



APPENDIX B4

Construction Soil and Water Quality Management Plan

Halfway Creek to Glenugie

Pacific Highway Upgrade

JUNE 2015



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Alistair Pagan



Martin Mulhearn



Steve Alford

CMC PM

CMC EM

RMS representative

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Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CMC	Civil Mining and Construction Pty Ltd
CoA	Condition of Approval
EPBC	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
DoE	Commonwealth Department of the Environment
DECC	Former Department of Environment and Climate Change (NSW) now NSW Office of Environment and Heritage.
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries (Fishing and Aquaculture)
EEC	Endangered Ecological Community
EIS	Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement (December, 2012)
EPA	NSW Environment Protection Authority
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPL	NSW Environment Protection Licence under the Protection of the Environment Operations Act 1997.
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
FM Act	NSW Fisheries Management Act 1994
G36	RMS QA Specification G36 Environmental Protection
G38	RMS QA Specification G36 Soil and Water Management
HC2G	Halfway Creek to Glenugie Project
Minister, the	NSW Minister for Planning
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage
PoEO Act	NSW Protection of the Environment Operations Act 1997
SEPP 14	State Environmental Planning Policy No 14 – Coastal Wetlands
RMS	New South Wales Roads and Maritime Service
SPiR	Woolgoolga to Ballina Pacific Highway Upgrade Submissions Preferred Infrastructure Report (November, 2013)

1 Introduction

1.1 Context

This Construction Soil and Water Quality Management Plan (CSWQMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the upgrade of the Pacific Highway from Halfway Creek to Glenugie (the Project). The Project is Section 2 of the Woolgoolga to Ballina (W2B) Pacific Highway upgrade project, approved by the Minister for Planning in June 2014

This CSWQMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA) and the mitigation measures listed in the Pacific Highway Upgrade Woolgoolga to Ballina Environmental Impact Statement RMS Dec 2012 (EIS), Submissions / Preferred Infrastructure Report (Nov 2013)(SPIR) and all applicable legislation.

The existing Glenugie Upgrade Project is to tie into the northern extent of the Project. The Glenugie Upgrade Project was approved separately by the Department of Planning and Environment in December 2009. Relevant conditions of approval for these projects have been referenced in the CEMP and plans as appropriate.

1.2 Background

The EIS assessed the impacts of construction and operation of the Project on soils and water, within Chapters 8 and 9.

As part of EIS development, detailed groundwater and water quality assessments were prepared to address the Environmental Assessment Requirements issued by the Department of Planning and Environment. These assessments were included in the EIS as Working Paper: Water Quality, Working Paper: Hydrology and Flooding and Working Paper: Groundwater.

The EIS identified the potential for direct and indirect impacts on water quality but concluded that, with implementation of appropriate impact mitigation measures, there would be no significant impacts to waterways crossed by the project, or to high risk areas or sensitive receiving environments downstream of the project.

Additional management measures were provided within the *Woolgoolga to Ballina Submissions / Preferred Infrastructure Report Nov 2013*, with applicable management measures from that report included as part of this CSWQMP.

1.3 Environmental management systems overview

The overall Environmental Management System for the Project is described in the Construction Environmental Management Plan (CEMP).

The CSWQMP is part of the CMC environmental management framework for the Project, as described in Section 4.1 of the CEMP. In accordance with CoA D26 (c), this Plan has been developed in consultation with EPA, DPI (Fisheries & Aquaculture NSW), NOW, and the Clarence Valley Council

Management measures identified in this Plan will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) and Erosion and Sediment Control Plans (ESCP).

EWMS will be developed and signed off by environment and management representatives prior to associated works and construction personnel will be required to undertake works in accordance with the identified safeguards. For high risk activities, such as construction of working platforms in waterways, EWMS will be provided to EPA, DPI Fisheries Conservation

and Aquaculture and NSW Office of Water for input prior to sign off (refer to Section 4.1.3 of the CEMP).

ESCP are designed for use as a practical guide and may be produced in conjunction with Environmental Work Method Statement (EWMS) to provide more detailed site-specific environmental mitigation measures. ESCP will be developed by the environment team in consultation with construction personnel and the Project Soil Conservationist, and modified as required when:

- Site conditions evolve.
- Flow paths change.
- Construction activities that affect the characteristics of ground conditions change.

Used together, the CEMP, strategies, procedures, EWMS and ESCP form management guides that clearly identify required environmental management actions for reference by CMC personnel and sub-contractors.

The review and document control processes for this Plan are described in Sections 9 and 10 of the CEMP.

2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how construction impacts on soil and water will be minimised and managed.

2.2 Objectives

The key objective of the CSWQMP is to ensure that impacts on water quality are minimised and within the scope permitted by the planning approval. To achieve this objective, CMC will undertake the following:

- Ensure best management practice controls and procedures are implemented during construction activities to avoid or minimise erosion/sedimentation impacts and potential impacts to water quality in rivers, creeks and groundwater along the Project corridor.
- Ensure appropriate measures are implemented to address the relevant CoA outlined in Table 3.1 and the safeguards detailed in the EIS and Submission / Preferred Infrastructure Report (SPIR).
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

2.3 Targets

The following targets have been established for the management of soil and water impacts during the project:

- Ensure full compliance with the relevant legislative requirements and CoA.
- Meet environment protection licence water quality discharge parameters for all planned basin discharges (ie those within design capacity).
- Manage downstream water quality impacts attributable to the project (ie maintain water waterway health by avoiding the introduction of nutrients, sediment and chemicals outside of that permitted by the environmental protection licence and/or ANZECC guidelines).
- Ensure training on best practice soil and water management is provided to all construction personnel through site inductions.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to soil and water management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- Environmental Planning and Assessment Regulation 2000.
- *Protection of the Environment Operations Act 1997*.
- *Water Management Act 2000*.
- *Fisheries Management Act 1994*.
- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.
- *Water Act 1912*.

Relevant provisions of the above legislation are explained in the register of legal and other requirements included in Appendix A1 of the CEMP.

3.1.2 Guidelines and standards

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

- Acid Sulfate Soil Manual (ASSMAC 1998).
- 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).
- Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section "Bu" November 1997.
- Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) March 2004 (reprinted 2006) (the "Blue Book"). Volume 1 and Volume 2.
- Volume 2A Installation of Services (DECCW 2008).
- Volume 2C Unsealed Roads (DECCW 2008).
- Volume 2D Main Roads Construction (DECCW 2008).
- DIPNR Roads and Salinity Guideline, 2003.
- DLWC, 1998. Constructed Wetlands Manual.
- Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries, Cronulla, 16 pp.
- *NSW Fisheries, November 2003. Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings* (Ref: NSWF – 1181).
- RMS Dewatering Guideline.
- RMS Pacific Highway Practice Note for Dewatering.
- RTA's Code of Practice for Water Management – Road Development and Management (1999).

- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW – March 2004.
- Guidelines for the Management of Acid Sulphate materials: Acid Sulphate Soils, Acid Sulphate Rock and Monosulphidic Black Ooze (RTA 2005).
- RMS Environment Direction Management of Tannins from Vegetation Mulch.
- Stockpile Site Management Guideline, RMS 2011.
- Environmental Best Management Practice Guideline for Concreting Contractors, DEC, 2004.
- Controlled Activities on Waterfront Land – Guidelines for instream works on waterfront land (Department of Primary Industries – Office of Water, July 2012); and
- Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013).

3.2 Minister’s Conditions of Approval

The CoA relevant to this Plan are listed Table 3-1. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-1 Conditions of Approval relevant to the CSWQMP

CoA No.	Condition Requirements	Document Reference
B34	Construction Soil and Water Management Soil and water management measures consistent with <i>Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition</i> (Landcom, 2004) and <i>Managing Urban Stormwater Soil and Construction Vols 2A and 2D Main Road Construction</i> (Department of Environment and Climate Change, 2008) shall be employed during the construction of the SSI to minimise soil erosion and the discharge of sediment and other pollutants to land and/or waters.	This plan Sect 6
B35	Where available, and of appropriate chemical and biological quality, stormwater, recycled water or other water sources shall be used in preference to potable water for construction activities, including concrete mixing and dust control.	This plan Table 6.1
B36	All surface water and groundwater shall be adequately treated as far as is practicable, prior to entering the stormwater system to protect the receiving water source quality.	This plan Table 6.1
B37	Prior to the commencement of site preparation and excavation activities, or as otherwise agreed by the Secretary, in areas identified as having a moderate to high risk of contamination, a site audit shall be carried out by a suitably accredited contaminated site auditor. A Site Audit Report is to be prepared by the site auditor detailing the outcomes of Phase 2 contamination investigations within these areas. The Site Audit Report shall detail, where	The RCA Factual Contamination Report (July 2014) has not identified any contaminated sites within the Section 2 project

CoA No.	Condition Requirements	Document Reference
	<p>relevant, whether the land is suitable (for the intended land use) or can be made suitable through remediation.</p> <p>Where the investigations identify that the site is suitable for the intended operations and that there is no need for a specific remediation strategy, measures to identify, handle and manage potential contaminated soils, materials and groundwater shall be identified in the Site Audit Report and incorporated into the Construction Environmental Management Plan. Where the investigations identify that the site is suitable for the intended operations and that a remediation strategy is required, the Site Audit Report shall include a remediation strategy for addressing the site contamination, and how the environmental and human health risks will be managed during the disturbance, remediation and/or removal of contaminated soil or groundwater, and be incorporated into the Construction Environmental Management Plan.</p> <p>Where remediation is required, a Site Audit Statement(s) shall be prepared verifying that the site has been remediated to a standard consistent with the intended land use.</p> <p><i>Note</i> <i>Terms used in this condition have the same meaning as in the Contaminated Land Management Act 1997.</i></p>	boundary
B38	<p>Watercourse crossings</p> <p>Watercourse crossings shall be designed in consultation with the DPI (Fisheries NSW), EPA, NOW and DoE, and where feasible and reasonable, be consistent with the <i>Guidelines for Controlled Activities Watercourse Crossings</i> (Department of Water and Energy, February 2008), <i>Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings</i> (Fairfull and Witheridge, 2003), <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (NSW Fisheries, February 2004), and <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (DPI Fisheries, 2013). Where multiple cell culverts are proposed for crossings of fish habitat streams, at least one cell shall be provided for fish passage, with an invert or bed level that mimics watercourse flows.</p>	This plan Table 6.1
B39	<p>All crossings of known Giant Barred Frog habitat or waterways with the confirmed presence of the species shall be designed and constructed with bridges. Should the Applicant construct a crossing structure other than a bridge, the Applicant shall demonstrate maintained connectivity for the Giant Barred Frog upstream and downstream of that crossing for a monitoring period of three consecutive years, or such other period agreed by the Secretary in consultation with the OEH.</p>	This plan

CoA No.	Condition Requirements	Document Reference
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Demonstration of maintained habitat connectivity shall:

- (a) be based on baseline data that confirms the presence, nature and distribution of Giant Barred Frog population using a survey methodology that has been endorsed by the OEH, and detailed in the Mitigation Framework required in condition D1 **Error! Reference source not found.**, and an assessment of the connectivity of the crossing site prior to commencement; or, if adequate baseline data is not provided to the satisfaction of the Secretary, be based on the assumption of occurrence of a population on either side of the crossing site; and
- (b) be based on evidence that the Giant Barred Frog has remained present upstream and downstream of the crossing site for the monitoring period, with periodic monitoring to occur at least biannually. Should the results of any instance of periodic monitoring record an absence of the Giant Barred Frog, the Applicant shall be required to demonstrate that this change is not as a result of the SSI within one month of the completion of that instance of periodic monitoring, to the satisfaction of the Secretary. Should the Secretary not be satisfied that the change is not a result of the SSI, the SSI will be deemed as the cause of the impact and the Applicant shall offset the loss of the habitat in accordance with this approval.

D12	<p>The Applicant shall prepare and implement a Water Quality Monitoring Program, to monitor the construction and operation impacts of the SSI on surface and groundwater quality and resources and wetlands, prior to construction. The Program shall be prepared in consultation with the OEH, EPA, DPI (Fisheries), NOW, DoE and Rous Water (in relation to the Woodburn borefields), to the satisfaction of the Secretary, and shall include but not necessarily be limited to:</p> <ul style="list-style-type: none"> (a) identification of surface and groundwater quality monitoring locations (including watercourses, waterbodies and SEPP14 wetlands) which are representative of the potential extent of impacts from the SSI; (b) the results of any groundwater modelling undertaken; (c) identification of works and activities during construction and operation of the SSI, including emergencies and spill events, that have the potential to impact on surface water quality of 	Appendix A
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CoA No.	Condition Requirements	Document Reference
	<p>potentially affected waterways and known Oxleyan Pygmy Perch habitat;</p> <p>(d) development and presentation of parameters and standards against which any changes to water quality will be assessed, having regard to the <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000</i> (Australian and New Zealand Environment Conservation Council, 2000) or relevant baseline data;</p> <p>(e) representative background monitoring of surface and groundwater quality parameters for a minimum of twelve months (considering seasonality) prior to the commencement of construction, to establish baseline water conditions, unless otherwise agreed by the Secretary;</p> <p>(f) a minimum monitoring period of three years following the completion of construction or until the affected waterways and/or groundwater resources are certified by an independent expert as being rehabilitated to an acceptable condition. The monitoring shall also confirm the establishment of operational water control measures (such as sedimentation basins and vegetation swales);</p> <p>(g) contingency and ameliorative measures in the event that adverse impacts to water quality are identified; and</p> <p>(h) reporting of the monitoring results to Department of Planning and Environment, OEH, EPA, DPI (Fisheries), NOW, DoE and Rous Water (in relation to the Woodburn borefields).</p>	
D26 (c)	<p>a Construction Soil and Water Quality Management Plan to manage surface and groundwater impacts during construction of the SSI. The Plan shall be developed in consultation with the EPA, DPI (Fisheries), NOW, Rous Water (in relation to the Woodburn borefield), DoE and the relevant council and include, but not necessarily be limited to:</p> <p>(i) details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater;</p> <p>(ii) surface water and ground water impact assessment criteria consistent with Australian and New Zealand Environment Conservation Council (ANZECC) guidelines or relevant site specific baseline data collected for known Oxleyan Pygmy Perch waterways;</p>	<p>This plan (Note that OPP habitat waterway management framework is not relevant to this plan) Chapter 5.2</p> <p>N/A</p> <p>Table 6.1,</p>

CoA No.	Condition Requirements	Document Reference
	(iii) management measures to be used to minimise surface and groundwater impacts, including details of how spoil and fill material required by the SSI will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;	Appendix B, H, I
	(iv) a Groundwater and Soil Salinity report should geotechnical investigations determine the presence, extent and severity of soil salinity within the SSI boundary, The report shall detail the outcomes of geotechnical investigations and identify and mitigate impacts to groundwater resources;	
	(v) an Acid Sulfate Soils contingency plan , consistent with the <i>Acid Sulfate Soils Manual</i> , to deal with the unexpected discovery of actual or potential acid sulfate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;	CEMP Appendix B11
	(vi) a tannin leachate management protocol to manage the stockpiling of mulch and use of cleared vegetation and mulch filters for erosion and sediment control;	Appendix D
	(vii) an Oxleyan Pygmy Perch habitat waterway management framework to detail the measures and construction methods that will be employed to avoid direct discharge of construction water to known Oxleyan Pygmy Perch habitat waterways and downstream impacts to suitable habitat;	
	(viii) management measures for contaminated material and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material during construction;	Appendix F
	(ix) a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified; and mechanisms for the monitoring, review and amendment of this plan.	Section 7.3

CoA No.	Condition Requirements	Document Reference
2.5 (Glenugie Upgrade approval 2009)	The Proponent shall apply all appropriate measures to prevent soil erosion and the discharge of sediments and pollutants from the project during construction and operation consistent with <i>Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition</i> (Landcom, 2004) and <i>Managing Urban Stormwater Soils And Construction Vol2d Main Road Construction</i> (DECC 2008).	This plan
2.6 (Glenugie Upgrade approval 2009)	Where available and of appropriate chemical and biological quality, the Proponent shall use stormwater, recycled water or other water sources in preference to potable water for construction activities, including concrete mixing and dust control.	This plan
2.7 (Glenugie Upgrade approval 2009)	<p>Prior to the commencement of construction of the project, or relevant parts of the project, the Proponent shall undertake detailed design of the construction and permanent stormwater, drainage and water management systems for the project in consultation with Council, DECCW and I&INSW, to the satisfaction of the Director General. The detailed design of this infrastructure shall be developed to:</p> <ul style="list-style-type: none"> (a) take into account relevant Council stormwater management policies and integration with existing Council drainage infrastructure where relevant; (b) include measures to minimise changes to afflux and flooding behaviour as a result of the project; and (c) ensure structural integrity of the drainage network is maintained. 	This plan

4 Existing environment

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

The key reference documents are Chapters 8 and 9 of the EIS, Working Paper: Water Quality, Working Paper: Hydrology and Flooding and Working Paper: Groundwater.

4.1 Topography and soil characteristics

The topography throughout the project comprises elevated areas consisting of rolling low hills and undulating terrain between Halfway Creek and Glenugie. The southern portion of the project starts at an elevation of 88 metres AHD at Lemon Tree Road, and drops to 66 metres AHD at Halfway Creek to the north. A rise in elevation then occurs heading further north, up to 109 metres AHD at Bald Nob Tick Gate Road, prior to dropping back down to 85 metres AHD where the northern extent of the project meets the existing Glenugie Upgrade alignment. No published soil landscape mapping is available for the project, however it is likely that the soil types are erosional or transferal and are highly erodible and have low bearing strength. Soft soils are reported to occur between the Dirty Creek Range and Halfway Creek.

Topography and soils for each project section are also outlined in Table 4-1.

Table 4-1 Topography and soils

Section	Topography	Soil type	Soil characteristics
2	Elevated	No published soil landscape map is available for this section.	Assumed to be highly erodible. Reported presence of soft soils.

Acid Sulfate Soils

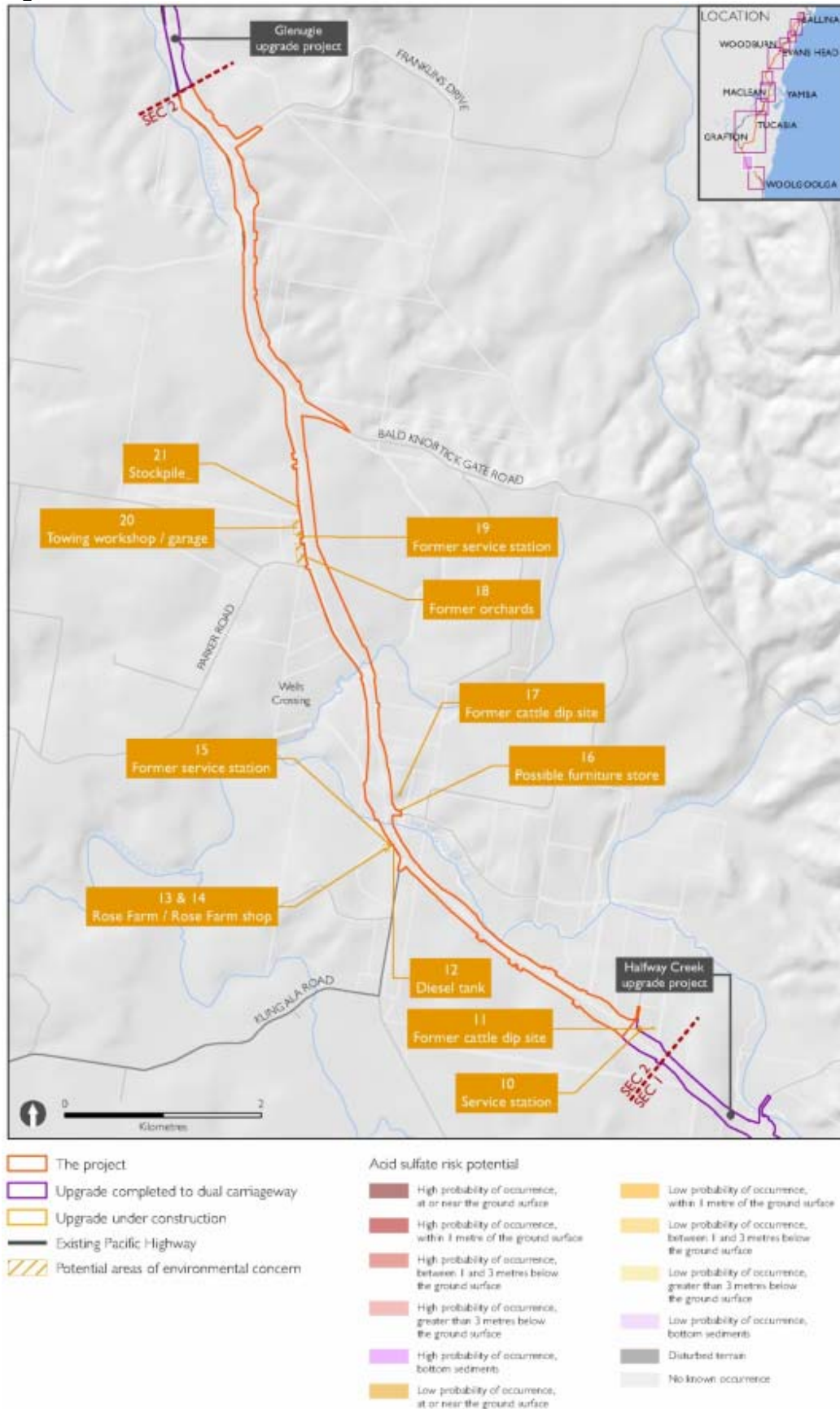
There are no known occurrences of ASS within the project corridor, as it is located on elevated terrain where ASS are not expected. ASS mapping for the project is shown in Figure 4-1

Contamination

EIS investigations identified 12 adjacent sites containing potential contamination associated with past land uses, including service stations, orchards, workshops, cattle dip sites, fuel tank, and stockpiles. Contaminants associated with these sites include hydrocarbons, heavy metals, pesticides, arsenic, PCBs, solvents, asbestos, and VOCs.

Potential contamination sites directly adjacent to the project corridor are shown in Figure 4-1. The EIS required that soil contamination would be addressed through further studies prior to construction with appropriate mitigation and management measures identified. Appropriate mitigation measures in relation to contamination are included in Section 6.

Figure 4-1 Potential ASS and Contamination



4.2 Surface water

The project crosses a number of waterways, which are typical of lowland freshwater systems. These are listed in Table 4-2.

There are no sensitive receiving environments located in the vicinity of the project, such as SEPP 14 wetlands, key fish habitat, or threatened species habitat.

Existing water quality monitoring data for waterways within each section was reviewed as part of the EIS. The existing water quality data indicate that the majority of the waterways potentially impacted by the project have a history of water quality problems, with conditions commonly found to be below the standard required for protection of aquatic ecosystems. The occurrence of poor water quality can be attributed to a number of factors, including modification of channel structure, macrophyte growth and soil erosion.

The pre-construction water quality data shows natural variability. Factors such as rainfall intensity during a storm event and the number of dry days preceding a wet event, can affect the magnitude of results, however no discernible trend was exhibited in the results.

Table 4.3 summarises the pre-construction phase monitoring results with respect to visual observations and a general summary of the water quality sampling results for each monitoring site Figure 4.3.

The data is considered suitable for use as a baseline data set for comparison with construction and operational phase data. (Geo-Link 2014)

Table 4-2 Watercourses, wetlands and water quality

Section	Waterways	Summary of water quality
2	<ul style="list-style-type: none"> • Halfway Creek • Wells Crossing Creek • Glenugie Creek 	<p>Samples from Glenugie Creek in 2007 indicated that dry weather water quality failed to meet the ANZECC/ ARMCANZ guidelines. At the time of sampling, the waterway was affected by low flows and excessive macrophyte growth, which would have contributed to low dissolved oxygen levels. Water quality was substantially higher during wet weather, complying with ANZECC/ ARMCANZ guidelines for all water quality indicators measured.</p> <p>Water quality in Halfway Creek was relatively good but was affected by soil and stream bank erosion, at least partially attributable to the poor design of existing creek crossings.</p>

Table 4-3 Water quality summary (Geo-Link 2014)

Site Identifier/ Waterway	Summary of Visual Observations	Overview of Water Quality Sampling Results
SW09 Halfway Creek Section 2 Ch. 20700	<p>No flow evident, light to dark brown water colour</p> <ul style="list-style-type: none"> • Width of approximately 2.5 m and depth of approximately 40 cm at monitoring site • Water surface occasionally had a light film of dust and/or leaf litter • Southern creek bank was sandy 	<ul style="list-style-type: none"> • pH: 6 – 6.9 • Temp: 11 - 21°C • EC: 0.13 – 0.3mS/cm • DO: 0.5 – 11mg/L • NTU: 4 – 11mg/L for dry weather and 25 – 38mg/L for wet weather • TSS: 0 – 10.5mg/L for dry weather and 11 – 21mg/L for wet

	at the monitoring site, with significant erosion present on both the southern and northern banks of the creek	<p>weather</p> <ul style="list-style-type: none"> • O&G: 1mg/L with some outliers • TP: 0.01 – 0.04mg/L for dry weather and 0.02 – 0.04mg/L for wet weather • TN: 0.1 – 0.7mg/L
SW10 Wells Crossing Section 2 Ch. 22400	<ul style="list-style-type: none"> • No flow evident, often relatively clear water colour varying to dark brown • Average width of approximately 5 m (varying between 12 m during high rainfall events, and 2 m during the driest months of the monitoring period) • Stream bed and banks are dominated by reeds and riparian vegetation • Water surface generally free of dust and leaf litter despite over hanging vegetation and the nearby road. 	<ul style="list-style-type: none"> • pH: 4.52 – 6.1 • Temp: 13 – 25.4°C • EC: 0.1 – 0.4mS/cm • DO: 1.8 – 6mg/L with some outliers • NTU: 1 – 10mg/L with some outliers for • dry weather and 5 – 25mg/L with some outliers for wet weather • TSS: 0 – 20mg/L with some outliers • O&G: 1 – 3.1mg/L with some outliers • TP: 0.02 – 0.06 with some outliers • TN: 0.3 – 0.8mg/L with some outliers
SW11 Glenugie Creek Section 2 Ch. 29300	<ul style="list-style-type: none"> • No flow evident, light to dark brown water colour • Width of approximately 2 m with water in the stream “pooling” in several locations (including the monitoring site) • Water surface occasionally covered in a light film and some leaf litter • Heavily vegetated stream banks comprising riparian vegetation. 	<ul style="list-style-type: none"> • Temp: 13 – 23.5°C • EC: 0.25 – 0.5mS/cm for dry weather and 0.15 – 0.2mS/cm for wet weather • DO: 1 – 2.8mg/L with some outliers • NTU: 0 – 100mg/L with some outliers • TSS: 0 – 38mg/L with some outliers • O&G: 1 – 2mg/L with some outliers • TP: 0.02 – 0.03 with some outliers • TN: 0.2 – 0.3mg/L with some outliers

Construction surface water quality monitoring

The water quality monitoring program to be implemented during and following construction is provided as Appendix A.

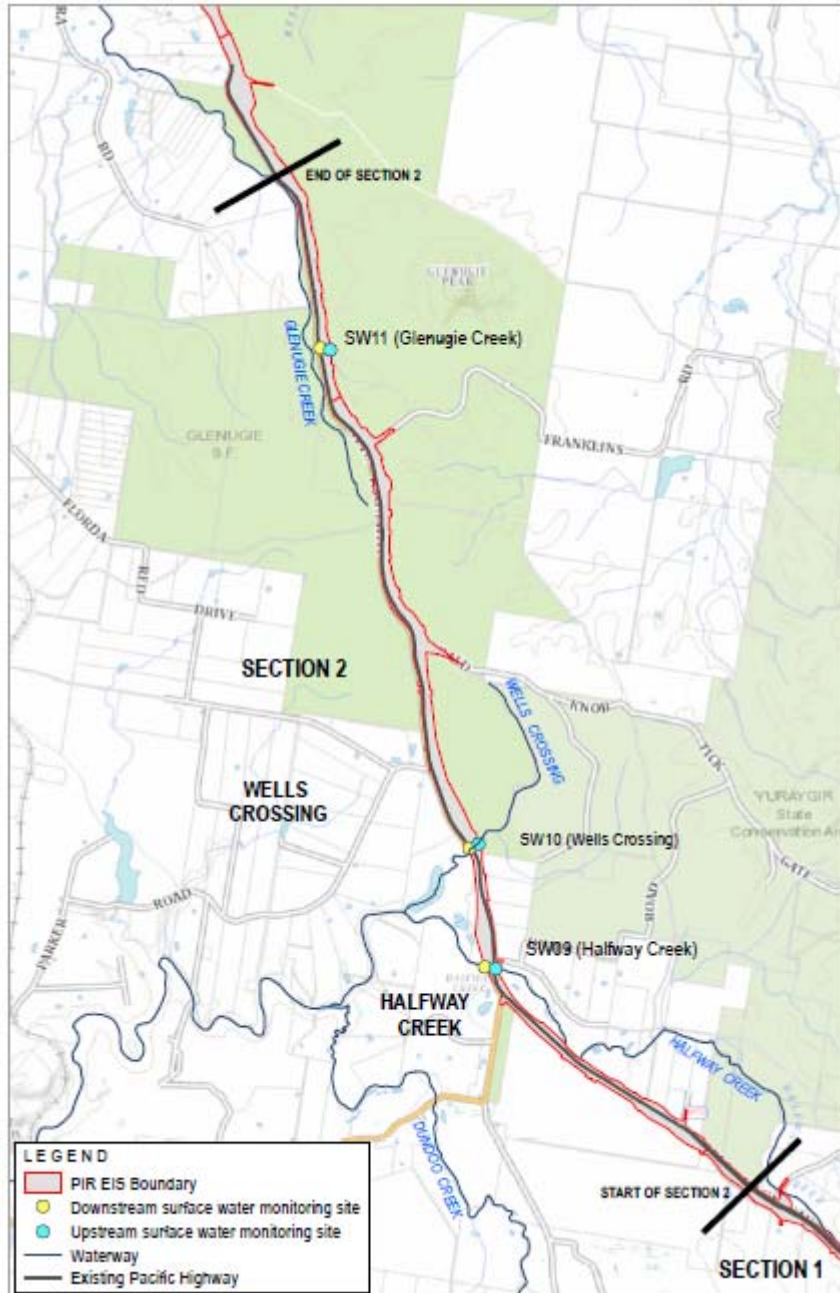
The paired (upstream and downstream) sites to be monitored are identified in Table 4.4 and Figure 4-2.

Table 4-4 Monitoring Locations

Waterway	Identifier	Chainage	Sensitive Receiver
Halfway Creek	SW9	20700	Fish habitat
Wells Crossing	SW10	22400	Fish Habitat
Glenugie Creek	SW11	29300	Fish Habitat

Halfway Creek to Glenugie

Figure 4-2 Surface water monitoring locations (Geo-Link 2014)



4.3 Groundwater

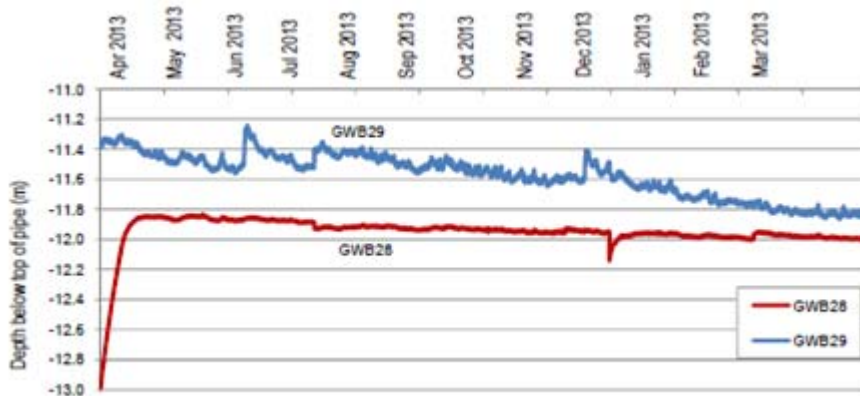
The project alignment runs through elevated areas, with shallower water tables within 5 metres of the surface in the southern portion, and becoming deeper to 50 metres in the north as elevation rises. There is low potential for impacts to occur to groundwater levels during construction in the southern portion, reducing to minimal potential in the north as the topography rises. Figure 4-3 details the groundwater depth adjacent to the deepest cut in Section 2 which is approximately 9 metres.

The depth of the earthworks at the three ground water monitoring locations is:

- GW 24 and 25 at Chainage 21650 cut depth is 3.5 metres and groundwater depth ranges from 10.7 metres to 12.7 metres.
- GW 28 and 29 at Chainage 26800 cut depth is 7 metres and groundwater depth ranges from 11.3 metres to 13.0 metres.
- GW 30 and 31 at Chainage 27200 cut depth is 9 metres and groundwater depth ranges from 13.0 metres to 14.5 metres.

Therefore no significant impacts to groundwater or water course related Groundwater Dependent Ecosystems (GDEs) is anticipated.

Figure 4-3 Groundwater depth at shallowest location (Geo-Link 2014)



Construction ground water quality monitoring

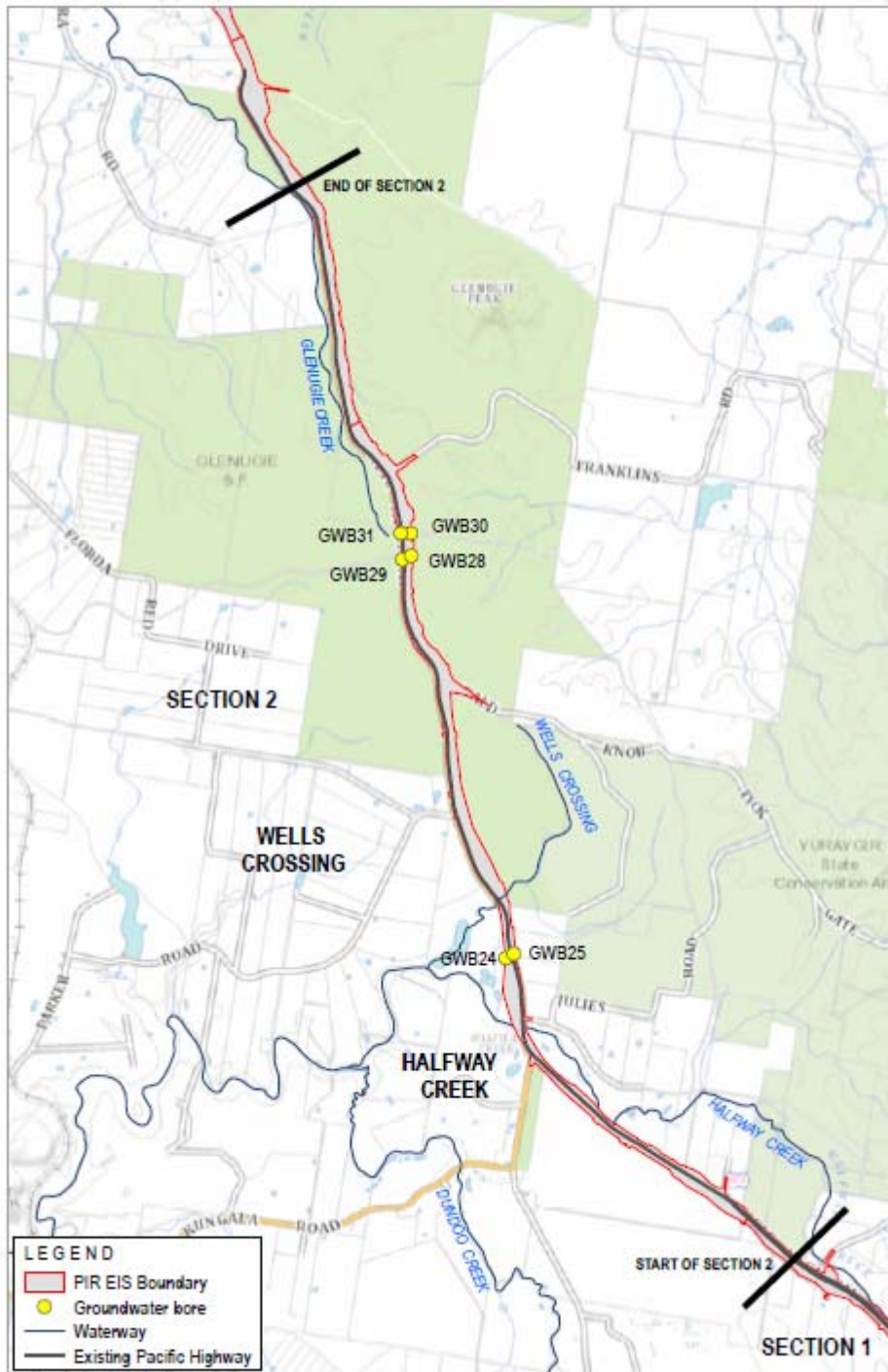
The water quality monitoring program to be implemented during and following construction is provided as Appendix A.

Groundwater monitoring is to occur at six locations as identified in Water Quality Monitoring Program these are detailed in Table 4.5 and Figure 4-4.

Table 4-5 Groundwater monitoring

Borehole Identifier	Chainage	General Location	Cut Type	Monitoring for	
				Level	Quality
GWB24	21600		B	Yes	-
GWB25	21660			Yes	-
GWB28	26860		A	Yes	-
GWB29	26880			Yes	-
GWB30	27120		A	Yes	Yes
GWB31	27130			Yes	Yes

Figure 4-4 Groundwater monitoring locations (Geo-Link 2014)



4.4 Rainfall

The rainfall records from Grafton have been selected to reflect the potential rainfall conditions across the Project site due to its location within the overall site, and extent of available data (from 1886 to present). A summary of the rainfall records from the Bureau of Meteorology is provided in Table 4-6.

Figure 4-5 Monthly Rainfall

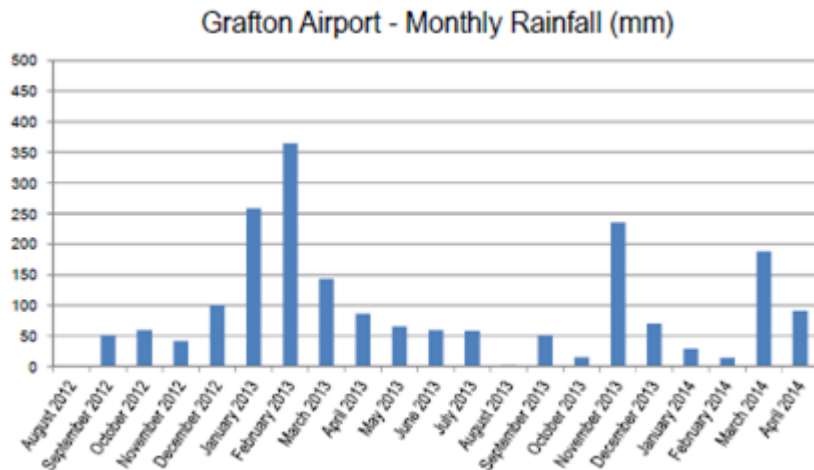


Table 4-6 Summary of rainfall records

Summary of rainfall record from 1888 to present													
	Summer / Autumn					Winter / Spring							
	Dec	Jan	Feb	Mar	Apr	Ma	Jun	July	Aug	Sep	Oct	Nov	Year
Mean rainfall (mm)	119.3	143.7	150.8	129.4	88.4	79.5	69.2	38.1	40.9	37.7	77.9	106.1	1080.0
Mean rain days	10.0	10.6	10.9	11.2	8.0	7.5	5.8	4.6	4.3	5.2	7.3	9.4	94.8
Mean dry days	6.3	6.3	4.2	7.0	9.0	10.2	11.5	13.9	15.5	14.0	9.4	7.9	115.2
Mean wind speed (km/h)	6.2	5.8	5.7	6.1	6.8	5.9	6.0	5.7	7.2	7.3	7.8	6.6	6.4
Mean maximum temp (OC)	29.6	30.1	29.3	28.2	26.2	23.1	20.8	20.5	22.2	24.9	26.7	28.1	25.8
Mean minimum temp (OC)	18.4	19.7	19.7	18.0	14.9	11.2	8.1	6.4	7.2	10.4	13.7	16.3	13.7

Rainfall is typically higher during summer and autumn. Winter and spring are typically drier periods during the year.

4.5 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 Equation 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 Project has a Rainfall Erosivity Factor ranging from 3720 in the northern section to 4030 towards the southern section.

4.6 Flooding

The project is located in the Northern Rivers catchment management area, and is located in an elevated position in the landscape, outside of floodplain areas. The project intersects the watercourses of Halfway Creek, Wells Crossing Creek and a number of small unnamed drainage lines.

Chapter 8.3 of the EIS includes an assessment of construction impacts in relation to hydrology and flooding, including ancillary sites. As the project is situated in an elevated position outside of the floodplain, and the W2B EIS determined that construction and operation of this section of the road alignment would not result in any significant flooding or hydrological impacts to surrounding properties.

5 Environmental aspects and impacts

5.1 Construction activities

Key aspects of the Project that could result in adverse impacts to soils and water include:

- Vegetation clearing and topsoil stripping.
- Mulching of vegetation
- Bulk earthworks.
- Cuts and fills
- Site access including temporary waterway crossings.
- Culvert and drainage works.
- Bridge construction.
- Material stockpiles including the treatment of acid sulphate soil and rock.
- Batch plant operation.
- Paving activities.
- Water use / extraction.
- Compounds operation including fuel and chemical storage, refuelling and chemical handling.
- Noxious weed treatment including herbicide spraying.

Refer also to the Aspects and Impacts Register included in Appendix A2 of the CEMP.

5.2 Potential Impacts

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:

- Exposure of soils during vegetation clearing and earthworks, creating the potential for off-site transport of eroded sediments and pollutants.
- Sensitive area damage from inappropriate stockpiling activities.
- Production of tannins from mulch during clearing.
- Disturbance of acid sulphate soils, creating the potential for oxidation of these soils and subsequent generation of acidic run-off.
- Alteration of surface and subsurface flows that could cause disturbances to hydrology and hydraulics.
- Intercepting with cuts perched water tables or layers of relatively low permeability soil/rock that support surrounding ecosystems and groundwater sensitive areas.
- A reduction in groundwater levels and flows, and off-site discharge of water containing sediment from dewatering activities.
- Interception and interference with an aquifer that could obstruct groundwater flow and limit groundwater availability.

- Contamination of soils, and surface and groundwater from accidental spills or oil leaks. This might include grease or fuel from machinery and vehicles, construction sites or compounds, or spills of other chemicals that may be used during the course of construction.
- Disturbance of unidentified contaminated land eg former cattle tick dip sites, or other pesticide/chemical concentrations in soil from historical land use practices, and subsequent generation of contaminated runoff.

The risk assessment conducted for the project indicates that there is a high risk of impact to soil and water. Relevant aspects and the potential for related impacts have been considered in a risk assessment at Section 3.4 and Appendix A2 of the CEMP. Chapter 6 provides a suite of mitigation measures that will be implemented to avoid or minimise those impacts.

6 Environmental control measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the EIS, supplementary assessments, Conditions of Approval and RMS documents, and from recent experience on similar road projects. Specific measures and requirements to address impacts on soil and water are outlined in Table 6-1.

Table 6-1 Soil and water management and mitigation measures

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
GENERAL					
SW1	Training will be provided to all project personnel, including relevant sub-contractors on sound erosion and sediment control practices and the requirements from this plan through inductions, toolboxes and targeted training.	Training package	Pre-construction / Construction	Construction Manager / Environment Manager	G38/G36, Good practice
SW2	A Project Soil Conservationist will be engaged during detailed design to develop an erosion and sedimentation management report to inform the soils and water management plan and will be regularly consulted throughout construction to provide advice on erosion and sediment control design, installation and maintenance.	Management staff	Pre-construction / Construction	Environment Manager	G38, Good practice, Submissions / PIR (SSW5)
SW3	An environmental protection licence (EPL) will be obtained for the Project. All relevant conditions relating to soil and water management will be implemented as required by the licence.	Management staff	Construction / Post construction	Construction Manager	POEO Act 1997
PROCEDURES AND PLANS					
SW4	Erosion and Sediment Control Plans (ESCPs) will be prepared and implemented in advance of construction, including earthworks and stockpiling. ESCPs and will be updated as required.	Soil conservationist	Pre-construction / Construction	Environment Officer / Supervisor	Managing Urban Stormwater: Soils and Construction Volume 1 and Volume 2D, EIS (SSW4)
SW5	The following EWMS will be prepared and implemented to manage soil and water impacts. EWMS for activities identified as having high environmental risk will undergo a period of consultation with EPA, the Office of Water, and DPI (Fisheries and Aquaculture). Those marked with an asterisk below are those likely to be subject to consultation: <ul style="list-style-type: none"> • Activities that impact on environmentally sensitive areas* • Working platforms in or adjacent to waterways* • Sediment basin construction and maintenance* • Concreting activities 	Field & management staff	Construction	Superintendent / Environment Manager	G36 and G40

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<ul style="list-style-type: none"> • Batch plant operation* • Management of Acid Sulfate Materials* • Dewatering* • Managing tannin leachate* • Vegetation clearing and grubbing* • Topsoil stripping* 				
SW6	Any ASS or PASS disturbed during the construction process will be managed in accordance with RMS Acid Sulfate Soil Management Procedure (incorporating an Acid Sulfate Soils contingency plan as required under CoA D26(c)v) attached at Appendix C.	Field & management staff	Pre-construction / Construction	Superintendent / Environment Manager	Submissions / PIR (SSW25) CoA D26(c) v
SW7	The requirements of the spoil and fill management procedure attached at Appendix B will be implemented throughout construction. The plan includes, among other detail, the types of material expected to be encountered during construction, and how excavated material will be handled, transported, stockpiled, reused and disposed.	Field & management staff	Construction	Superintendent / Supervisor	CoA D25(d)ix
SW8	<p>Dewatering will be undertaken and managed in accordance with the Pacific Highway Projects Dewatering Guidelines attached at Appendix G. A specific EWMS for dewatering will be prepared and will consider and/or incorporate the following detail:</p> <ul style="list-style-type: none"> • Areas of the site that will require dewatering. • Dewatering methods that will minimise potential environmental impacts. • Opportunities for reuse. • The limitations for any proposed reuse methods. • Discharge locations and adequate energy dissipation. • Water quality criteria for discharge and/or reuse. • Treatment techniques required to meet the water quality criteria. • Water sampling and testing requirements. 	Field & management staff	Construction	Superintendent / Environment Manager	G38 (Section3.5)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
SOIL EROSION AND SEDIMENTATION CONTROL					
SW9	<p>Appropriate erosion and sediment controls, following the guidelines of the 'Blue Books' (Landcom, 2004 and DECC, 2008), will be established before the start of construction and maintained in effective working order for the duration of the construction period until site stabilisation. Specific controls will include:</p> <ul style="list-style-type: none"> • Sediment fences and filters to intercept and filter small volumes of non-concentrated construction runoff • Rock check dams across swales and diversion channels to reduce the velocity of flow, thereby reducing erosion of the channel bed and trapping sediment • Level spreaders to convert erosive, concentrated flow into sheet flow • Diversion drains that collect construction runoff and direct it away from unstable and/or exposed soil to treatment facilities • Diversion drains to collect clean runoff from upstream of the construction area and divert it around or through the site without it mixing with construction runoff • Lining of channels and other concentrated flow paths • Sedimentation basins to capture sediment and associated pollutants in construction runoff (see further details below) <p>Specific measures and procedures for works within waterways, such as the use of silt barriers and temporary creek diversions, in accordance with RMS' Technical Guideline – Temporary Stormwater Drainage for Main Road Construction (RMS, 2011).</p>	Field & management staff	Construction	Superintendent / Supervisor / Environment Manager	CoA B34 Submissions / PIR (SSW26) / EPL/ POEO Act
SW10	Erosion and sediment control plans will be developed in line with current Roads and Maritime specifications and as detailed in the Working paper – Water quality.	Soil conservationist	Pre-construction and construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW4)
SW11	Sedimentation basins and water quality ponds will be sized and located in accordance with the principles identified in the	Soil conservationist	Pre-construction	Environment Manager /	Submissions / PIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	Working paper – Water quality.		and construction	Superintendent / Supervisor	(SSW6)
SW12	Exposed areas will be progressively rehabilitated. Methods will include permanent revegetation, or temporary protection with spray mulching or cover crops.	Revegetation equipment	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW7)
SW13	Any necessary approvals will be obtained in accordance with Roads and Maritime specification G36 for permanent and temporary waterway crossings.	Soil conservationist	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW8)
SW14	Sensitive receiving environments will be reconsidered during detailed design to include any threatened ecological communities and non- aquatic species and their habitats that may be affected by the project. Appropriate management measures will be implemented, if required.	Sensitive area plan	Pre-construction	Environment Manager / Design Manager	EIS (SSW34)
SW15	The design and construction of works within riparian corridors and within the minimum required distance from waterways will be undertaken in accordance with NSW Office of Water guidelines for working within riparian corridors.	Field & management staff	Pre-construction / Construction	Superintendent / Supervisor / Environment Manager	EIS (SSW36)
SW16	Flow discharge points will be designed with erosion controls to slow the flow velocities.	Soil conservationist	Pre-construction	Design Manager	EIS (SSW37)
SW17	In steep areas, the length between sediment fences and other physical controls will be decreased to reduce soil erosion.	N/A	Construction	Superintendent / Supervisor	EIS (SSW38)
SW18	Construction sequencing and temporary diversions of water will be developed and designed to consider the impact of change on flow regimes and to minimise these changes throughout construction.	Soil conservationist	Pre-construction / Construction	Superintendent / Supervisor	EIS (SSW39)
SW19	Works will be programmed to minimise the extent and duration of disturbance to vegetation. This will include leaving clearing (undertaken by manual means) and initial earthworks in intermittent and permanent watercourses until subsequent works are about to commence.	Field management staff &	Pre-construction / Construction	Superintendent / Supervisor	G38
SW20	Wastewater or “dirty” water generated during the construction process will, wherever possible, be collected, treated and	Field & management staff	Construction	Superintendent / Supervisor	G38 / EPL / POEO Act

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	disposed of by appropriate means, including the installation of sediment barriers downslope of all disturbed areas. In areas where it is not possible to direct dirty water to sediment basins, other sediment controls will be implemented in accordance with "Blue book" best practice.				
SW21	Clean and dirty water runoff will be adequately separated to avoid mixing where possible through the use of diversions, clean water drains, and the early installation of permanent drainage infrastructure.	Field & management staff	Construction	Superintendent / Supervisor	G38
SW22	Active work areas will be stabilised at the end of each day's work and/or just prior to inclement weather, by means such as grading or smooth drum rolling to create a smooth surface and by installing of temporary "catch" drains to prevent / minimise transport of sediment.	Field & management staff	Construction	Superintendent / Supervisor	G38
SW23	Catch drains; contour and diversion drains across exposed areas will be installed immediately following clearing, and re-established and maintained during topsoil removal and earthwork operations.	Field & management staff	Construction	Superintendent / Supervisor	G38
SW45	Hardstand material, rumble grids or similar will be provided at exit points from construction areas onto public roads to minimise the tracking of soil and particulates onto public roads.	Field & management staff	Pre-construction / Construction	Superintendent / Supervisor	G38
SW25	Vehicle movements from site will be minimised during wet weather if the tracking of mud may become an issue.	Field & management staff	Pre-construction / Construction	Superintendent / Supervisor	Good practice
SW26	Loose rock, soil, debris etc. will be removed from road surfaces (including sweeping of the road) at the end of each work shift.	Field & management staff	Pre-construction / Construction	Superintendent / Supervisor	G38
SW27	All required sediment basins and associated drainage will be installed and commissioned prior to the commencement of clearing and grubbing works in that catchment that could cause sediment to leave site. (Except where clearing is required for basin installation).	Field & management staff	Construction	Superintendent / Supervisor	G38, Good practice
SW28	Sediment basins will be operated and maintained in accordance with the Sediment Basin Management and Discharge Procedure and Water Quality Monitoring Program		Construction	Superintendent / Supervisor	Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	contained in Appendix H and Appendix A, respectively. Basins will not be discharged until all monitoring and water quality criteria has been verified and documented.				
SW29	Works within waterways will consider the need to maintain fish passage, in consultation with the Department of Primary Industries (Fisheries).	Management staff, DPI Fisheries	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW27)
SSW30	Flow discharge points will be designed with erosion controls to manage the flow velocities.	Soil conservationist	Pre-construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW28)
DESIGN OF CUT AND FILL BATTERS					
SW31	Batter slope gradients will be designed to minimise erosion of select topsoil.	Field & management staff	Pre-construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW1)
SW32	Where feasible, bench cuttings will be diverted onto contours and surface flow drainage paths designed to spread flow at the source in preference to concentrating the flow and treating it further downstream.	Field & management staff	Pre-construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW2)
CONSTRUCTION SEDIMENT BASINS					
SW33	Where appropriate, construction phase sedimentations basins will be designed so they could be retained and used as permanent operational water quality ponds, where required for operational purposes.	Soil conservationist	Pre-construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW29)
SW34	Sedimentation basins will be inspected at regular intervals and following significant rainfall events to assess available water storage capacity, water quality, structural integrity and debris levels.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW31)
SW35	Where appropriate, an approved flocculent will be applied to sedimentation basins as early as possible so that early mixing of flocculants occurs. Water quality in the sediment basin will be tested prior to discharge in accordance with any licence requirements and the receiving waters quality criteria as	Testing regime	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW32)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	defined in the RMS Dewatering Practice Note and detailed in the surface water quality results in the EIS..				
SW36	Where sediment has built up in a basin to a point where the total sediment storage zone has reached capacity, sediment will be removed and appropriately disposed of in accordance with the Construction Waste and Energy Management Plan, Appendix B7.	Field management staff &	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW33)
SW37	Water from sedimentation basins will be used for construction purposes, such as dust suppression, where feasible.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW34)
SW38	When sedimentation basins require pumping out rather than discharge via a flow outlet, a float will be attached to the suction hose or the hose will be located inside a bucket to prevent sediment from the basin floor from being discharged.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW35)
SW39	Records will be kept of water quality monitoring and erosion and sediment control inspections, including details of rain events, use of flocculants, discharge, sediment removal and dewatering activities.	Environment manager	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW36)
ANCILLARY FACILITY AND STOCKPILE MANAGEMENT					
SW40	Stockpiles and ancillary facilities will be located to minimise erosion and in accordance with the criteria outlined in Appendix A3 of the CEMP and Appendix I of this plan.	Field & management staff	Pre-construction / Construction	Superintendent / Supervisor / Environment Manager	CoA D21, CoA D25(d)ix, G38, Submissions / PIR (SSW11 – SSW13)
SW41	Measures to be implemented to minimise impacts to surface and ground water quality include: <ul style="list-style-type: none"> • Impervious bunded, and covered storage facilities for fuels and chemicals • Bunded areas for refuelling and washdown 	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW37)
SW42	At ancillary facilities, management of runoff and spills will include:	Field & management staff	Construction	Environment Manager /	Submissions / PIR (SSW38)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<ul style="list-style-type: none"> Restricting vehicle movements to designated pathways where feasible. Paving areas that will be exposed for extended periods, such as car parks and main access roads, where reasonable and feasible. Diverting off-site runoff around sites where required. Locating chemical or other hazardous material storage areas away from areas of known near-surface groundwater supplies, in areas where the water table is more than five metres below the surface; otherwise, areas be lined if they are to be located over a shallow groundwater source less than two metres deep. 			Superintendent / Supervisor	
SW43	Soil and water management at borrow source sites will be in line with Volume 2E of the Blue Book which covers water management of mines and quarries.	Soil conservationist	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW39)
SW44	Topsoil, earthworks and other excess spoil material will be stockpiled and managed in accordance with the Stockpile Management Protocol, Appendix I, Roads and Maritime Stockpile Management Guidelines (Roads and Maritime, 2011a) and the "Management of Surplus Material" in Section 3.9 of the Submissions / Preferred Infrastructure Report.	Stockpile protocol	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW10)
SW45	Where reasonable and feasible, stockpiles will: <ul style="list-style-type: none"> Not require removal of areas of native vegetation. Be located outside of known areas of weed infestation. Be located such that waterways and drainage lines are not directly or indirectly impacted. 	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW11)
SW46	Where practicable, stockpiles will be located away from areas subject to concentrated overland flow. Stockpiles located on a floodplain be finished and contoured so as to minimise loss of material in flood or rainfall events.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW12)
SW48	All construction stockpiles will comply with the requirements of the <i>Protection of the Environment Operations Act 1997</i> and	Stockpile protocol	Construction	Environment Manager /	Submissions / PIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	NSW Waste Avoidance and Resource Recovery Strategy 2007 for any waste activities that involve the generation, storage and/or disposal of waste and also consider the NSW Resource Recovery Exemptions as applying the storage of stockpiled material.			Superintendent / Supervisor	(SSW14)
SW49	Stockpiles containing potential acid sulfate soils will be lined, bunded and covered in accordance with relevant guidelines.	CASMMP	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW15)
SW50	Management of tannin leaching from vegetation mulch will be in accordance with Roads and Maritime' Environmental Direction – Management of Tannins from Vegetation Mulch (Roads and Maritime, 2012).	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW16)
DRAINAGE AND WATERWAY					
SW51	<p>The EWMS for working platforms in or adjacent to waterways will detail how the works are to be undertaken to reduce erosion and minimise impacts on water quality and riparian fauna and flora. Considerations will include:</p> <ul style="list-style-type: none"> • Ensuring that where possible earth and/or rock platforms for driving piles are constructed to minimise impacts on the direct water channel. • Keeping vegetation clearing to a minimum. • Constructing rock platforms for driving piles / girder erection only where necessary. • Selecting the optimum rock size for platforms/ haul roads to account for all issues including safety and environment. • Using larger rock size and grades on the lower side of the works to assist in reducing failure risks. • Addressing stormwater overflow design and pipe capacity. • Enclosing platforms in geotextile fabric and appropriate erosion and sediment controls before clearance commences. 	Field & management staff	Pre-construction / Construction	Environment Manager / Superintendent	G36, Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	The EWMS will be prepared in consultation with EPA and DPI (Fisheries Conservation and Aquaculture) [and NSW Office of Water].				
SW52	<p>Watercourse crossings shall be designed in consultation with the DPI (Fisheries NSW), EPA, NOW and DoE, and where feasible and reasonable, be consistent with the <i>Guidelines for Controlled Activities Watercourse Crossings</i> (Department of Water and Energy, February 2008), <i>Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings</i> (Fairfull and Witheridge, 2003), <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (NSW Fisheries, February 2004), and <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (DPI Fisheries, 2013). Where multiple cell culverts are proposed for crossings of fish habitat streams, at least one cell shall be provided for fish passage, with an invert or bed level that mimics watercourse flows.</p> <p>Where temporary crossings are required, these will be designed, constructed and maintained in accordance with <i>Managing Urban Stormwater Soils and Construction Volumes 2A and 2D Main Road Construction</i> (DECC 2008) and section 5.3.4 of the guideline <i>Managing Urban Stormwater 4th edition Volume 1 Soils and Construction</i> and subject to the preparation of an EWMS identified in SW2 and SW31. Temporary crossings will:</p> <ul style="list-style-type: none"> • Be 'fish friendly' with a lower section of the temporary crossing provided to act as an emergency spillway. • Be used for the shortest time required to complete their designed operational function. • Use material that will not result in fine sediment material entering the waterway. • Where rock crossings are used, the rock will be of suitable size to prevent / reduce the likelihood of the material being washed away in a storm or flood event, with large sized rock on the lower side of crossings where water velocity increases. 	Environment manager, guidelines	Construction	Environment Manager / Superintendent / Engineers	CoA B38 G36, PIR(B21)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<ul style="list-style-type: none"> Waterflow is to be maintained at all times in watercourses. 				
SW53	Scour protection will be installed at the base of permanent and temporary drainage outlets, and will be integrated where feasible into current banks to minimise impacts.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	G36, G38
SW54	Drainage works will be stabilised against erosion by appropriate selection of channel dimensions, slope and lining, and the inclusion, if necessary, of drop structures and energy dissipaters.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	G38, Good practice
SW55	Culverts and permanent stream protection measures will be installed as early as possible in the construction program to facilitate transverse drainage during the early stages of construction.	Construction manager	Construction	Environment Manager / Superintendent / Supervisor	Good practice
MANAGEMENT OF GROUNDWATER INTERSECTION					
SW56	Where groundwater is released, recharge of the water table is the preferred option of managing groundwater. This will be facilitated by collecting groundwater in grassed swales for infiltration back to the groundwater source. Where possible, these swales will divert the groundwater around the construction area so that the groundwater does not further mix with construction runoff.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW42)
SW57	If recharging is not possible or suitable, then discharging groundwater will be collected via the sedimentation basins before discharge into natural waterways. If discharging to downstream groundwater, then the potential effects of mounding will be mitigated.	Field & management staff	Pre-construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW43)
SW58	Dewatering of excavations will be undertaken in line with Roads and Maritime' Technical Guideline – Environmental Management of Construction Site Dewatering (Roads and Maritime, 2011c), and in accordance with any licence conditions.	Guideline	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW44)
GROUNDWATER					
SW59	The monitoring of locations in the vicinity of type A and B	Water monitoring	Pre-construction,	Environment	Submissions / PIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	cuttings and major embankments will commence before construction to identify the need to implement any mitigation measure.	equipment	construction	Manager / Superintendent / Supervisor	(SSW47)
SW60	<p>If required to manage groundwater impacts at type A and type B cuttings and major embankments, the following engineering mitigation measures will be considered:</p> <ul style="list-style-type: none"> • Engineering measures that transfer the seepage water downstream. Standard practice will be to collect the seepage from the cut face in the drainage system for the highway, which will be diverted into water quality basins before being released back into the creek or natural drainage system at some point downstream. • Engineering impact mitigation measures that transfer the seepage water (where present) into the groundwater ecosystem immediately downslope of the cutting or embankments. 	Engineer	Pre-construction and construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW48)
SW61	Major embankments will be designed to enable distributed flow of surface waters.	Field & management staff	Pre-construction and construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW49)
SW62	Sites used for batch plants, refuelling and chemical storage will be managed so that no groundwater intrusion occurs.	Management plan	Pre-construction and construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW51)
WATER QUALITY AND USE					
SW64	Appropriate scour protection for drainage measures will be determined during detailed design.	Engineer	Operation	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW61)
SW65	<p>Except as may be expressly provided by an EPL, the contractor shall comply with section 120 of the Protection of the Environment Operations Act 1997.</p> <p>Water will be used during construction for a number of purposes, including, but not limited to:</p>	Field & management staff	Pre-construction /Construction	Environment Manager / Superintendent / Supervisor	CoA B30, Good practice / EPL / POEO Act

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	<ul style="list-style-type: none"> • Concrete and asphalt batching. • Dust control. • Washing of plant and equipment. • Drinking water. • Amenities. • Landscaping and re-vegetation. <p>Prior to and during construction, water needs will be identified and water sources assessed to determine the most appropriate water source(s). When determining the most appropriate water source(s), the use of non-potable water sources will be considered in preference to potable water where appropriate.</p> <p>The water sources likely to be considered for construction include:</p> <ul style="list-style-type: none"> • Creeks. • Groundwater. • Farm dams. • Sediment basins. • Rainwater collection. • Potable water. • Effluent reuse where available and meeting suitable standards. <p>Appropriate licences and/or permits will be sought for each water source as required.</p>				
SW66	Where available, and of appropriate chemical and biological quality, stormwater, recycled water or other water sources shall be used in preference to potable water for construction activities, including concrete mixing and dust control.	Field & management staff	Construction		CoA B35
SW67	All surface water and groundwater shall be adequately treated as far as is practicable, prior to entering the stormwater system to protect the receiving water source quality.	Field & management staff, PESCP	Construction		CoA B36

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
MATERIAL STORAGE AND MANAGEMENT					
SW68	Concrete pumping or concreting activities will be undertaken in accordance with Environmental Best Management Practice Guideline for Concreting Contractors 2002 to prevent and/or minimise spillages.	Guideline	Construction	Superintendent / Supervisor	G38
SW69	Designated impervious bunded facilities will be provided for washout of concrete trucks and cleaning and/or maintenance of other vehicles, plant or equipment. These facilities will be located at least 40 metres away from natural and built drainage lines.	Field & management staff	Construction	Superintendent / Supervisor	G38
SW70	An EWMS for managing tannin leachate (tannin leachate management protocol) will be prepared in accordance with the RMS Environmental Direction for the Management of Tannins from Vegetation Mulch attached at Appendix D. The requirements include detail on: <ul style="list-style-type: none"> • Planning and staging vegetation processing activities. • Stockpile location and management to minimise the production and release of tannins. • Monitoring the stockpiles for the production of tannins. • Response to tannin production. 	Protocol	Construction	Environment Manager / Supervisor	RMS Environmental Direction for the Management of Tannins from Vegetation Mulch CoA D26(c)vi
SW71	Where refuelling on site is required, the following management practices will be implemented: <ul style="list-style-type: none"> • Refuelling will be undertaken on level ground and at least 20 metres from drainage lines, waterways and/or environmentally sensitive areas. • Refuelling will be undertaken within the designated refuelling areas with appropriate bunding and/or absorbent material. • Refuelling will not be undertaken on or in the vicinity vegetated areas (even roadside grasses). • Refuelling will be attended at all times. • Spill kits will be readily available and personnel trained in their use. A spill kit will be kept on the refuelling truck at 	Field & management staff	Construction	Supervisor	Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	all times. Hand tools will be refuelled within lined trays of site vehicles wherever possible.				
SW72	Physical controls to address the potential risks associated with the use and storage of chemicals on site will include: <ul style="list-style-type: none"> • Use of appropriately bunded storage facilities for chemicals and fuels. • Use of appropriately bunded areas for refueling and washdown. • Availability of effective spill kits at all construction sites • Staff suitably trained in response to spills and the use of spill kits.. 	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW37)
CONTAMINATION					
SW73	A Stage 1 Preliminary Site Investigation will be conducted to verify past and present potentially contaminating activities, potential contaminants of concern and the need for further investigation. This will include a review of past highway crashes and spills and the associated contamination risks.	Environment Manager	Pre-construction	Construction Manager / Environment Manager	Submissions / PIR (SSW17), CoA B37
SW74	If necessary, a Stage 2 Detailed Site Investigation will be undertaken to: <ul style="list-style-type: none"> • Provide information on the type, nature, extent and concentrations of contamination present, and the corresponding risks to human health and the environment. • Examine pathways of contaminant dispersal and exposure, the potential for off-site impacts and the management requirements and options. 	Environment Manager	Pre-construction	Construction Manager / Environment Manager	Submissions / PIR (SSW18)
SW75	If required, a Stage 3 Remedial Action Plan will be produced, detailing the remediation goals, environmental safeguards, and any necessary approval and licence requirements in accordance with NSW Office of Environment and Heritage guidelines.	Environment Manager, guidelines	Pre-construction	Construction Manager / Environment Manager	Submissions / PIR (SSW19)
SW76	Where further assessment indicates that further action is not	Environment	Pre-construction	Construction	Submissions / PIR

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	required, Roads and Maritime' Contaminated Land Management Guideline (RTA, 2005a) will be applied to address any contamination issues and prevent any associated adverse impacts.	Manager		Manager / Environment Manager	(SSW20)
SW77	A hazardous materials buildings assessment will be carried out before the demolition of any structures or buildings to identify the issues of concern and the management requirements. This is required under Clause 1.6 of Australian Standard AS 2601 – 2001 The Demolition of Structures.	Specialist staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW21)
SW78	Permanent water quality basins will incorporate measures to contain accidental fuel and chemical spills resulting from vehicle accidents on the highway. Basins will be designed to accommodate a spill volume of up to 40,000 litres.	Design	Operation	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW59)
SW79	An emergency spill response plan will be developed and incorporated into the soils and water management plan. This plan will detail measures for the prevention, containment and clean-up of accidental spills of fuels and chemicals.	Plan	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW22)
SW80	The storage, handling and use of the chemicals and fuels will be in accordance with the Work Health and Safety Act 2000 and Workcover's Storage and Handling of Dangerous Goods Code of Practice (WorkCover, 2005).	Code of practice	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW23)
ACID SULFATE SOILS					
SW81	All ASS or PASS disturbed during the construction process will be managed in accordance with RMS Acid Sulfate Soil Management Procedure attached at Appendix C. Specific controls to be implemented will include: <ul style="list-style-type: none"> • Capping of exposed surfaces with clean fill to prevent oxidation. • Placing excavated acid sulfate soils separately in a lined, bunded and covered area. • Neutralising acid sulfate soils for reuse (where appropriate) by using additives such as lime. • Disposing of acid sulfate soils where necessary in accordance with the relevant guidelines set out in DECC 	CASMMP	Construction	Supervisor / Superintendent / Environment Manager	EIS (SSW31, SSW32), CoA D26 (c)(v)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	(2008). The requirements will be incorporated into the EWMS for "Management of Acid Sulfate Materials" referred to in SW6.				
SW82	Strategies to remove / reduce risks associated with acid sulfate soils will be identified.	CASMMP	Pre-construction and Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (SSW24)
REHABILITATION AND LANDSCAPING					
SW83	Disturbed areas will be progressively stabilised during the construction phase eg with a cover crop, hydromulch, hydroseeding, topsoil and/or mulch. Wherever possible, permanent landscaping and revegetation works will take place progressively in accordance with the Urban Design and Landscape Plan.	Field & management staff	Construction	Superintendent / Supervisor	G38, EIS (SSW7)
MONITORING					
SW84	Surface water quality monitoring will be undertaken in accordance with Roads and Maritime' Guideline for Construction Water quality Monitoring (RTA, 2003), and as per the framework outlined in the Working paper – Water quality and the Water Quality Monitoring Program, Appendix A	Guideline	Pre-construction	Superintendent / Supervisor / Environmental Manager / Environment Officer	Submissions / PIR (SSW62)
SW85	Groundwater monitoring will be undertaken in accordance with the framework outlined in the Working paper – Groundwater (Section 5.2). Appendix A	N/A	Construction	Superintendent / Supervisor / Environmental Manager / Environment Officer	Submissions / PIR (SSW63)
SW86	Rainfall forecasts will be monitored daily and the site managed to avoid erosion and sedimentation, and to minimise the impact of heavy rainfall and flood events.	Weather station	Construction	Superintendent / Supervisor / Environmental Manager / Environment Officer	G38
SW87	Erosion and sediment controls will be inspected at least daily	Field &	Construction	Supervisor	G38, Good practice

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	(with maintenance and/or modifications made as necessary). Inspections and/or maintenance during wet-weather maybe increased where necessary.	management staff			
SW88	A project soil conservation specialist will inspect the work areas, typically on a fortnightly basis, or as required where high-risk activities are proposed, or where sensitive areas have the potential to be affected eg SEPP 14 wetland, heritage sites.	Soil conservationist	Pre-construction / Construction	Soil Conservation Specialist Environment Manager	Good practice / EPL / POEO Act
SW89	Monitoring of sediment basin water quality will be undertaken in accordance with EPL requirements. See Sediment Basin Management and Discharge Procedure in Appendix H.	Field & management staff	Construction	Environment Officer	Appendix H
RECORDS					
SW90	Records of dewatering activities will be maintained. Details will include: i. A copy of the work method statement(s). ii. Date, time and estimated volume released at each discharge location. iii. Water quality test results for each discharge. iv. The personnel approving the dewatering activities. v. Evidence of discharge monitoring, or risk assessment and mitigation measures used to eliminate the risks of pollution.	Discharge procedure	Construction	Environment Manager	G36
HYDROLOGY AND FLOODING					
HF1	Any permanent fencing at culvert and bridge crossings will consider the potential for blockage and be designed and operated to maintain the existing flood regime	N/A	Pre-construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (HF4)
HF2	Detailed design for permanent road fencing will consider hydrology and flooding impacts	N/A	Pre-construction	Construction Manager / Environment Manager	Submissions / PIR (HF5)
HF3	Scour and erosion protection measures at temporary and permanent waterway crossings will be provided upstream	Design	Pre-construction.	Construction Manager /	Submissions / PIR (HF6)

ID	Measure / Requirement	Resources needed	When to implement	Responsibility	Reference
	and downstream of the highway, particularly within 50 metres of Class 1 waterways or within the range of the Oxleyan Pygmy Perch as identified in section 3.9.6 of the Working paper – Biodiversity and the supplementary biodiversity assessment in Appendix E of the Submissions / Preferred Infrastructure Report. This will be undertaken in consultation with the Department of Primary Industries (Fisheries). (Refer Appendix L)			Environment Manager	
HF4	Waterway diversions will be designed in consultation with Office of Environment and Heritage, NSW Office of Water and Department of Primary Industries (Fisheries) so that the final diversion mimics, where feasible and reasonable, the characteristics of the waterway that is being diverted. Characteristics include flow regime, flow velocity, base material, vegetation and habitat for aquatic fauna.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (HF7)
HF5	Revegetation of waterway diversions and surrounding areas will be undertaken in accordance with the following principles: <ul style="list-style-type: none"> • Diversions will be stabilised prior to the diversion receiving flows, in conjunction with the establishment of other scour and erosion control measures. • Diversions will establish appropriate vegetation communities along the channel bed and banks, using endemic native species. 	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (HF8)
HF6	All work within 40 metres of a permanent watercourse, crossed by the project, will be undertaken in accordance with the NSW Office of Water 'Guidelines for Controlled Actions' and industry best practice including maintaining where feasible and reasonable the geomorphic integrity and natural hydrological flow regime.	Field & management staff	Construction	Environment Manager / Superintendent / Supervisor	Submissions / PIR (HF19)
HF7	Recommendations made in Table 8-8 of Working paper – Hydrology and flooding to minimise the flood impacts of ancillary facilities will be considered in the final location and layout of ancillary facilities.	Management staff	Pre-construction	Construction Manager / Environment Manager	Submissions / PIR (HF22)

7 Compliance management

7.1 Roles and responsibilities

The CMC Project Team's organisational structure and overall roles and responsibilities are outlined in Section 4.2 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 6 of this Plan.

7.2 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 sub-plan.
- Relevant legislation.
- Roles and responsibilities for soil and water management.
- Procedure to be implemented in the event of an unexpected find of ASS or PASS.
- Water quality management and protection measures.
- Procedure to be implemented in the event of an unexpected discovery of contaminated land.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management. Examples of training topics include:

- ERSED control installation methodology.
- Sediment basin construction.
- Sediment basin operation.
- Sediment basin maintenance.
- Working near or in drainage lines and creeks.
- Emergency response measures in high rainfall events / Pollution Incident Response Management Plan (PIRMP).
- Preparedness for high rainfall events.
- Lessons learnt from incidents and other event eg high rainfall/flooding.
- Mulch and tannin management.
- Spill response.
- Stockpile location criteria.
- Identification of potentially contaminated spoil and fill material.

Further details regarding staff induction and training are outlined in Section 5 of the CEMP.

7.3 Monitoring and inspection

Regular monitoring and inspections will be undertaken in the lead up to, during and following construction. Monitoring and inspections will include, but not be limited to:

- Up and downstream of the project alignment water quality monitoring at nominated locations.

- Groundwater monitoring, both level and quality at nominated locations.
- Construction sediment basin water quality prior to discharge.
- Weekly and post rainfall inspections to evaluate the effectiveness of erosion and sediment controls measures in accordance with Section 8.1.1 of the CEMP.
- All monitoring will be carried out in accordance with AS 5667.1 1987.

The type, timing, frequency, assessment criteria and associated reporting requirements are detailed in the Water Quality Monitoring Program (required as per CoA D12) attached at Appendix A.

Additional requirements and responsibilities in relation to inspections are documented in Section 8.2 of the CEMP.

7.4 Licenses and permits

An Environment Protection License (EPL) will be obtained for the scheduled activity “road construction”. The EPL typically prescribes water quality parameters to be measured and associated discharge criteria. They also detail the monitoring and analytical requirements by reference to authority publications eg Approved Methods for Sampling and Analysis of Water Pollutants in NSW, 2004. The water quality discharge criteria for the Project are listed in Table 7-1 CMC will *update table 7-1 following issue of the EPL* for the Project.

Table 7-1 Discharge water quality criteria

Parameter	Criteria	Sampling method	Analytical method
pH*	6.5 –8.5	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment
Turbidity	TBA following correlation with TSS results	Grab Sample	Field analysis and confirmed as required with laboratory assessment, regularly updating correlations and having a factor of conservatism.
Total Suspended Solids*	50 mg/L	Grab Sample	Laboratory analysis
Oil and Grease*	No visible	Grab Sample	Field analysis and confirmed as required with laboratory assessment

Any other relevant licenses or permits will be obtained in the lead up to and during construction as required. Refer to CEMP – Section 3.3 Approvals, permits & Licences.

7.5 Weather monitoring

Rainfall at the premises will be measured and recorded in millimetres per 24-hour period at the same time each day from the time that the site office associated with the activities is established. Automatic rainfall intensity/ weather devices will be installed on the project, likely to be at the major compounds. The data collected from the automatic weather station and gauges shall;

- Provide a more detailed early understanding of potential rainfall and other adverse weather impacts
- Provide a proactive and early inspection and maintenance regime response to erosion and sedimentation and the effects of other adverse climatic conditions before pollution occurs
- Trigger weather alarms and messages to relevant site personnel to take action where appropriate
- Assess and validate the performance of installed erosion and sediment control measures against the design performance criteria, and

- Provide compliance data for statutory monitoring on-site.

The station and gauges shall record rainfall, temperature, relative humidity, wind speed, wind direction and bathymetric pressure. The rain gauge within each mobile automatic weather station shall be of the tipping bucket type. The station and gauges shall have a battery or voltage meter and shall target 98% reliability. Manual rain gauges will also be used across the project to assist with assessment of rainfall data accuracy. The weather station and gauges shall conform to relevant standards for the location of such devices and shall be fully protected and secured.

Data from the automatic weather station shall be accessible via SMS alarms or queries to a mobile phone and downloadable to a desktop console logger or laptop computer. SMS queries and alarms shall be sent to RMS Representatives as necessary. All data shall be accessible at all times by the RMS representative(s). The mobile automatic weather stations shall download data to the internet and allow live views of weather data by authorised users, which shall include RMS Representative(s), the Project Verifier and the Environmental Representative. The mobile automatic weather stations shall also be compatible with and communicate live data to RMS's online weather station page.

In accordance with normal standard construction practices weather forecasts shall be used to guide work activities undertaken on-site. Forecasts shall be checked at the start of each day and prior to undertaking new work activities that may be affected by rainfall or adverse weather. Where weather forecasts predict conditions that may pose an environmental risk, site environmental controls shall be inspected and secured to reduce erosion and sediment control impacts. Contingency planning to prevent spills shall also involve monitoring for predicted flood events and the removal of fuels and chemicals from flood prone areas.

7.6 Auditing

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

Audit requirements are detailed in Section 8.3 of the CEMP.

7.7 Reporting

Reporting requirements and responsibilities are documented in the Water Quality Monitoring Program, EPL and Chapter 7 and Section 8.3 of the CEMP.

8 Review and improvement

8.1 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.
- Make comparisons with objectives and targets.

8.2 CSWMP update and amendment

The processes described in Section 8 and Section 9 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 with approval from the Environmental Representative for minor changes to the CEMP/Sub-plans in accordance with CoA D23(e). All other amendments must be approved by the secretary.

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 10.2 of the CEMP.

Appendix A
Water Quality Monitoring Program

Appendix B
Spoil and Fill Management Procedure

Spoil and fill management

CIV-HSE-PRO-0042

Project description: Upgrade of the Pacific Highway, Halfway Creek to Glenugie
Project address: Halfway Creek, New South Wales
Contract number:
CMC Job number: CN1001



ACN 102 557 175
ABN 18 102 557 175

HEAD OFFICE

21 Lavarack Avenue
Eagle Farm Qld 4009
PO Box 1570
Eagle Farm BC Qld 4009
Phone: 07 3212 5000
Fax: 07 3212 5001
Email: enquiries@cmc.net.au

MARYBOROUGH

35 Island Plantation Road
Maryborough Old 4650
PO Box 146
Maryborough Qld 4650
Phone: 07 4190 2900
Fax: 07 4190 2901

www.cmc.net.au

1300 727 023

Spoil and Fill Management Procedure

CN1001-CIV-EN-PRO-0042

New South Wales

Approval				
Revision	Date	Name	Position	Signature
0	12/12/14	Mark Chilton	HSE Manager	
1				
2				

Spoil and fill management

CIV-HSE-PRO-0042

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Purpose

The Spoil and Fill Management Procedure (SFMP) has been developed to ensure spoil and fill is appropriately managed. The objectives of this SFMP are to:

- identify spoil and fill issues potentially arising from the Project;
- present processes for spoil and fill material handling, transportation and movement, stockpiling, reuse and disposal to protect the environment and
- maximise the reuse of earthen materials generated on site;
- identify and describe measures to be implemented relating to spoil and fill activities that may impact on air quality, sedimentation, contamination, noise and local amenity; and
- outline an effective monitoring, auditing and reporting framework to assess the effectiveness of the controls implemented.

Spoil and fill management

CIV-HSE-PRO-0042

Induction / Training

All employees, contractors and utility staff working on site will undergo site induction training relating to environmental issues, including spoil and fill management. A specific Toolbox Talk which will address the following elements related to spoil and fill management will be delivered to all staff involved in the establishment and maintenance of stockpiles and spoils sites:

- the existence and requirements of this procedure;
- spoil handling, stockpiling and disposal management requirements;
- haulage routes and haul management;
- managing contaminated soil; and
- dust and Erosion and Sediment (E&S) control mitigation measures.
- segregation requirements e.g. topsoil horizons, EECs, weed infested material, contaminated material etc.
- signage requirements

Records would be kept of all personnel undertaking the site induction and training, including the contents of the training, date and name of trainer/s.

Scope

This procedure is applicable to all activities that may lead to the generation, transportation, storage or disposal of spoil or fill.

Aspects and Impacts

Material Types

For the purpose of this procedure, spoil can be defined as any earthen material that is surplus to requirements or unsuitable for reuse in fill and embankments, or material that is contaminated.

For the purpose of this procedure, fill can be defined as earthen material excavated from either along the corridor and relocated elsewhere as compacted fill or imported from off site for utilisation in earthworks.

Select Material Zone (SMZ) is earthen material of comparatively higher quality than general fill material and necessary for engineered backfilling.

Unsuitable (non-contaminated) spoil comprises soil of comparatively lower engineering quality than SMZ and may after treatment be utilised for general fill or landscaping works. Unsuitable material may be won during earthworks from areas including:

- creek beds;
- water courses;
- pile spoils;
- low lying fill foundation areas; and
- shallow cut locations.

Topsoil occurs between approximately 50-200mm of natural ground surface. Topsoil reuse will be maximised on site to minimise the import of external topsoil for revegetation and landscaping purposes. Topsoil needs to be carefully managed to ensure microbial life, physical properties and seed bank viability is maintained, processes to maximise viability are included in Appendix I, Stockpile Management Protocol.

Spoil Classification

The classification of spoil will be undertaken in accordance with the Waste Classification Guidelines, 2014, including the implementation of a spoil sampling and analysis program during excavations. This will determine the type of spoil:

- Virgin Excavated Natural Material (VENM): EPA places no specific restrictions on reuse options of VENM
- Clean fill: If deemed suitable (i.e. waste classification and poses no environmental or OH&S risk) can be used as fill on site. Topsoils are suitable for reuse in rehabilitation works
- Potentially contaminated material: Requires management or disposal in accordance with EPA Waste classification guidelines 2014 and the Hazard and Risk Management Plan.
- The risk of encountering Acid Sulfate Soils is very low, however if it is identified it will be treated as per the Acid Sulfate Material procedure Appendix C.

Spoil and fill management

CIV-HSE-PRO-0042

Transport of Spoil

Spoil and fill will be required to be transported both within and outside the project boundary during construction, however, wherever possible haulage will be along the Project corridor.

In instances where haulage of cut material is required by road, exit from and entry to the project will be via specific Project access points, using designated haul routes, as detailed in the Traffic Management Plan.

Where the construction program necessitates movement of material prior to haul roads being established, or for other justified reasons, material may be hauled on public roads by road trucks. When this is required, standard dust and mud tracking controls will be implemented and additional requirements will be detailed in other project traffic and safety plans.

Storage of Spoil

Temporary stockpile areas for the Project will be located as detailed in the Stockpile Management Protocol.

Fill material required for engineering purposes in road construction will be managed to maximise direct placement and minimise double handling and stockpiling requirements.

Dust and E&S control measures will be implemented as required to minimise air water quality impacts as per the Air Quality Management Plan and the Soil and Water Management Plan.

Risk assessment

Work must not commence if an activity has a risk that has been assessed as Extreme. Consider hierarchy of controls - Elimination Substitution Engineering Administration PPE.	Consequence severity level (from table above)				
	1	2	3	4	5
A -Almost certain - It is expected to occur at least once in the life of the project	High	High	Extreme	Extreme	Extreme
B -Likely - Will probably occur; may occur every second similar type project	Medium	High	High	Extreme	Extreme
C -Moderate - Should occur at some time; once in 5 similar type projects	Low	Medium	High	Extreme	Extreme
D -Unlikely - Could occur at some time; once in 10 similar type projects	Low	Low	Medium	High	Extreme
E -Rare - May occur only in exceptional circumstances	Low	Low	Medium	High	High

Level	Likelihood	Description
A	Almost certain	Is expected to occur during the project, 90% or > probability
B	Likely	Will probably occur during the project, ~50% probability
C	Moderate	Might occur at sometime during the project, ~10% probability
D	Unlikely	Could occur at some time during the project, ~1% probability
E	Rare	Only occur in exceptional circumstances, < 1% probability
Level	Consequence	Description
1	Insignificant	Insignificant Breach of Environmental Statutes
2	Minor	Minor Breach of Environmental Statutes
3	Moderate	Moderate Breach of Environmental Statutes
4	Major	Major Breach of Environmental Statutes
5	Severe	Shutdown of Project Due to Environmental Breach

Note: Refer to CMCRisk management Procedure CIV-HSE-PRO-0001

Spoil and fill management

CIV-HSE-PRO-0042

Aspects and Mitigation

Table 1 Aspects and Mitigation

Np	Aspect	Risk	Mitigation Measures	Risk	Responsibility	Timing
General						
SFM1	Training and awareness	High	All staff and subcontractors will undergo a site induction and ongoing toolbox talks where required that will detail environmental issues including spoil and fill management where applicable.	Low	ESR, PM	Prior to works
SFM2	Waste and reuse	High	The NSW Governments Waste Management Hierarchy of “a void-reduce-reuse-recycle-dispose” will be followed as the framework of waste management throughout the project.	Low	All	During construction
SFM3	Control	High	Mitigation measures from this procedure will be included in relevant activity or a area specific Work Method Statements (WMSs)	Low	ESR	Prior to works
SFM4	Monitoring and records	Med	The weekly environmental inspection checklist will be completed as described in the CEMP and will record spoil and fill related issues where required	Low	ESR	Weekly
SFM5	Waste and reuse	Med	Excavated material from cuttings and excavations will be utilised where possible as engineering fill on the site (as opposed to importing fill from off site).	Low	Supervisor, Construction Manager	During construction
SFM6	Contaminated material	High	If suspected contaminated materials are encountered cease work and undertake action in accordance with the Unexpected Discovery of Contaminated Land Procedure, Appendix F.	Low	Supervisor/All	During construction
SFM7	Operations	Med	Scrapers, dozers, dump trucks, moxy trucks and b-double trucks will be used to transport spoil and fill material, whilst graders, compactors, dozers, water trucks and rollers will be used to place the material.	Low	Supervisor, Construction Manager	During construction
SFM8	Monitoring and records	Med	Records of all spoil and fill movements will be kept in accordance with the project Earthworks Management Plan. This includes daily records of cut to fill movements, tip sheets and overall mass haul calculations.	Low	Supervisor, Construction Manager	During construction
SFM9	ERSED	High	Dust and E&S controls will be installed and maintained to manage spoil and fill areas (cuts, fills, stockpiles etc) in accordance with the project Air Quality and Soil and Water Management Plans	Med	Supervisor, Construction Manager	During construction
SFM10	Rehabilitation	High	Restoration of stockpile site areas must be undertaken progressively following completion of stockpiling operations in each area.	Low	Supervisor, Construction Manager, ESR	During construction
Stockpiling						
SFM11	Locations	High	The locations of all stockpiles of spoil and fill material will be in accordance with the Stockpile Management Protocol. All stockpile locations will be included in the project CEMP. All stockpiles will be signed to indicate material type, soil horizon, EEC and location as applicable.	Low	Supervisor, Construction Manager	During construction
SFM12		Med	In addition to the above criteria, stockpile locations will not be under the drip zone of native vegetation and minimum distances from drains and gutters will be determined in consultation with the project Soil Conservationist.	Low	All	During construction
SFM13	Topsoil management	High	Topsoil stockpiles identified for reuse will be designed and managed in accordance with the requirements of the Soil and Water Management. Environmental Work Method Statement, Topsoil Stripping and Stockpiling, will be prepared to ensure these requirements are met and will include the requirements to separate different topsoil horizons, limit	Med	Supervisor, Construction Manager, ESR	During construction

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			s stockpile heights and timeframes to ensure seed bank viability and ensure topsoil is used in the same vegetation region from which it was removed..			
SFM14	Noise	High	Where nearby residents may potentially be impacted by noise from the project, stockpiles will be placed to provide noise barriers where feasible	Low	Supervisor, Construction Manager, ESR	During construction
Transportation of Spoil and Fill						
SFM15	Community	High	Designated haulage routes will be communicated to relevant personnel and sub-contractors and periodic surveillance undertaken to ensure routes are being used	Low	Supervisor	During construction
SFM16	ERSED	High	Dust and E&S controls will be installed and maintained for spoil and fill transportation in accordance with the project Air Quality and Soil and Water Management Plans	Low	Supervisor, Construction Manager	During construction
SFM17	Air quality	High	Vehicle movements associated with spoil and fill movement will be reassessed on site where dust generation, sedimentation or mud tracking may result	Low	Supervisor, Construction Manager	During construction
SFM18	Community	High	Spoil and fill materials will be moved along project haul roads through the construction corridor where possible.	Low	Supervisor, Construction Manager	During construction
Imported Fill						
SFM19	Quality	Med	Verification of the source and quality of imported materials will be undertaken to confirm that the material is not contaminated.	Low	Supervisor	Prior to use
Surplus Material						
SFM20	Waste	Med	Unsuitable material determined to be unsatisfactory for use as engineering fill in the project will be managed in one or more of the following ways, subject to development approvals and meeting legislation requirements, including waste legislation: <ul style="list-style-type: none"> • Reused within the job for noise mitigation, landscape shaping, batter flattening, etc • Taken off site to be used in other RTA projects • Used for landscape works in community areas • Offer to local council for noise mitigation and landscaping • Offer to local residents and businesses • As a last resort taken to landfill 	Low	Supervisor, Construction Manager	During construction
SFM21		Med	Removal of any spoil off site will be in compliance with the processes described in the project Construction Waste and Energy Management Plan (CWEMP) Appendix B7 of the CEMP.	Low	Supervisor, ESR	During construction
Mulch						
SFM22	Water quality	High	Stockpile sites will be located away from drainage lines and watercourses and arranged to minimise damage to natural vegetation and trees. The stockpile sites will be accessible, and have temporary erosion and sediment control measures installed.	Med	Supervisor, Construction Manager	During construction
SFM23	Rehab	Med	Mulch stockpile areas will be progressively restored following completion of stockpiling in that area.	Low	Supervisor, Construction Manager	During construction

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SFM24	Water quality	High	Run off from the mulch stockpile will be managed in accordance with the RMS publication 'Management of Tanins from Vegetation Mulch 2012'	Low	Supervisor, ESR	During construction
SFM25	Fire	Med	Stockpiles must be monitored and managed to avoid spontaneous combustion	Low	Supervisor, Construction Manager	During construction

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Maintenance, monitoring and evaluation of performance

Inspections

All control and mitigation measures will be inspected weekly and corrective actions implemented if non-conformance is observed. Targeted inspections will be conducted by the Environmental Site Representative during high risk activities, such as excavation works.

Monitoring

Following liming, the pH of the treated soils is to be monitored twice a day for one week to ensure there is adequate lime application.

Stockpiles will be monitored on a daily basis by the supervisor to ensure all controls are maintained. The Environmental Site Representative will undertake weekly inspections to ensure compliance with this and other CEMP requirements.

Incidents and corrective action

Incident reporting

All incidents will be reported in accordance with the *Incident Notification Procedure* (CIV-HS-PRO-0004), *Incident Investigation and Reporting Procedure* (CIV-HSE-PRO-0005) and the *Incident Notification and Reporting Guide* (CIV-HS-GUI-0002). Class 1, 2 and 3 incidents will be reported using the *Incident Notification* (CIV-HSE-FRM-0232) and the *Incident Report* (CIV-HSE-FRM-0011) and minor environmental incidents will be recorded on a *Minor Environmental Incident Log* (CIV-HSE-FRM-0195).

In the event of an environmental incident, Roads and Maritime Environmental Incident Classification and Reporting Procedure will be implemented in conjunction with CMC procedures. Typically, environmental incidents will be notified verbally immediately and in writing within one hour of any incident occurring to the Roads and Maritime Representative and the Environmental Representative. Incident reports will be provided to the Roads and Maritime Representative and the Environmental Representative within 24 hours of the incident occurring, including lessons learnt from each environmental incident and proposed measures to prevent the occurrence of a similar incident.

The following reporting procedure will be followed for any incident resulting in an emergency situation:

Step	Details	Contact number
1	Call Emergency Services if incident presents an immediate threat to human health or property	000
2	Call the appropriate regulatory authority (ARA) (DPI (Fisheries))	1300 550 474
3	Call the EPA, if not the ARA	131 555
4	Call the Ministry of Health via the local Public Health Unit	1300 066 055
5	Call the Work Cover Authority	13 10 50
6	Call the local authority (Shoalhaven City Council), if this is not the ARA	(02) 4429 3111 or (02) 4421 3100 (after hours)
7	Call Fire and Rescue NSW (unless 000 has already been called)	1300 729 579

Notifiable event

The EPA will be notified of any environmental incidents or pollution incidents on or around the site via the EPA Environment Line (telephone 131 555) in accordance with Part 5.7 of the PoEO Act. The circumstances where this will take place include:

- If the actual or potential harm to the health or safety of human beings or ecosystems is not trivial.
- If a actual or potential loss or property damage (including clean-up costs) associated with an environmental incident exceeds \$10,000.

Pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise.

In addition the following notification requirements will be implemented.

Event	Notification Requirements	Responsibility
Fish kills	DPI (Fisheries) and the Principal	PM
Pollution of HC2G Creek	EPA and the Principal	PM
Fauna death or injury	EPA and the Principal	PM

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Harm to aboriginal heritage artefact	Registered Aboriginal Parties and the Principal	PM
Harm to non-aboriginal heritage artefact	Heritage Division of OEH and the Principal	PM

Corrective action

Corrective actions will be implemented in response to an event or identified improvement and are intended to ensure that prompt and immediate action is taken to correct the event. The Project Manager will ensure that corrective actions identified on daily and weekly inspections and audits and incident reports are transferred to the *CIV-HS-FRM-0096 HSE Corrective Action Log* and timeframes and responsibilities assigned. Outstanding actions will be reviewed at weekly project meetings.

Review and improvement

Document review

This Procedure will be reviewed and updated every three months in accordance with the project's CEMP.

Auditing

Audits will be scheduled as per the requirements of the CEMP and CMC Environmental Management System. These audits will review on-site performance against the Procedure and suitability of the Procedure in meeting legislative and contractual requirements.

Reporting

Complaint and environmental incidents will be reported using the CMC Incident Notification Procedure (CIV-HS-PRO-0004), and the Roads and Maritime Environmental Incident Classification and Reporting Procedure Appendix 6 of the CEMP .

A report will be submitted to the Client on a monthly basis. This report will contain but not be limited to:

- Objectives and targets
- Monitoring results
- Complaints
- Incidents
- Audit results
- Corrective/preventative actions and improvements.

Appendix C

Acid Sulfate Soil Management Procedure

Refer to Appendix B11 Acid Sulfate Materials
Management Plan

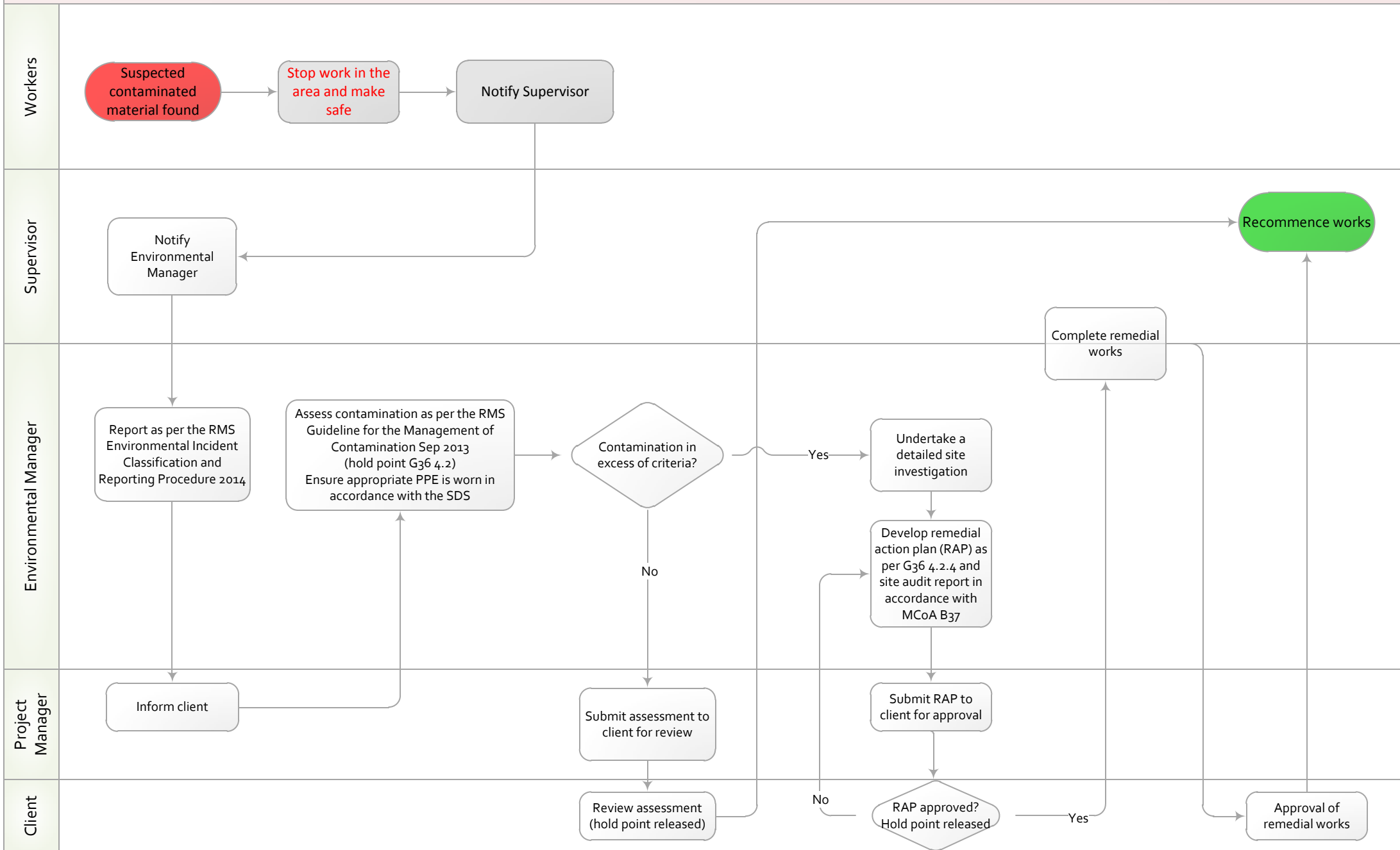
Appendix D

Management of Tannins from Vegetation Mulch

Appendix E
Groundwater Management Strategy
Not Applicable

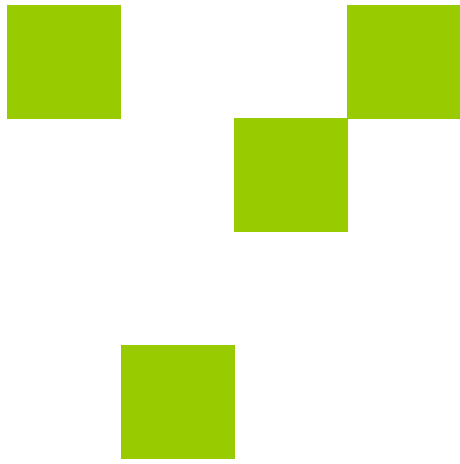
Appendix F

Unexpected Discovery of Contaminated Land Procedure



Appendix G

Pacific Highway Projects Dewatering Practice Note



DEWATERING PRACTICE NOTE

Pacific Highway Projects

May 2012



Document control

Document Title	Dewatering Practice Note (Pacific Highway Projects)
Author	RMS Pacific Highway Office

Issue	Date	Revision Description
1	January 2012	Draft
2	February 2012	Draft
3	May 2012	Final

Disclaimer

The information contained within this practice note is for general information only and is not intended to constitute legal advice. RMS accepts no responsibility for any loss arising out of reliance on any information contained in this document.

Acknowledgements

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I. How to use the Practice Note

The Dewatering Practice Note is intended for use by RMS project managers, staff and contractors on Pacific Highway construction projects. It has been designed as a means to ensure key mitigation and management principles for dewatering are identified and included in project specific Environmental Work Method Statements (EWMS) to be implemented prior to the need to conduct dewatering activities. It should be employed by RMS project teams as a means to proactively plan, assess and improve on-site procedures involving dewatering. When used correctly the practice note will aid in the enhancement of RMS environmental procedures, ensuring detrimental environmental impacts from RMS construction projects are kept to a minimum.

Refer to this practice note when preparing or assessing EWMS for work activities associated with the removal of ponded stormwater or infiltrated groundwater from any location on site, as well as the subsequent reuse or discharge of that water.

2. Introduction

2.1. Background

Dewatering is considered as any activity involving the removal of ponded stormwater or infiltrated groundwater from any location on site. For the purposes of this practice note and other RMS documentation, dewatering also encompasses any activity involving the subsequent reuse or discharge of such water.

Dewatering is a necessary part of any construction or maintenance project as captured stormwater and infiltrating groundwater will fill and pool in low-lying areas of construction sites over time. Without dewatering, pooling water may otherwise adversely affect project objectives. Reduced sediment control effectiveness, damage to formations and excavations, decreased site-access and increased downtime may all result without dewatering activity.

2.2. Objective

It is a requirement of all RMS Pacific Highway construction projects that ALL dewatering activities are undertaken in a manner that does not pollute the environment. As such project teams working on Pacific Highway projects must develop and comply with appropriately planned, approved and supervised procedures to govern such activities. Documentation of such procedures shall be in the form of an environmental work method statement (EWMS). An EWMS shall be both activity related and project specific and ALL dewatering activities must be addressed for each project. Minimum requirements for each EWMS have been outlined within this practice note, although the use of innovation is encouraged to continually enhance RMS environmental best practice.

Specific aims of this practice note are to deliver best practise and due diligence requirements on Pacific Highway construction projects that enable:

- dewatering activities to be managed to avoid pollution and/or environmental harm as defined under the Protection of the Environment Operations Act (NSW, 1997), (POEO Act) and Regulation;
- that promote sustainability in reusing valuable resources; and
- compliance with conditions of approval, permits, and licence conditions.

3. Considerations in planning dewatering activities

Every dewatering activity must be planned to achieve satisfactory environmental outcomes. In the preparation of an effective and acceptable dewatering EWMS, the following actions must be undertaken:

- Identify areas of the site that will require dewatering
- Identify receiving environment where water will be discharged with consideration and assessment of the sensitivity of the receiving environment (E.g. threatened frog/fish species habitat, Marine Park Areas, etc) - wherever possible dewatering to environmentally sensitive areas should be avoided.
- Consider dewatering methods that will minimise potential environmental impacts
- Assess opportunities for reuse

- Assess limitations for any proposed reuse methods
- Select discharge locations and provide adequate energy dissipation
- Determine and document water quality criteria for discharge and/or reuse
- Assess the treatment techniques required to meet the water quality criteria
- Assess water sampling and testing requirements
- Where discharge to sensitive areas is unavoidable, discharge methods, monitoring, sampling and testing should all reflect the specific nature of that receiving environment, its sensitivity and potential threats. This includes specifically targeting relevant parameters based on consideration of the nature of these sensitive environments.
- Identification of any potential contaminants. It is possible that previous land use activity and or the natural geology may produce contaminants. Where there is evidence to suggest there may be contamination within the catchment of an area requiring dewatering the testing regime should identify any risk and be targeted to ensure that risk is managed.
- Indication of likely volumes and duration of dewatering
- Monitoring requirements / regime
- Ensuring that dewatering does not result in discharged water re-entering the site / disturbed surfaces.
- Considering and addressing potential impacts on natural flows / water levels down stream.
- Considering and addressing mixing rates and dilution to the receiving environment.
- Training requirements / assessment of competency
- Incident management response
- Arrangement and management of the pump inlet
- Bunding of the pump

The subsequent sections (*sections 3.1 to 3.8*) will outline considerations associated with each of the actions listed above. These actions are highly recommended in the early stages of preparing an EWMS although do not constitute necessary deliverable inclusions in an EWMS document. (for minimum deliverable requirements in an EWMS document refer *Section 4: Minimum requirements for dewatering environmental work method statements*)

In addition the *Appendix* of this document provides photographs taken of dewatering activities on RMS construction projects. The photographs may be used to illustrate example designs, aiding in the design consideration process.

3.1. Identify areas of the site that will require dewatering

Dewatering locations will be identified through detailed design, in the development of the CEMP and during construction phase as earthworks and construction processes result in changing site drainage conditions. Typically locations that will require dewatering on RMS projects include:

- Sedimentation controls (e.g. sedimentation basins and sumps)
- Excavations
- Culvert and drainage constructions
- Low lying areas of road formations

3.2. Consider dewatering methods to minimise potential environmental impacts

There are various methods for dewatering sedimentation controls and inundated areas of construction excavation and formations. Common dewatering methods for sedimentation controls such as basins include pumping, low flow pipes and siphon discharges.

When selecting dewatering methods, consideration should be given to alternatives to pumped discharges where practical. Pumped dewatering presents specific risks relating to the pump inlet falling to the level of deposited sediment. This would result in direct discharge of polluted water to the receiving environment. In situations where pumping is necessary, additional protection measures should be designed into the dewatering methodology to prevent this scenario from occurring. Likewise, deposited sediment in controls such as basins must be routinely maintained (removed) to ensure that inlets to dewatering pumps and pipes are always above the level of deposited sediment.

There are two general methods for achieving water quality objectives for any site discharge, these being:

1) Water quality treatment prior to discharge.

This is required for sedimentation basins and is the preferred method for any construction excavation of inundated area that has sufficient volume and depth of water to provide flocculation of sediments prior to discharge. Any area other than defined sedimentation basins that can be treated prior to discharge should have a designed dewatering method (e.g. a defined pumping point, low flow or siphon discharge). This method would be designed to address appropriate water quality parameters and limits, and the type and volume of treatments required.

2) Treatment with best practise controls prior to discharge.

Best practise controls are those referred to within Blue Book Volume 1 and Volume 2D. Controls may include sedimentation fences, mulch bunds, sedimentation sumps, geofabric wrapped gravel or mulch bunds, use of onsite grassed areas or a combination of techniques. Treatment with best practise controls is undertaken prior to discharge. These controls must be designed, implemented, monitored and maintained to prevent erosion of the receiving environment and pollution of waters.

Treatment with best practise erosion and sedimentation controls during discharge is only applicable for minor stormwater ponding and for activities such as individual culvert extensions where the volume of stormwater captured is minor and the dewatering activity is infrequent. Addressing due diligence, risk pollution and environmental harm, site conditions and receiving environment would still need to be considered when determining whether to treat or not to treat water prior to discharge, When considering discharge location and treatment method. The following factors should also be considered:

- application rates,
- soil types,
- hydraulic loading,
- evapo-transpiration rates (as per s6.2 Blue Book Volume 2D, page 28).

The effectiveness of treatments are to be monitored and assessed and need to rectify controls and management strategy as required.

3.3. Assess opportunities for reuse

Onsite reuse of stormwater or detained groundwater should be considered as a priority for all dewatering activities. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/rehabilitation, and plant/vehicle wash-down.

Reuse of water on construction site may reduce the need for imported or extracted water and provide a lower risk to the environment than direct discharge to the environment. A common minimum requirement for any reuse activity is that any reuse should not cause the ponding or runoff of water, which may then cause concentrated runoff and unauthorised discharge.

3.4. Assess limitations for any proposed reuse methods

Any reuse activity may be limited by climatic or site conditions. During heavy rainfall periods, when there is the greatest need to remove treated stormwater from sedimentation basins, construction sites may be closed or access limited due to the wet conditions. In such cases, onsite reuse for dust suppression or compaction is neither feasible nor possible. In these cases the water must be discharged to meet the sedimentation basin maintenance timeframes specified in either the environmental protection licence or the CEMP (for non-licensed site).

Planning for any reuse activity and the EWMS for dewatering must take these limitations into consideration, and an EWMS developed for the management of discharge which may be required as a result of high rainfall events. Planning may include controls such as lining basins, sumps, and excavations with gypsum and/or ensuring the capacity of sumps, excavations are re-instated prior to forecast rain events.

3.5. Select discharge locations and provide adequate energy dissipation

It is important to ensure that dewatering activities do not cause erosion at the discharge location or in receiving environments. Consideration must be given to the potential for erosion at discharge locations when designing dewatering outlets. Preference for treated discharge should be given to locations with established drainage and outlet structures. Locations of designated discharge points should be included on all relevant erosion and sediment control plans for the specific construction activity.

Energy dissipation must be provided at all dewatering discharge points. This may include the use of surface protection such as concrete aprons, rock bunds, geofabric, shade cloth, gabions or form ply and will be dependent on the condition of the receiving environment.

Discharge locations should be chosen with consideration to the receiving environment that may contain environmentally sensitive receivers such as threatened frog/fish species, Marine Park, etc.

Where it is not possible to avoid discharges to sensitive areas, discharge methods, monitoring, sampling and testing should all reflect the specific nature of the receiving environment and relevant parameters should be targeted to monitor, control and minimise any potential impacts.

It is possible that previous land use activity and or the natural geology of the receiving environment may produce contaminants requiring identification and assessment. Where there is evidence to suggest there may be contamination within the catchment of an area requiring dewatering then the testing regime should also identify any risk and be targeted so that the risk is managed.

3.6. Determine and document water quality criteria for discharge and/or reuse

Sites with environmental protection licences will have defined water quality objectives for licensed discharge points. The water quality parameters are also only applicable to basin discharges registered under the license. A discharge that does not achieve the environmental outcomes permitted by an EPL is likely to be considered pollution under s120 of the POEO Act. Any discharges containing contaminants other than those specifically identified in the EPL must not result in pollution to waterways. Best management practice applies when discharging water from all other sites or non-licensed discharge points. This includes defining representative water quality criteria for the receiving environment and ensuring all discharges comply with these requirements as required under the license. For the majority of EPLs for Pacific Highway projects only the outlets of basins is a licensed discharge point registered under the EPL. Standard project water quality objectives criteria for Pacific Highway projects are as follows:

- Total suspended solids 50mg/L
- pH 6.5 – 8.5
- Oil and grease no visible trace

Additional specified receiving water quality criteria may be required for activities that have the potential to impact water quality through a range of pollutants including:

- general earthworks in soils with contamination issues
- earthworks in naturally occurring problematic soils such as acid sulphate soils, saline soil or high levels of other sulphide minerals
- lime storage areas
- tannin leachate
- hydrocarbon spills
- concrete works (including batching operations)
- stabilised pavements
- precoat aggregates and spray sealing
- polymers
- curing compounds

Generally a review of environmental assessment and approval conditions and onsite conditions will provide further information on potential pollutants that may be present onsite or in site waters. Other methods to determine water pollutants may include the use of a testing probe, indicator strips, laboratory analysis, local knowledge and consultation with environmental officers and regulatory agencies.

If reuse activities are properly designed and managed then ponded stormwater or groundwater may be able to be reused onsite without specific treatment.

3.7. Assess the treatment techniques required to meet the water quality criteria

Treatments should be designed to achieve the water quality outcome specified, as well as to cater for the time constraints that may be applicable to the activity (i.e. 5 day management period for sedimentation basins). Treatments should be applied to waters, and should be applied only by

experienced and competent personnel. Care needs to be taken to ensure treatment methods do not adversely affect water quality or the receiving environment.

Examples of common treatment applicable to RMS projects may include:

- Flocculation of turbid waters to minimise the settling duration of suspended particles, as well as facilitate the clearing of waters exposed to dispersive soils. Flocculation enables water quality standards to be achieved within an acceptable time period. A suitable flocculent should be chosen for sites based on an impact assessment of the receiving environment. In most cases RMS projects would utilise gypsum, which is considered to be inert. There are other flocculants available; however the use of these must be subject to consultation with relevant stakeholders, including EPA and NSW DPI (Fisheries) prior to use.
- pH adjustment using a base such as hydrated lime (for acidic waters) and inversely an acid such as hydrochloric acid (for alkaline waters). Low volume trials for each location will need to be carried out to determine dosage rates. Special care must be taken when adjusting pH to understand the buffer capacity of the waters, ensuring the neutral point is not over-shot. Any personnel involved in the adjustment of pH must be suitably trained and competent in the use of any additives.
- Absorption of oils and grease is used to remove traces of hydrocarbons that may have been mobilised by rainfall. Sources of oil and grease on a project may include spills and leaks from machinery, runoff from precoat aggregate stockpiles and runoff from adjacent travel lanes. Generally oils and grease will be removed from the surface of water detention by the use of floating booms, pads and absorption socks.

Additional information is provided in Blue Book references:

- Appendix B, page 41 of Blue Book Volume 2D for basin management immediately after rain
- Appendix E of the Blue Book Volume I with regards to the best practice methodology of flocculation of basins.
- Attachment 5, page 51 of Blue Book V2D for managing pH.

3.8. Assess water sampling and testing requirements

Water quality sampling and testing may be required to ensure that the water quality objectives are met both prior to and during either reuse or discharge of the water. Techniques may include sample collection and laboratory testing or in-situ field assessment.

A list of approved testing methods for various analytes can be referenced from “Approved Methods for the Sampling and Analysis of Water Pollutant in New South Wales” (EPA 2004). All sampling should be representative of the water to be discharged and testing methods in accordance with this document. Licensed premises require approved testing methods as per the conditions of the environmental protection licence (EPL) unless formal agreement has been reached with the relevant agencies. Any such agreement must be documented, and records kept onsite at all times.

Using turbidity as a tool for Total Suspended Solids (TSS) requires an established NTU/TSS correlation and ongoing laboratory verification to ensure the NTU/TSS correlation being applied for the project is correct.

4. Minimum requirements for dewatering environmental work method statements (EWMS)

4.1. EWMS format

The format of site-specific EWMS is flexible according to the procedures used by each project team. This practice note and RMS specification G36 do not require an individual EWMS for each dewatering location on each site although it is necessary for ALL dewatering activities to be accounted for within a documented EWMS.

The EWMS should provide clear guidance for each dewatering activity utilising each of the following:

- a) a map showing areas of the site/project that will require dewatering. This map should identify environmentally sensitive areas and features to be considered when planning discharge locations
- b) detailed description and staged methodology of selected dewatering methods. This should include a clear and concise step by step procedure
- c) description of onsite water reuse requirements
- d) a map showing proposed discharge locations for any offsite discharge
- e) design requirements for each offsite discharge location to prevent erosion at the discharge location or in the receiving environment
- f) water quality objectives relevant to the type of dewatering activity
- g) description of the water quality treatment techniques to be used
- h) water sampling and testing regime to validate water quality prior to and (if required) during dewatering. Water quality sampling records should include, times, persons, method, parameters, treatment, consistent location, results etc.
- i) Treatment volumes, time of application, who, how etc.
- j) details of delegated approval of dewatering activities eg. Internal permit signed off by Environment Construction Manager.
- k) proposed monitoring and supervision regimes.

If changes are proposed to the dewatering method used at any location or new dewatering requirements are identified during construction the project team must submit either of the following to the Principal before commencing the activity:

- a) a revised and updated the site/project EWMS, or
- b) a new stand-alone EWMS for the activity.

5. Document the site activity approvals process

All sites discharging water must have a robust procedure in place for the approval of all controlled discharges from dewatering activities and include a mechanism for quality assurance and verification. This process is to be clearly documented in the EWMS and must nominate specific personnel who can approve dewatering activities and specifically the controlled discharge of water. Delegates responsible for dewatering approval must be suitably trained and experienced in their duties. The approval process for dewatering activities is to be included in the worksite induction and training of onsite personnel. The inclusion and enforcement of these procedures will ensure that the risk of unauthorised discharges is significantly reduced.

The minimum requirements of this approval are:

- water quality is demonstrated to meet the objectives in the EWMS and this practice note
- inspections of intake and discharge locations, equipment and receiving environments are completed
- trained personnel are available to supervise and monitor the activity as specified on the EWMS.

5.1. Document training and induction requirements

All staff responsible for approval and/or execution of dewatering activities must be trained and inducted into use of the EWMS. The EWMS should include an induction register as a record of staff that are approved to conduct or approve dewatering activities.

5.2. Document the requirements for supervision of dewatering activities

The EWMS must provide a clear description of all supervision and monitoring required for each dewatering activity. All dewatering activities must be inspected by inducted, experienced and competent personnel. Prior to commencing any dewatering activity of the entire system including intake and outlet, pump, and discharge locations must be inspected.

All dewatering activities must be directly supervised for the entire duration of the dewatering. To remove the need for direct supervision, sites may carry out risk assessments and implement mitigation measures to ELIMINATE risks of causing environmental harm. Due diligence must be demonstrated to eliminate the possibilities of the following incidents:

- intakes dropping into deposited sediments and discharging sediment-laden waters
- erosion of the discharge locations and downstream environment
- inadvertent or intentional controlled discharge of untreated waters.

5.3. Record keeping for dewatering activities

You must keep the following records:

- a) a copy of the dewatering EWMS
- b) date, time and estimated volume of water released for each discharge location
- c) water quality test results for each discharge
- d) records to verify persons monitoring, and monitoring data including water quality parameters and criteria, timing and location of monitoring
- e) records indicating who provides approval for each dewatering activity, and
- f) evidence of discharge monitoring or risk assessment

Appendix: Photographs of Dewatering Activity on RMS Projects



Figure 1. Application to a sediment basin allows faster settling of sediments and improvements to water quality prior to discharge.



Figure 2. Consideration should always be given to measures to prevent pumped inlets from falling into sediment zones at the bottom of basins. In this example an anchored bucket was seen to be effective.



Figure 3. Informal use of bunding and geotextile was assessed as a suitable outlet treatment for scour protection in this example. The use of a tyre provided both energy dissipation for the discharge flow and anchorage for the discharge pipe.



Figure 3. Use of formal signage indicating discharge procedures was an effective management tool to prevent unauthorised discharges.



Figure 4. A sump adjacent to a working area may require higher levels of maintenance in order to remain effective. Dewatering to a larger sediment basin will be a more viable treatment measure when compared to flocculating the sump itself. Consideration to minimising exposed fines around the immediate catchment (e.g. bottom left corner of the figure) will also reduce sediment entering the sump if deemed practical for construction purposes.



Figure 5. A siphon and float system used for discharging a basin without use of pumps. Floats may be useful for preventing inlets from falling into sediment zones.



Figure 6. An inlet designed with up-turned pipe to ensure settled sediment is not sucked up during discharge. Note that sediment storage zone needs regular maintenance to ensure levels do not reach the inlet level.

Appendix H
Sediment Basin Management and Discharge
Procedure

Project description: Upgrade of the Pacific Highway, Halfway Creek to Glenugie

Project address: Halfway Creek, New South Wales

Contract number:

CMC Job number: CN1001



- Building The Future -

ACN 102 557 175
ABN 18 102 557 175

HEAD OFFICE

21 Lavarack Avenue
Eagle Farm Qld 4009
PO Box 1570
Eagle Farm BC Qld 4009
Phone: 07 3212 5000
Fax: 07 3212 5001
Email: enquiries@cmc.net.au

MARYBOROUGH

35 Island Plantation Road
Maryborough Qld 4650
PO Box 146
Maryborough Qld 4650
Phone: 07 4190 2900
Fax: 07 4190 2901

www.cmc.net.au

1300 727 023

Sediment Basin Management and Discharge Procedure

CN1001-CIV-EN-PRO-0044

New South Wales

Approval				
Revision	Date	Name	Position	Signature
0	12/12/14	Mark Chilton	HSE Manager	
1	01/04/15	Mark Chilton	HSE Manager	
2				

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Introduction

Purpose

This Sediment Basin Management and Discharge Management Procedure is an appendix to the Construction Environmental Management Plan (CEMP) Upgrade of the Pacific Highway, Halfway Creek to Glenugie (HC2G) (the project). The purpose of this Procedure is to provide guidance for the ongoing management of sediment basins and also for the de-watering of the basins

Relevant legislation, guidelines, licences and approvals

The following legislation, guidelines and standards are considered relevant to soil and water management for the project:

Type	Details
Legislation	<ul style="list-style-type: none"> • Protection of the Environment Operations Act 1997 (POEO Act) • Water Management Act 2000 • Fisheries Management Act 1994
Guidelines	<ul style="list-style-type: none"> • Soils and Construction Vol 1, Managing Urban Stormwater, Landcom 2004 (The Blue Book) • RMS Technical Guideline Environmental Management of Construction Site Dewatering (EMCSD) • RMS Pacific Highway Practice Note for Dewatering • Occupational Health and Safety guidelines • ANZECC Water Quality Criteria
Contract documents	<ul style="list-style-type: none"> • RMS Specification G36, G38 • Submissions/Preferred Infrastructure Report (SPIR)
Related documents	<ul style="list-style-type: none"> • Soil and Water Management Plan • Emergency Response Sub-Plan • Environmental Work Method Statement – Sediment Basin Management

Introduction

This Sediment Basin and Discharge Management Procedure forms part of the Construction Environmental Management Plan (CEMP) for the upgrade of the Pacific Highway from Halfway Creek to Glenugie (the Project). The Project is Section 2 of the Woolgoolga to Ballina (W2B) Pacific Highway upgrade project, approved by the Minister for Planning in June 2014.

The existing Glenugie Upgrade Project ties into the northern extent of the Project. The Glenugie Project was approved separately by the Minister for Planning in 2009 and relevant conditions of this approval have been referenced in the CEMP and this plan as appropriate.

Objectives and targets

Objectives	Targets
To ensure sediment basins are managed appropriately	To ensure that there is no unplanned release from or failure of a sediment basin
To comply with guidelines and legislation	No penalty infringement notices.
Implement control measures to ensure basins are dewatered in accordance with EPL requirements.	No infringements

Responsibilities and authorities

Who	What
All staff	<ul style="list-style-type: none"> Complete a site induction prior to commencement of work. Implement and comply with this procedure. Report any damaged or failed controls and any activity that has resulted in, or has the potential to result in environmental harm to their Supervisors.
Project Manager	<ul style="list-style-type: none"> Ensure implementation of the procedure. Lead by example – develop a 'beyond compliance' culture within the team. Provide necessary resources and technical support for implementation of procedure. Ensure non-conformances/corrective actions have been investigated and closed out appropriately.
Project Engineer	<ul style="list-style-type: none"> Implementation of requirements outlined in procedure. Ensure this SBMDP is reviewed when planning activities that may generate ASS/PASS. Ensure all staff including sub-contractors are inducted prior to commencement of works. Notify the Project Manager of incidents/non-conformances. Conduct and document weekly site inspections. Advise Site Supervisor immediately of any corrective actions that are required upon completion of site inspections. Report non-conformances to the Project Manager.
Site Supervisors	<ul style="list-style-type: none"> Implementation of requirements outlined in procedure. Ensure all staff including sub-contractors are inducted prior to commencement of works. Install and maintain controls as outlined in EWMSs'. Conduct daily visual inspections of environmental control measures on site. Notify the Project Engineer and/or Project Manager of incidents/non-conformances.
Environmental Site Representative	<ul style="list-style-type: none"> Ensure the results of daily and weekly monitoring are forwarded to the Client monthly as required. Conduct/commission and record all monitoring. Ensure any breaches or Non-conformance Reports (NCR's) are reported in a timely fashion. Complete all reporting requirements. Accompany the Superintendent on periodic inspections and audits.

Control procedures

Location

Sediment basins shall be located at the sites identified by the Soil Conservationist in the approved Erosion and Sediment Control Plans (ESCP). These locations are to be confirmed by survey to ensure the design parameters outlined below can be met. If they can not be met, the Soil Conservationist is to assess whether the location or size of the basins is to change or whether alternative controls are to be used.

Basin discharge points will be specified in the Environmental Protection Licence (EPL).

Risk assessment

Work must not commence if an activity has a risk that has been assessed as Extreme. Consider hierarchy of controls - Elimination Substitution Engineering Administration PPE.	Consequence severity level (from table above)				
	1	2	3	4	5
A -Almost certain - It is expected to occur at least once in the life of the project	High	High	Extreme	Extreme	Extreme
B -Likely - Will probably occur; may occur every second similar type project	Medium	High	High	Extreme	Extreme
C -Moderate - Should occur at some time; once in 5	Low	Medium	High	Extreme	Extreme

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similar type projects					
D -Unlikely - Could occur at some time; once in 10 similar type projects	Low	Low	Medium)	High)	Extreme
E- Rare - May occur only in exceptional circumstances	Low	Low	Medium	High	High

Level	Likelihood	Description
A	Almost certain	Is expected to occur during the project, 90% or > probability
B	Likely	Will probably occur during the project, ~50% probability
C	Moderate	Might occur at sometime during the project, ~10% probability
D	Unlikely	Could occur at some time during the project, ~1% probability
E	Rare	Only occur in exceptional circumstances, < 1% probability
Level	Consequence	Description
1	Insignificant	Insignificant Breach of Environmental Statutes
2	Minor	Minor Breach of Environmental Statutes
3	Moderate	Moderate Breach of Environmental Statutes
4	Major	Major Breach of Environmental Statutes
5	Severe	Shutdown of Project Due to Environmental Breach

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Work Sequence

Sequence of work activities		Potential hazards	Risk level	Details	Residual risk level	Responsibility
Maintenance						
1	Inspections	Excessive volume, damage	Med (C2)	<ul style="list-style-type: none"> All sediment basins will be inspected for capacity and water quality immediately following cessation of a rain period. Check all visible pipe connections for leaks, and repair as necessary. Remove all trash and other debris from the basin and riser. Ensure all rock protection on inlet and outlets are as per design Check basin walls and drainage lines for signs of scouring and/or failure 	Low (D5)	Supervisor
2	Stormwater capacity	Insufficient capacity	High (C3)	<ul style="list-style-type: none"> Re-establish stormwater capacity of sediment basins within 5 days of each rainfall event. This may involve reuse of the water for dust suppression or discharge after treatment of the water that meets water quality objectives. Any controlled release of water from the sediment basins will be tested to comply with the EPL water quality requirements prior to being discharged from site (refer to water quality testing process below). If water within the sediment basins is going to be used within the construction site for dust-suppression purposes and will flow back into the sediment capture system it does not require flocculation and would be applied so as not to result in overland flow run-off. If water is pumped into a tanker truck for later use, it can only be discharged at a licenced discharge point after first being tested and if required, treated. Water maybe used for irrigating landscaping if this approved EPA by a and meets EPL requirements. 	Med (C2)	Supervisor
4	Sediment Capacity	Insufficient sediment capacity	High (C3)	<ul style="list-style-type: none"> Clean out sediment basins, at a minimum, whenever the accumulated sediment exceeds 60% of the sediment storage zone this level will be clearly marked on the marker post... Remove accumulated sediment from sediment basins and traps in such a manner as not to damage the structures. Dispose of the sediment removed in such locations that the sediment will not be conveyed back into the construction areas, into watercourses or offsite. Provide and maintain suitable access to sediment basins and sediment traps to allow cleaning out in all weather conditions. 	Med (C2)	Supervisor

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Sequence of work activities		Potential hazards	Risk level	Details	Residual risk level	Responsibility
Water Quality Testing						
5	Water Quality Objectives	Pollution	High (C3)	<ul style="list-style-type: none"> Before discharging water from a basin, test the water to ensure that it meets EPL criteria, which are as follows: (modify to suit EPL requirements) <ul style="list-style-type: none"> pH: 6.5 – 8.5, total suspended solids: 50mg/L; and oil and grease no visible trace. 	Med (C2)	ESR
6	pH	Pollution	High (C3)	<ul style="list-style-type: none"> Test basin water with meter No action if pH reading between 6.5 and 8.5 Lime to be added if pH below 6.5 Hydrochloric Acid (32% Muriatic) to be added if pH above 8.5 Determine volume of water in basin Determine percentage of lime or acid required by taking a 10-litre sample of basin water and adding a known amount of lime or acid (initially 0.004%). If the pH is still not acceptable, vary the amount of lime or acid until within the limits. Once the required percentage has been determined, calculate the actual amount of lime or acid to be added by multiplying the volume of water in the basin by the determined percentage Treat the water for pH prior to T.S.S in accordance with the flocculation section below. 	Med (C2)	ESR
7	T.S.S or Turbidity	Pollution	High (C3)	<ul style="list-style-type: none"> Collect grab sample for NATA approved laboratory testing – or use correlated Turbidity levels if methodology approved by Environmental Rep and EPA. No action if T.S.S. reading <50mg/l (or as determined by EPL) If basins require flocculation (eg. T.S.S. >50mg/l) treat with gypsum in accordance with the flocculation process below. 	Med (C2)	ESR
8	Oil and grease	Pollution	Med (C2)	<ul style="list-style-type: none"> Examine surface of water for evidence (eg sheen, discolouration) Sample as per EPL requirements No action if no visual contamination Oil absorbent material to be spread if there is contamination (eg cell-u-sorb) 	Low (D2)	ESR
Flocculation (Further details also be detailed in the Sediment Basin Management Discharge Procedure as part of the SWMP)						
9	Trigger	Poor water quality	Med (C2)	<ul style="list-style-type: none"> The sediment basins will be effectively flocculated, settled, tested to comply with the discharge requirements and discharged within 5-days or less following a rainfall event. 	Low (D2)	Supervisor

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Sequence of work activities		Potential hazards	Risk level	Details	Residual risk level	Responsibility
10	Quantity	Waste	Med (C2)	<ul style="list-style-type: none"> Before using any flocculating agent, determine the amount of the agent that is appropriate for the volume to be treated, the sediment type and the prevailing weather conditions. 	Low (D2)	ESR
11	Process	Ineffective flocculation	Med (C2)	<ul style="list-style-type: none"> Where flocculation is necessary to settle suspended sediments in the basins, apply calcium sulphate (gypsum) as the flocculating agent to settle the sediments within 24 hours of the conclusion of each rain event causing runoff. Flocculation can be achieved by using gypsum at a rate of approximately 30kg /100m3 of stormwater. Alternative flocculating agents can only be used if approval by RMS has been granted. Methods of application to include (in order of preference): <ul style="list-style-type: none"> Spray gypsum across surface using a hydromulcher Mixing in a drum with water and pumping through a hose on large basins (i.e. >200m3) Broadcast by shovels on small basins (i.e. <200m3) least effective Ensure the flocculation/coagulant is thoroughly mixed/diluted with water (e.g. within and IBC) prior to spreading evenly over the entire pond surface for proper treatment of water. Dirty water from the basins will be used to mix the flocculent/coagulant. 	Low (D2)	ESR
Dewatering (Further details also be detailed in the Sediment Basin Management Discharge Procedure as part of the SWMP)						
12	Approval	Unapproved discharge	High (C3)	<ul style="list-style-type: none"> Discharges from sediment basins are only to be carried out following approval from the Environmental Advisor/Manger issued via a Permit to Discharge form (Appendix A). Water must not be dewatered in any other way than that stated within this procedure Water must be de-watered in accordance with the Pacific Highway Practice Note for Dewatering 	Low (D5)	All
13	Process	Non-compliance	High (C3)	<ul style="list-style-type: none"> After flocking leave basins to compensate for 24 to 48 hours. After retesting, and once the above field tests (section 5, 6, 7, 8) indicate, the water quality is acceptable and a Permit to Discharge is approved, the stop valve should be opened by two or three notches, for discharge and monitor outlet to ensure there is no erosion or disturbance of sediments. Adjust valve to dewater in the quickest time without causing harm. Ensure Permit to Discharge is completed including a record of discharge volumes. If using a syphon prime the syphon with a portable pump before releasing the release valve and act as above. If dewatering with a pump ensure intake is above the floor of the basin to ensure sediments are not sucked through. Ensure outlet is on to a stabilised area and erosion does not occur. <u>Do not leave pump unattended.</u> Ensure scouring does not occur at the outlet 	Low (D5)	ESR, Supervisor

Maintenance, monitoring and evaluation of performance

Inspections

All control and mitigation measures will be inspected weekly and corrective actions implemented if non-conformance is observed. Targeted inspections will be conducted by the Environmental Site Representative during high risk activities, such as excavation works.

Incidents and corrective action

Incident reporting

All incidents will be reported in accordance with the *Incident Notification Procedure* (CIV-HS-PRO-0004), *Incident Investigation and Reporting Procedure* (CIV-HSE-PRO-0005) and the *Incident Notification and Reporting Guide* (CIV-HS-GUI-0002). Class 1, 2 and 3 incidents will be reported using the *Incident Notification* (CIV-HSE-FRM-0232) and the *Incident Report* (CIV-HSE-FRM-0011) and minor environmental incidents will be recorded on a *Minor Environmental Incident Log* (CIV-HSE-FRM-0195).

In the event of an environmental incident, Roads and Maritime Environmental Incident Classification and Reporting Procedure will be implemented in conjunction with CMC procedures. Typically, environmental incidents will be notified verbally immediately and in writing within one hour of any incident occurring to the Roads and Maritime Representative and the Environmental Representative. Incident reports will be provided to the Roads and Maritime Representative and the Environmental Representative within 24 hours of the incident occurring, including lessons learnt from each environmental incident and proposed measures to prevent the occurrence of a similar incident.

The following reporting procedure will be followed for any incident resulting in an emergency situation:

Step	Details	Contact number
1	Call Emergency Services if incident presents an immediate threat to human health or property	000
2	Call the appropriate regulatory authority (ARA) (DPI (Fisheries))	1300 550 474
3	Call the EPA, if not the ARA	131 555
4	Call the Ministry of Health via the local Public Health Unit	1300 066 055
5	Call the Work Cover Authority	13 10 50
6	Call the local authority (Clarence River Council), if this is not the ARA	(02) 66266858 or (02) 66260200 (after hours)
7	Call Fire and Rescue NSW (unless 000 has already been called)	1300 729 579

Notifiable event

The EPA will be notified of any environmental incidents or pollution incidents on or around the site via the EPA Environment Line (telephone 131 555) in accordance with Part 5.7 of the PoEO Act. The circumstances where this will take place include:

- a) If the actual or potential harm to the health or safety of human beings or ecosystems is not trivial.
- b) If a actual or potential loss or property damage (including clean-up costs) associated with an environmental incident exceeds \$10,000.

Pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise.

In addition the following notification requirements will be implemented.

Event	Notification Requirements	Responsibility
Fish kills	DPI (Fisheries) and the Principal	PM
Pollution of HC2G Creek	EPA and the Principal	PM
Fauna death or injury	EPA and the Principal	PM
Harm to aboriginal heritage artefact	Registered Aboriginal Parties and the Principal	PM
Harm to non-aboriginal heritage artefact	OEH and the Principal	PM

Corrective action

Corrective actions will be implemented in response to an event or identified improvement and are intended to ensure that prompt and immediate action is taken to correct the event. The Project Manager will ensure that corrective actions identified on daily and weekly inspections and audits and incident reports are transferred to the *CIV-HS-FRM-0096 HSE Corrective Action Log* and timeframes and responsibilities assigned. Outstanding actions will be reviewed at weekly project meetings.



Review and improvement

Document review

This Procedure will be reviewed and updated every three months in accordance with the project's CEMP.

Auditing

Audits will be scheduled as per the requirements of the CEMP and CMC Environmental Management System. These audits will review on-site performance against the Procedure and suitability of the Procedure in meeting legislative and contractual requirements.

Reporting

Complaint and environmental incidents will be reported using the Incident Management Procedure and additional procedures outline in the CEMP.

A report will be submitted to the Client on a monthly basis. This report will contain information related to this procedure but not be limited to:

- Volume discharged
- Water quality
- Basin maintenance

Appendices

A1 Permit to Discharge

Appendix I
Stockpile Management Protocol



Approver: Systems and IT Manager

Reviewer: HSE Manager

Reviewed: 13/05/2015

Activity	Stockpile Management		
Project	Halfway Creek to Glenugie	Project number	CN1001
Project Manager	Alistair Pagan	Project Engineer	
Environmental Rep	Martin Mulhearn	Current as at	13/05/15

Document control

File name	Draft Protocol - Stockpile Management
Report name	Halfway Creek to Glenugie - <i>Stockpile Management Protocol</i>
Revision number	1

Protocol approved by:

[signed]

Alistair Pagan

[signed]

Martin Mulhearn

[signed]

Steven Alford

Project Manager

Environmental Manager

RMS representative

Revision history

Revision	Date	Description	Approval
0	2015/05/01	Draft	
1	13/05/15	Agency feedback included	
2			
3			



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1 Glossary / Abbreviations

CEMP	Construction Environmental Management Plan
CMC	Civil Mining and Construction Pty Ltd
CoA	Condition of Approval
CSWQMP	Construction Soil and Water Quality Management Plan
CWEMP	Construction Waste and Energy Management Plan
EPBC	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
DoE	Commonwealth Department of the Environment
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries (Fishing and Aquaculture)
EEC	Endangered Ecological Community
EIS	Woolgoolga to Ballina Pacific Highway Upgrade Environmental Impact Statement (December, 2012)
EPA	NSW Environment Protection Authority
EPL	NSW Environment Protection Licence under the Protection of the Environment Operations Act 1997.
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
FM Act	NSW Fisheries Management Act 1994
G36	RMS QA Specification G36 Environmental Protection
G38	RMS QA Specification G36 Soil and Water Management
HC2G	Halfway Creek to Glenugie Project
Minister, the	NSW Minister for Planning
NOW	NSW Office of Water
OEH	NSW Office of Environment and Heritage
PoEO Act	NSW Protection of the Environment Operations Act 1997
RMS	New South Wales Roads and Maritime Service
SMP	Stockpile Management Protocol
SPIR	Woolgoolga to Ballina Pacific Highway Upgrade Submissions Preferred Infrastructure Report (November, 2013)



1 Objectives

The objective of this protocol is to provide specific control measures so as to ensure that stockpiles are in accordance with the Minister's Conditions of Approval, CoA D25(d)(ix) and D26(c)(iii), shown in Table 1 and are managed correctly so that the material stockpiled is preserved and that it does not cause environmental harm or nuisance, materials are stored within approved clearing limits wherever possible, heritage impacts are avoided, impacts are reduced and greenhouse reduction approaches used where achievable. This Stockpile Management Protocol (SMP) is subject to the approval of the Secretary as a part of the CEMP and then stockpiles would not be assessed as ancillary facilities..

Table 1 Minister's Conditions of Approval

CoA No.	Condition Requirements	Document Reference
D25	<p>The Applicant shall prepare and implement (following approval) a Construction Environmental Management Plan for the SSI, prior to the commencement of construction, or as otherwise agreed by the Secretary. The Plan shall be prepared in consultation with the EPA, OEH, DPI (Fisheries), NOW and DoE and outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in consultation with the relevant government agencies and in accordance with the Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004). The Plan shall include, but not necessarily be limited to:</p> <p>(d) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase and details of how environmental performance would be managed and monitored to meet acceptable outcomes, including what actions will be taken to address identified potential adverse environmental impacts (including any impacts arising from the staging of the construction of the SSI). In particular, the following environmental performance issues shall be addressed in the Plan:</p> <p>(ix) measures to monitor and manage spoil, fill and materials stockpile sites including details of how spoil, fill or material would be handled, stockpiled, reused and disposed in a Stockpile Management Protocol.</p> <p>The Protocol shall include details of the locational criteria that would guide the placement of temporary stockpiles, and management measures that would be implemented to avoid/minimise amenity impacts to surrounding residents and environmental risks (including surrounding water courses). Stockpile sites that affect heritage, threatened species, populations or endangered ecological communities require the approval of the Secretary, in consultation with the EPA, OEH and DPI (Fisheries);</p>	CEMP
D26	<p>As part of the Construction Environmental Management Plan for the SSI, the Applicant shall prepare and implement:</p> <p>a Construction Soil and Water Quality Management Plan to manage surface and groundwater impacts during construction of the SSI. The Plan shall be developed in consultation with the EPA, DPI (Fisheries), NOW, Rous Water (in relation to the Woodburn borefield), DoE and the relevant council and include, but not necessarily be limited to:</p> <p>(iii) management measures to be used to minimise surface and groundwater impacts, including details of how spoil and fill material required by the SSI will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;</p>	CSWQMP



2 Purpose/Scope

This protocol is relevant to the planning, placement and management of all stockpiles on/related to the Halfway Creek to Glenugie project. It would attempt to outline the locational criteria used to guide the placement of temporary stockpiles and provides both standard and site-specific mitigation measures to be implemented to minimise impacts on the environment. Stockpile sites may typically be required to store material including, but not limited to:

- Temporary storage of excavated material to be used in fill embankments and other design features.
- ASS subject to treatment prior to reuse.
- Temporary storage of excavated material unsuitable for reuse in the formation.
- Excess concrete, pavement, rock, steel and other material stored for either future use in the Project or prior to removal from site.
- Topsoil,
- Mulch, excess timber for landscaping and revegetation works.
- Gravels, fill and asphalt profiling's. If there are risks, these materials would be discussed with RMS

Temporary stockpiles would be removed for re-use within the project or disposed off-site at approved locations and comply with RMS Stockpile Site Management Guideline, as outlined in the Construction Soil and Water Quality Management Plan (CSWQMP).

Note, the process for monitoring and managing spoil and fill including details of how excavated material would be handled, stockpiled, reused and disposed is detailed in the Earthworks Management Plan, CSWQMP and the Construction Waste and Energy Management Plan (CWEMP).

This includes ensuring the offsite disposal of materials to an appropriately licensed facility or in accordance with the waste exemptions; and records including section 143 certificates to be completed and retained for any material to be disposed of outside of the project boundary.

3 Approval Process

As outlined in the CoA ancillary definition, where a SMP has been approved by the Secretary for the SSI, material stockpile areas are not considered to be ancillary facilities. Consequently this SMP is being forwarded to DPE for approval.

Where stockpile affect heritage, threatened species, populations or endangered ecological communities they will require the approval of the Secretary, in consultation with the EPA, OEH and DPI (Fisheries)

4 Stockpile Location Criteria

Stockpiles on the Project will be located according to the following criteria: These criteria have been derived from CoA, best practice on other Pacific Highway projects and also derived from the G36-38, R44 and R178 RMS Specifications.

- Be located at least 5 metres clear of all areas of possible concentrated water flow.
- Be located at least 50 metres from a waterway.
- Be located on land with slopes less than 10%.
- Have ready access to the road network or direct access to the construction corridor.
- On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.
- Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project. (refer to Sensitive Area Map Appendix 5 of CEMP)

Where the stockpile location is either outside of the Project corridor, or does not meet all of the stockpile criteria, an environmental assessment or environmental review of the proposed stockpile location would be undertaken. This would be submitted to the Environmental Representative and RMS for approval. Where heritage, threatened species, or endangered ecological communities are affected, the Secretary's approval is required. This assessment will include as a minimum a review of heritage, ecological and water quality issues, distance from receivers, noise, dust issues and may also detail land ownership and lease agreements, and measures to manage or mitigate potential environmental impacts.

An assessment of the identified stockpile sites for the Project against the above location criteria is detailed in Table 1. The current stockpile sites assessed in Table 1 are also shown in the associated maps in Attachment 1.

Table 1 and the associated mapping will be updated as new stockpile areas are identified and approved. Changes to Table 1 and the mapping will be approved by the Environmental Representative as minor updates to the Stockpile Management Protocol (and SWMP) as described in Section 1.6 of the CEMP. Stockpile Management Protocol.



5 Mitigation

Prior to the establishment of any stockpile on site as part of the project, ensure that:

1. The location of the stockpile is considered against the site selection criteria and Table 1 and that detail of how the stockpile site meets each of the criteria is provided.
2. Site-specific mitigation measures, where they are necessary to further reduced impacts, are identified and detailed in Table 1.
3. Mitigation measures for each stockpile site include as a minimum are detailed in Table 2

Table 2 Mitigation Measures

ID	Measure/Requirement	Responsibility	Reference
1	The requirements of the CEMP and management plans.	Project Manager	CEMP
2	The perimeter of the stockpile (excluding vehicle access points) will be delineated with a bund (made out of earth/rock or similar) or other type of fencing or barrier such as sediment fence.	Supervisor	CSWQMP
3	Be located at least 5 metres clear of all areas of possible concentrated natural water flow. It will be avoided where reasonable and practicable that materials will not be stockpiled under the drip lines trees or native vegetation to be retained, and never pushed up around the base of trees. Mulch stockpiles are exempt from this requirement as they do not erode and are light, so as to have minimal impact on compaction of the root systems.	Construction Manager	Best practice
4	Erosion and sedimentation controls will be erected between the site and any drainage lines or down-slope areas.	Supervisor	CSWQMP
5	A diversion bund will be installed on the uphill side of the stockpile to divert water around the site.	Supervisor	CSWQMP
6	Short-term stockpiles will be covered with plastic or kept damp to control dust where required. Longer-term stockpiles (i.e. to remain for greater than 20 days) will be stabilised with cover crop or similar as per the mitigation measures in Table 6-1 of the SWMP	Supervisor	CAQMP
7	Potentially affected residents within 200 metres of stockpiles will be notified regarding the location of the stockpile areas in advance of works, the potential impact from constructing the stockpile (including visual and odour impacts) and proposed mitigation measures. Should a resident express concern or are not satisfied with the proposed mitigation measures, the stockpile location or associated mitigation measures would be revised accordingly.	Community Manager	Communication strategy
8	Where stockpiles are located within 200 metres of residences, these stockpile areas will be monitored for odour. If nuisance odours are generated and are impacting sensitive receivers, odour control measures will be implemented, if feasible and reasonable. If this is not possible, material found to be emitting odours will be relocated to an alternative stockpile location away from residences.	Supervisor	CAQMP



ID	Measure/Requirement	Responsibility	Reference
9	ASS or mulch stockpile management, including leachate containment, will be in accordance with the CSWQMP, ASSMP and Tannin Leachate Management Protocol respectively.	Environment Manager	CSWQMP
10	Dust management measures (including for vehicle movements associated with stockpiling activities) will be implemented in accordance with the requirements of the Construction Air Quality Management Plan.	Supervisor	CAQMP
11	Be free from subsoil, other excavated materials, contaminated materials, refuse, clay lumps and stones, timber or other rubbish;	Supervisor	RMS R44 clause 2.3.2
12	Be trimmed to a regular shape to facilitate measuring with a height not exceeding 2.5m and batter slopes not steeper than 2H:1V;	Supervisor	RMS R44 clause 2.3.2
13	Have their batters track rolled or stabilised by other means;	Supervisor	RMS R44 clause 2.3.2
14	Be seeded in accordance with Specification Roads and Maritime R178 clause 6 to encourage vegetation cover.	Supervisor	RMS R44 clause 2.3.2
15	Be clearly signed with vegetation community type, soil horizon, collection area (by chainage) and date of stockpiling	Environment Manager	RMS R44 clause 2.3.2
16	Be stockpiled in areas separate from all other stockpiled material to minimise the potential for weed contamination.	Supervisor	RMS R178 clause 2.1.1.4.3
17	Be stockpiled separately by vegetation community type. For each vegetation community type, topsoil is to be stockpiled with A1, A2 and B1 horizons in separate windrows with A1 horizon up to 1 metre high and A2 and B1 up to 2.5 metres. (ERG approval)	Supervisor	RMS R178 clause 2.1.1.4.3
18	Not stockpiled for periods greater than 12 months unless otherwise approved by the principal	Supervisor	RMS R178 clause 2.1.1.4.3
19	Stockpiles should be located more than 50 metres from defined waterways such as Halfway Creek and Wells Crossing.	Construction Manager	DPI (Fisheries)
20	<p>The rehabilitation of stockpile areas following their removal will be in accordance with the Stockpile Management Guideline, May 2011, RMS requirements/RMS R178 and as follows:</p> <p>Where no further stockpiling or work is proposed on the disturbed site, they would be rapidly and progressively stabilised and/or rehabilitated as they are completed. Rehabilitation would aim to achieve at least 70% cover (i.e. C-factor of 0.05 or less) within 60 days.</p> <p>Where further works or stockpiling is proposed, temporary ground covers would be used for any temporary cessation in works in an area exceeding 20 days, to achieve at least 50% cover (i.e. a C-factor of 0.15 or less). This would apply to stockpile sites and other exposed areas and measures may include (but are not limited to) biodegradable polymer soil binders, geotextile fabrics; erosion control blankets,</p>	Construction Manager	Stockpile Management Guideline, 2011/RMS R178



ID	Measure/Requirement	Responsibility	Reference
	temporary seeding and mulching.		

6 Induction/Training

Personnel involved in planning or managing stockpiles will be trained in the requirements of this Protocol. Training will also include inductions, toolbox talks, pre-starts and targeted training as required.

7 Protocol update and amendment

The processes described in Section 8 and Section 9 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 with a approval from the Environmental Representative for minor changes to the CEMP/Sub-plans in accordance with CoA D23(e). All other amendments must be approved by the secretary.

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 10.2 of the CEMP.

8 Relevant documents

Progressive Erosion and Sediment Control Plans	Construction Waste and Energy Management Sub- Plan
Clearing and Grubbing EWMS	Construction Soil and Water Quality Management Plan
Construction Air Quality Management Plan	RMS Specifications G36, G38, G40, R44, R178
Sensitive Area Plans	Soils and Construction Vol 1, Managing Urban Stormwater (Blue Book)
Construction Acid Sulfate Materials Management Plan	Topsail Stripping EWMS
Stockpile Management Guideline, RMS 2011	



Table 1 Stockpile management protocol temporary locations

Addenda update table.

Document Revision	Table Reference numbers	Date	Reason for update	RMS/ ER approval
0	1 to 143	23/4/2015	N/A	N/A

Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
1	16930-17000	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	Retain 5m distance from drainage line to the west
2	17010-17110	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	Retain 5m distance from drainage line to the west
3	17450-17910	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
4	17960-18000	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
5	17400-18500	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	Manage drainage of the area as per ESCP. Ensure Type 2 controls are used within the site.
6	18520-18590	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
7	18610-18780	RMS	Stockpile area		Y	Y	Y	Y	Y	Y	
8	17380-17480	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
9	17500-17600	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
10	17610-17710	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
11	17720-	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Further site assessment required



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	17820		area								by EM with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.
12	17830-17850	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	Further site assessment required by EM with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.
13	17840-17940	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	Further site assessment required by EM with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.
14	17950-18000	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	Further site assessment required by EM with regards to space and drainage. Implement silt



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											retention/ stabilisation of stockpile.
15	18220-18320	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
16	18330-18380	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
17	18150-18250	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
18	18260-18360	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
19	18370-18470	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence



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											or additional distance)
20	18480-18580	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
21	18590-18690	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Further site assessment required by EM with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.
22	18990-19040	RMS	Stockpile	Y	Y (ensure onsite and in consultation with DPI before establishment of site that	Y	Y	Y	Y	Y	Further site assessment required by EM with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
					the physical distance able to allow is enough)						
23	19040-19090	RMS	Stockpile	Y	Y(ensure onsite and in consultation with DPI before establishment of site that the physical distance able to allow is enough)	Y	Y	Y	Y	Y	Further site assessment required by EM with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
24	19210-19310	RMS	Stockpile	Y	Y(ensure onsite and in consultation with DPI before establishment of site that the physical distance able to allow is enough)	Y	Y	Y	Y	Y	Further site assessment required with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.
25	18700-18800	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Further site assessment required with regards to space and drainage. Implement silt retention/ stabilisation of stockpile.



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26	18810-18910	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
27	18920-19020	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
28	19030-19130	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
29	19230-19330	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
30	19340-19440	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
31	19540-19600	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection



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											for the windrows (mulch toe, silt fence or additional distance)
32	19750-19830	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
33	19850-19950	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
34	19960-20030	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
35	20040-20140	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
36	19450-19550	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
37	19560-19660	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)



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38	19670-19770	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
39	19890-19990	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
40	20000-20100	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
41	20150-20220	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
42	20110-20210	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
43	20220-20270	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
44	20290-20320	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



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45	20870-20920	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
46	21070-21170	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
47	21090-21190	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
48	21200-21300	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
49	21310-21410	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
50	21420-21470	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
51	21180-21240	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.
52	21310-21340	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



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53	21350-21400	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
54	21410-21480	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.
55	21040-21140	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
56	21150-21220	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
57	21340-21370	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
58	21380-21480	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Possibly mitigate the slope with existing dam? Site assessment necessary to evaluate.
59	21510-21610	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Have to check if stockpile can be made without clearing and away from the drain.



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60	21710-21850	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
61	21700-21900	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
62	21860-21930	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
63	21500-21600	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.
64	21610-21640	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
65	21650-21730	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
66	22550-22650	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
67	22660-22760	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



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68	22780-22880	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
69	22530-22630	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
70	22640-22700	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
71	22710-22780	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
72	22790-22890	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
73	22900-23000	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
74	23010-23090	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
75	23120-23220	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.



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76	23230-23280	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.
77	23310-23410	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.
78	23420-23520	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
79	23530-23630	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
80	22980-22380	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
81	23160-23260	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
82	23270-	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



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	23370										
83	23690-23750	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
84	23790-23890	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
85	23900-23950	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
86	23980-24080	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
87	24100-24180	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
88	24190-24290	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
89	24050-24150	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
90	24230-24330	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
91	24300-24350	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows



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											(mulch toe, silt fence or additional distance)
92	24400-24470	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
93	24580-24670	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
94	24730-24830	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
95	24850-24950	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
96	24340-24400	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Only use if no additional clearing is required



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97	24410-24480	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Only use if no additional clearing is required
98	24780-24880	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
99	24900-25000	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
100	25000-25100	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
101	25080-25160	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	
102	25160-25210	RMS	Stockpile area	Y	Y	Y	Y	Y	Y	Y	



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
103	25240-25260	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
104	25270-25370	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
105	25380-25440	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
106	25580-25680	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
107	25010-25110	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
108	25120-25220	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
109	25250-25450	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
110	25500-25600	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
111	25610-	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
	25710										
112	25700-25800	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
113	26010-26110	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
114	26120-26220	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
115	26230-26270	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
116	25720-25800	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
117	25810-25845	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
118	25870-25930	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
119	25950-26050	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
120	26060-26160	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
121	26180-26280	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
122	26290-26380	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows (mulch toe, silt fence or additional distance)
123	26420-26520	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
124	26530-26630	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
125	26640-26710	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
126	26780-26840	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further controls to be approved and implemented onsite (mulch bund, silt fence)
127	26850-26920	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further controls to be approved and implemented onsite (mulch bund, silt fence)
128	27030-27130	RMS	Stockpile	Y	Y	N	Y	Y	Y	Y	Further controls to be approved and implemented onsite (mulch bund, silt fence)
129	26400-26500	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	Proximity of small drain requires additional protection for the windrows
130	27140-27250	RMS	Stockpile	Y	Y	N	Y	Y	Y	N	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
											retain and divert runoff as assessed.
131	27260-27310	RMS	Stockpile	Y	Y	N	Y	Y	Y	N	Further onsite assessment to be made with regards to slope. Implement ESC's suitable to retain and divert runoff as assessed.
132	27500-27600	RMS	Stockpile	Y	Y	N	Y	Y	Y	N	Further controls to be approved and implemented onsite (mulch bund, silt fence)
133	27610-27680	RMS	Stockpile	Y	Y	N	Y	Y	Y	N	Further controls to be approved and implemented onsite (mulch bund, silt fence)
134	27180-27280	RMS	Stockpile	Y	Y	N	Y	Y	Y	N	Further controls to be approved and implemented onsite (mulch bund, silt fence)
135	27320-27380	RMS	Stockpile	Y	N	Y	Y	Y	Y	Y	Further onsite assessment to be made with regards to slope. Implement



Ref no.	Location (chainage)	Landowner	Purpose	a) Be located at least 5 metres clear of all areas of possible concentrated water flow.	b) Be located at least 50 metres from a waterway	c) Be located on land with a slope less than 10%	d) Have ready access to the road network or direct access to the construction corridor.	e) On land that does not require the removal of threatened species, EECs or roosting habitat for listed threatened fauna species.	f) Be located in areas of low heritage conservation significance (including identified Aboriginal cultural value) and not impact on heritage sites beyond those already impacted by the project.	Complies?	Site specific mitigation measures or other actions
											ESC's suitable to retain and divert runoff as assessed.
136	27410-27460	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
137	27470-27520	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
138	27530-27630	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
139	27640-27720	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
140	27800-27870	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
141	27910-27960	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
142	28110-28210	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	
143	27800-28010	RMS	Stockpile	Y	Y	Y	Y	Y	Y	Y	



9 Attachment 1: Stockpile Locations

Stockpile Management Protocol (Plans)

Approved Project Boundary



EPL Boundary Legend



Clearing Boundary Section



Waterways



New Road Design



Non-Aboriginal Historic Sites



Noise Sensitive Recievers



Aboriginal Sites



Stockpile Sites



Endangered Ecological Communities



Black Bean - Weeping Lilly Pilly
Riparian Rainforest Of The North
Coast



Blackbutt Grassy Open Forest Of
The Lower Clarence Valley Of
The North Coast



Narrow-Leaved Red Gum
Woodlands Of The Lowlands Of
The North Coast



Paperbark Swamp Forest Of The
Coastal Lowlands Of The North
Coast



Swamp Box Swamp Forest Of
The Coastal Lowlands Of The
North Coast



Swamp Mahogany Swamp Forest
Of The Coastal Lowlands Of The
North Coast

State Forests



Contaminated Sites



Document: Stockpile Location
Revision: 2
Date: 2015/04/29
Sheet: 1/15



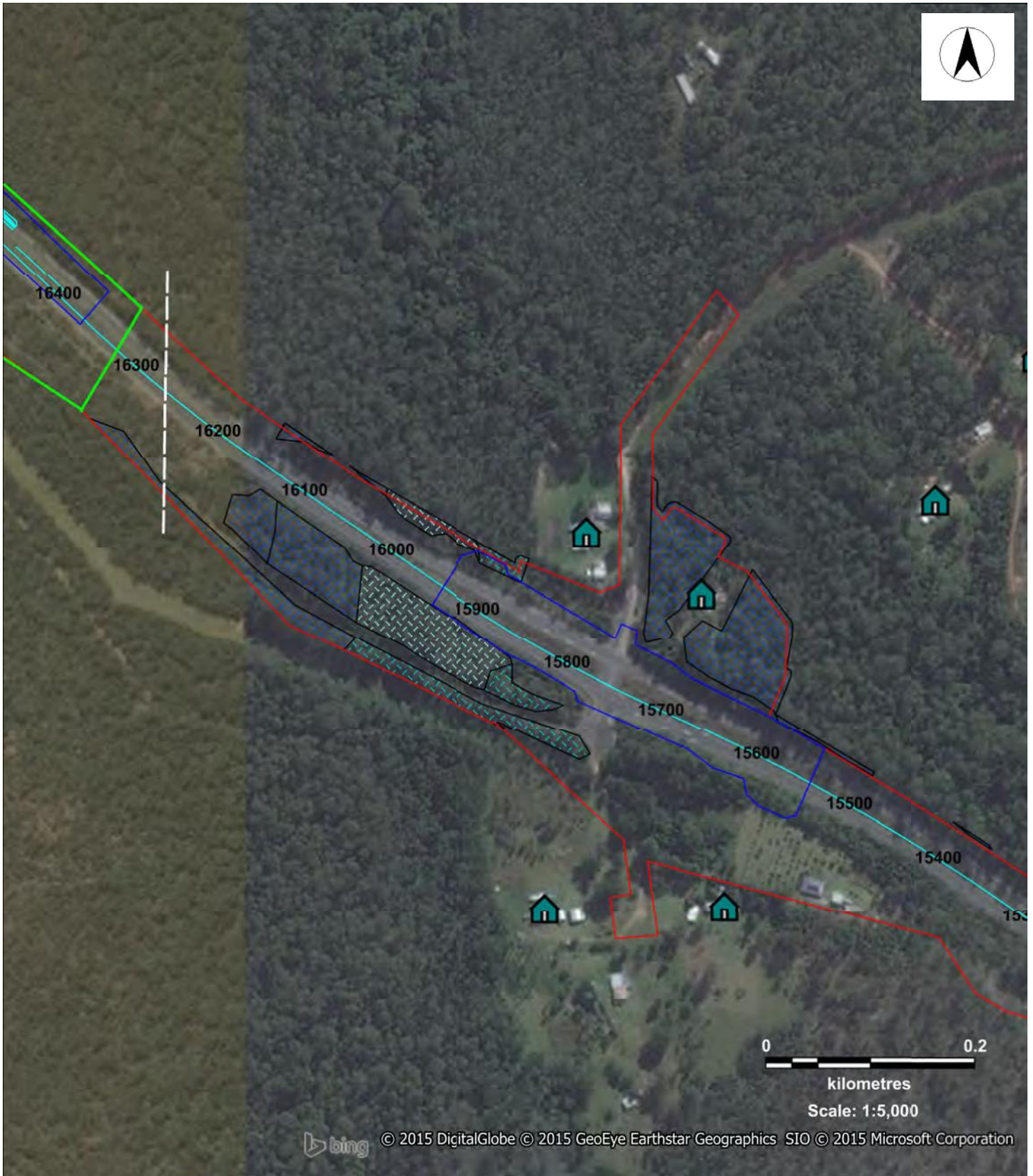
	Chainage Southside	Chainage Northside	Length
1		16930-17000	70
2		17010-17110	100
3	17450-17910		460
4	17960-18000		40
5	17400-18500		1100
6	18520-18590		70
7	18610-18780		170
8		17380-17480	100
9		17500-17600	100
10		17610-17710	100
11		17720-17820	100
12		17830-17850	20
13		17840-17940	100
14		17950-18000	50
15	18220-18320		100
16	18330-18380		50
17		18150-18250	100
18		18260-18360	100
19		18370-18470	100
20		18480-18580	100
21		18590-18690	100
22	18990-19040		50
23	19040-19090		50
24	19210-19310		100
25		18700-18800	100
26		18810-18910	100
27		18920-19020	100
28		19030-19130	100
29		19230-19330	100
30		19340-19440	100
31	19540-19600		60
32	19750-19830		80
33	19850-19950		100
34	19960-20030		70
35	20040-20140		100
36		19450-19550	100
37		19560-19660	100
38		19670-19770	100
39		19890-19990	100
40		20000-20100	100
41	20150-20220		70
42		20110-20210	100
43		20220-20270	50
44		20290-20320	30
45	20870-20920		50
46	21070-21170		100
47	21090-21190		100
48	21200-21300		100
49	21310-21410		100

	Chainage Southside	Chainage Northside	Length
50	21420-21470		50
51	21180-21240		60
52	21310-21340		30
53	21350-21400		50
54	21410-21480		70
55		21040-21140	100
56		21150-21220	70
57		21340-21370	30
58		21380-21480	100
59	21510-21610		100
60	21710-21850		140
61	21700-21900		200
62	21860-21930		70
63		21500-21600	100
64		21610-21640	30
65		21650-21730	80
66	22550-22650		100
67	22660-22760		100
68	22780-22880		100
69		22530-22630	100
70		22640-22700	60
71		22710-22780	70
72		22790-22890	100
73	22900-23000		100
74	23010-23090		80
75	23120-23220		100
76	23230-23280		50
77	23310-23410		100
78	23420-23520		100
79	23530-23630		100
80		22980-22380	100
81		23160-23260	100
82		23270-23370	100
83	23690-23750		60
84	23790-23890		100
85	23900-23950		50
86	23980-24080		100
87	24100-24180		80
88	24190-24290		100
89		24050-24150	100
90		24230-24330	100
91	24300-24350		50
92	24400-24470		70
93	24580-24670		80
94	24730-24830		100
95	24850-24950		100
96		24340-24400	60
97		24410-24480	70
98		24780-24880	100



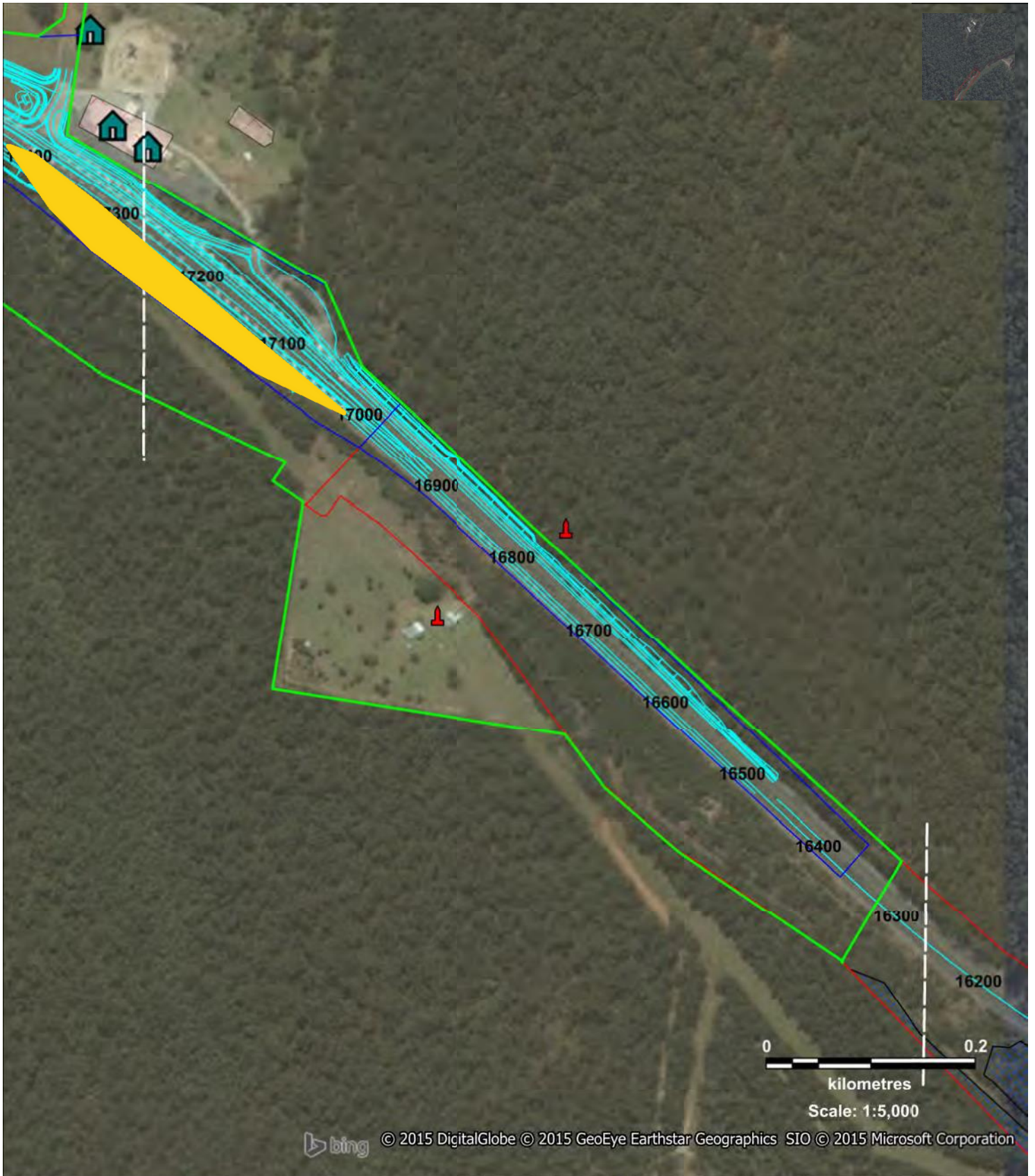
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99		24900-25000	100
100	25000-25100		100
101	25080-25160		100
102	25160-25210		60
103	25240-25260		25
104	25270-25370		100
105	25380-25440		60
106	25580-25680		100
107		25010-25110	100
108		25120-25220	100
109		25250-25450	200
110		25500-25600	100
111		25610-25710	100
112	25700-25800		100
113	26010-26110		100
114	26120-26220		100
115	26230-26270		40
116		25720-25800	80
117		25810-25845	35
118		25870-25930	60
119		25950-26050	100
120		26060-26160	100
121		26180-26280	100
122		26290-26380	90
123	26420-26520		100
124	26530-26630		100
125	26640-26710		70
126	26780-26840		60
127	26850-26920		70
128	27030-27130		100
129		26400-26500	100
130	27140-27250		100
131	27260-27310		50
132	27500-27600		100
133	27610-27680		70
134		27180-27280	100
135		27320-27380	60
136		27410-27460	40
137		27470-27520	50
138		27530-27630	100
139		27640-27720	80
140	27800-27870		70
141	27910-27960		50
142	28110-28210		100
143		27800-28010	210





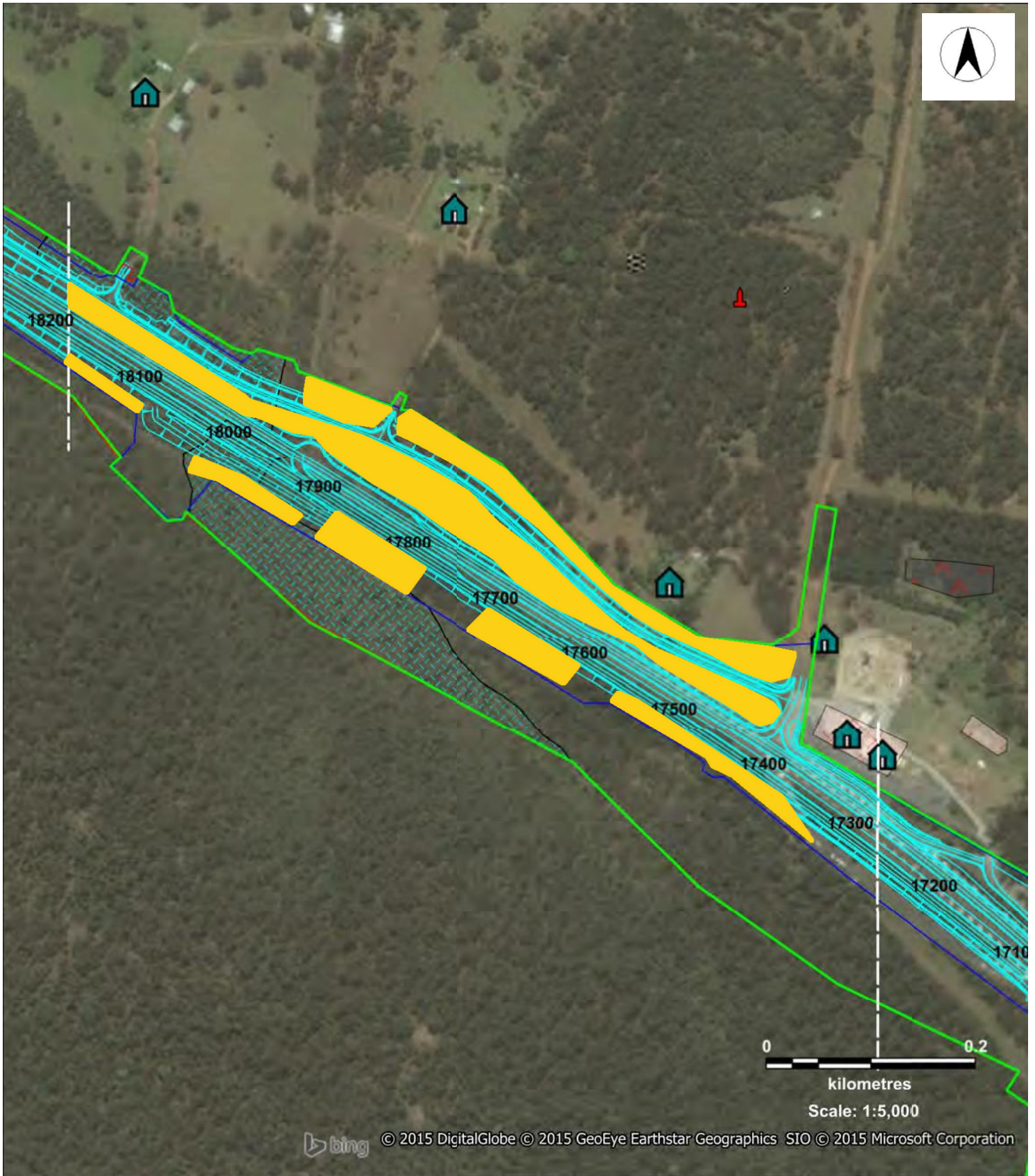
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Date: 2015/04/29
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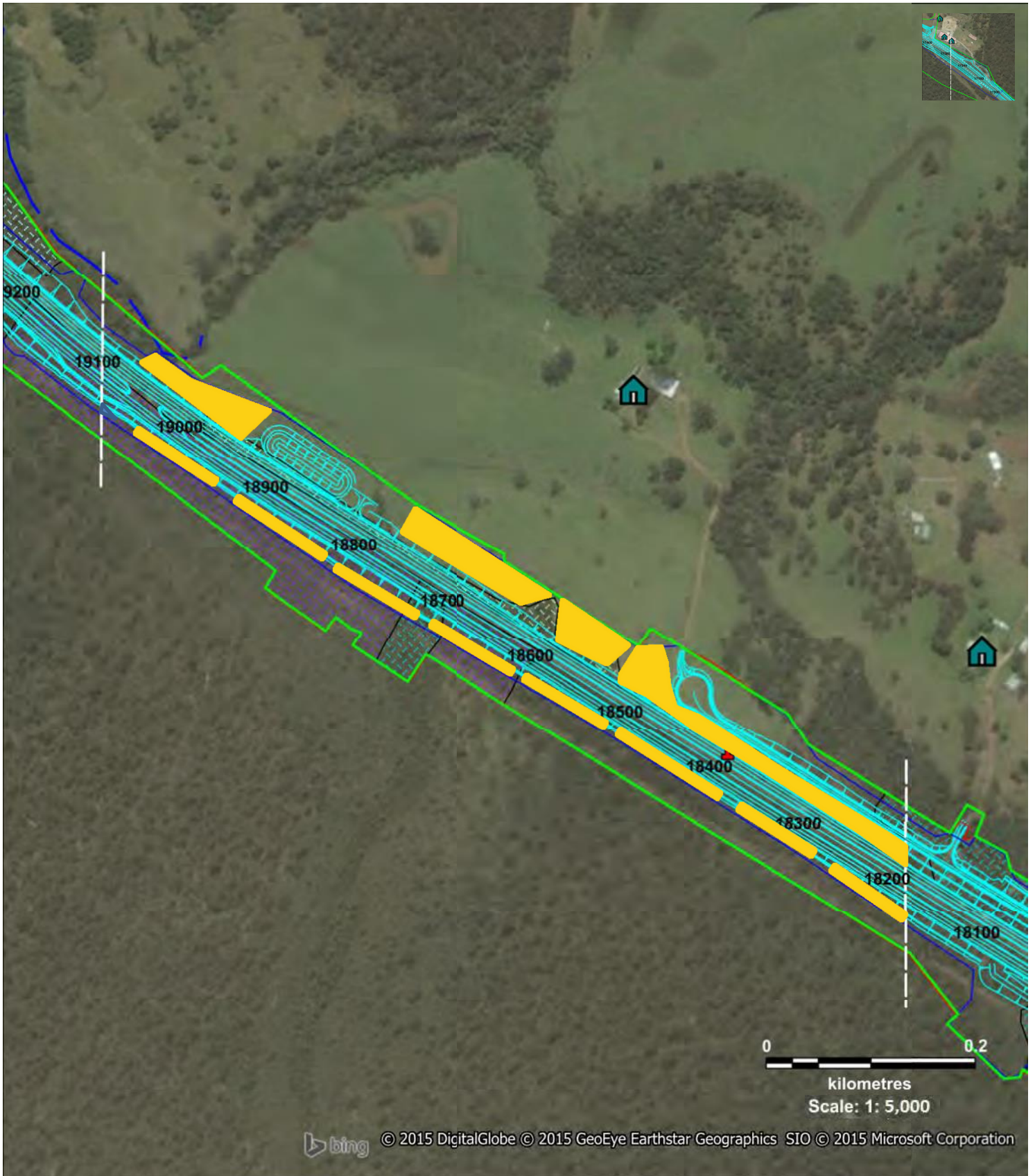
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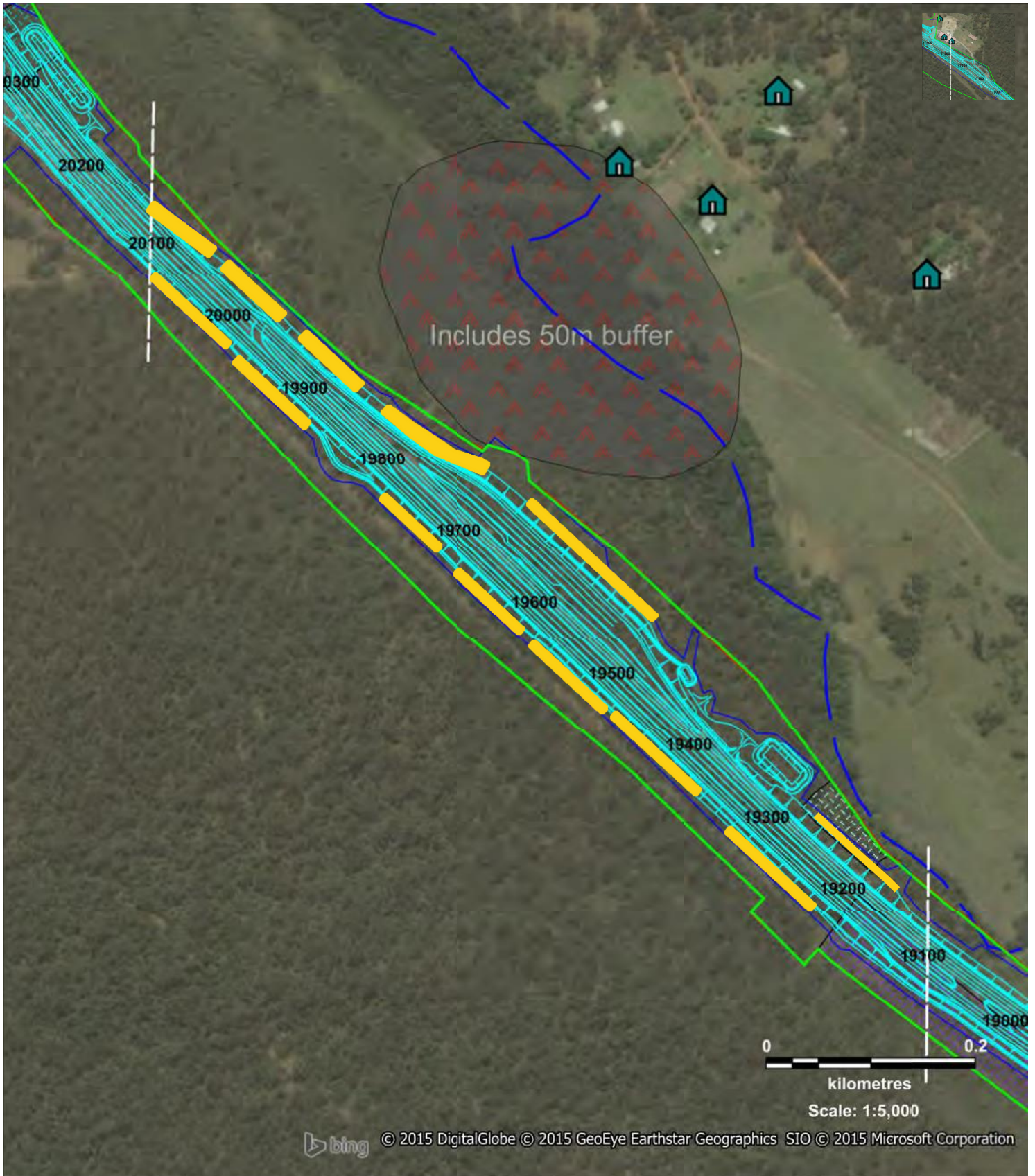
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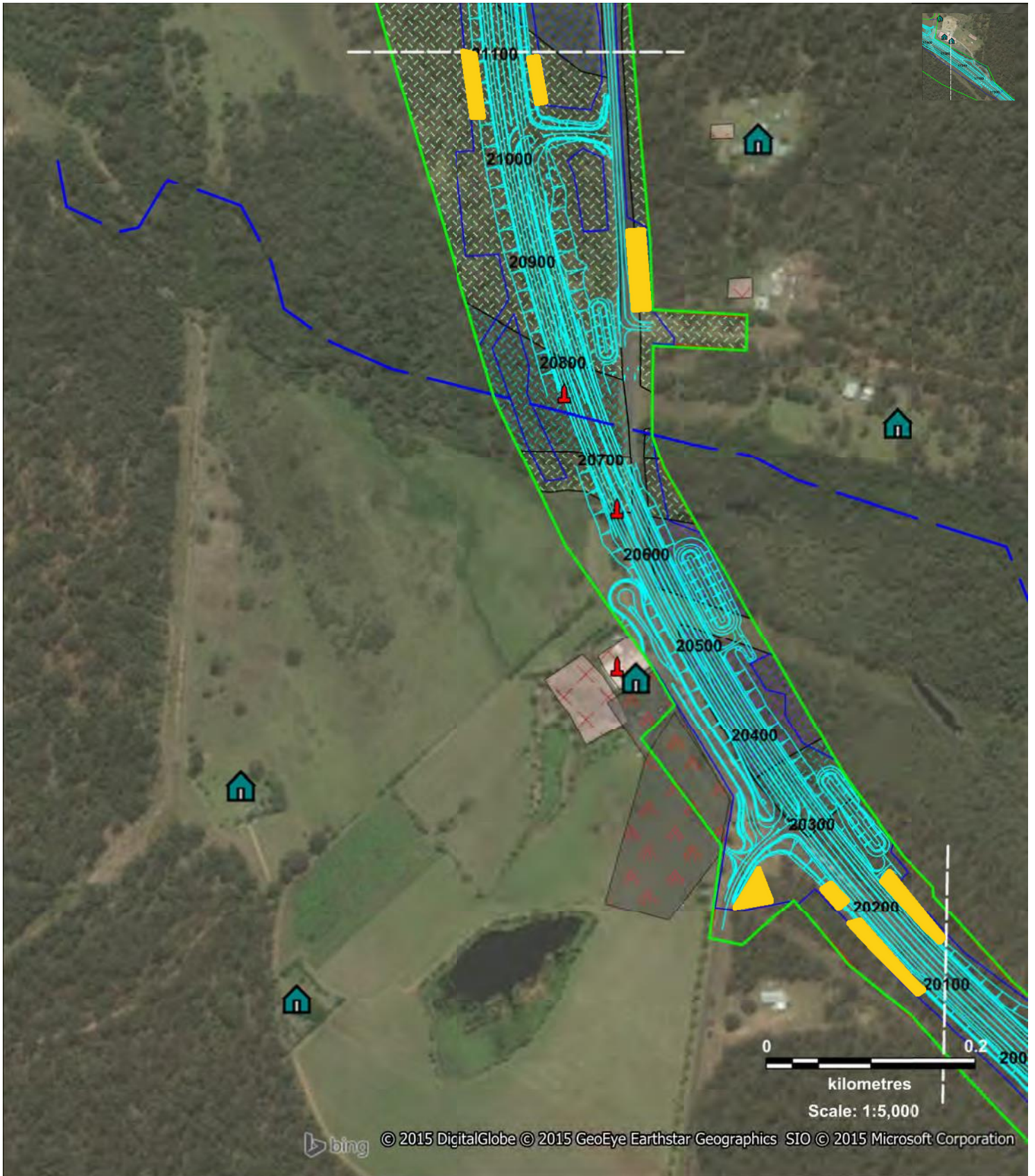
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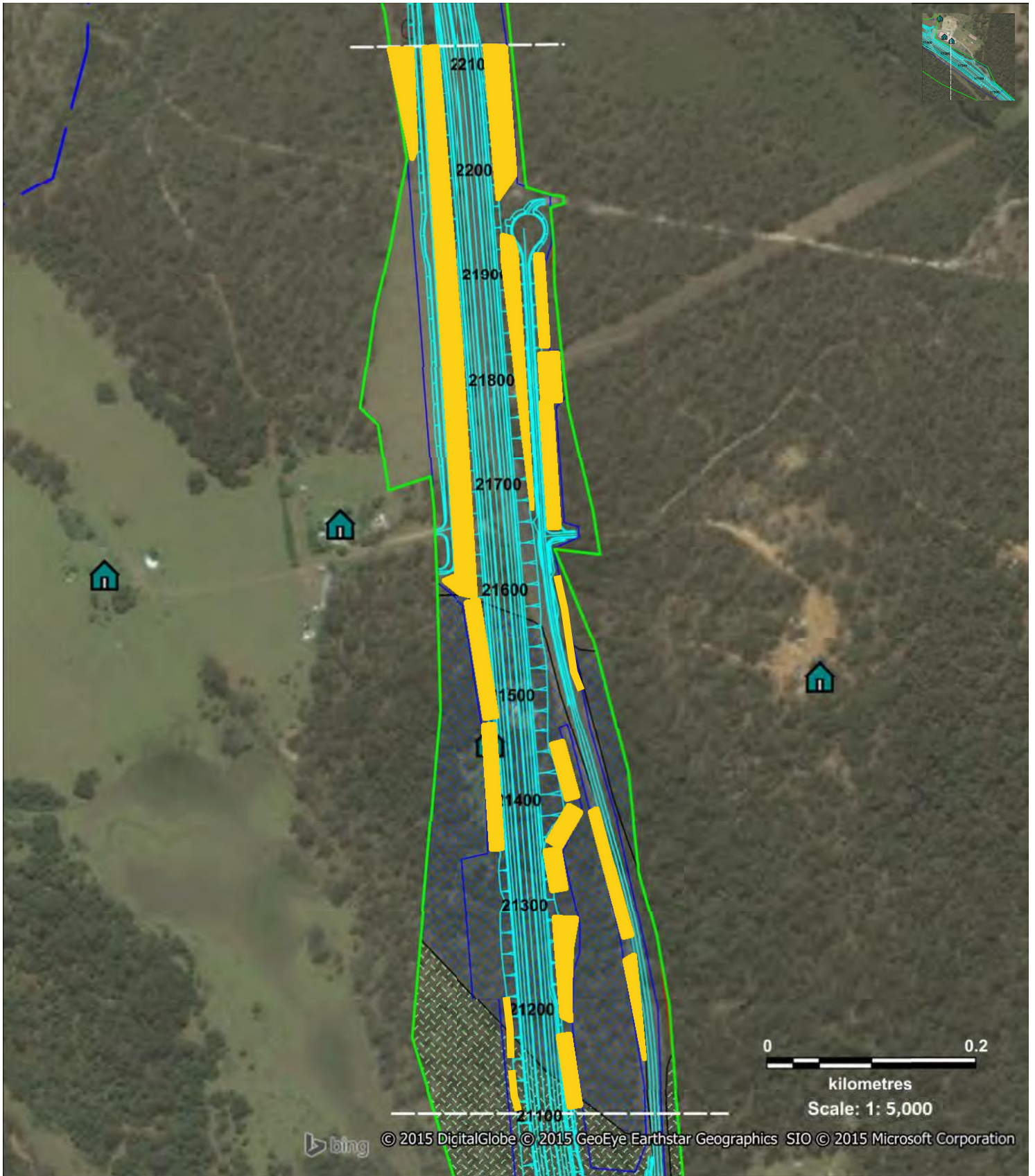
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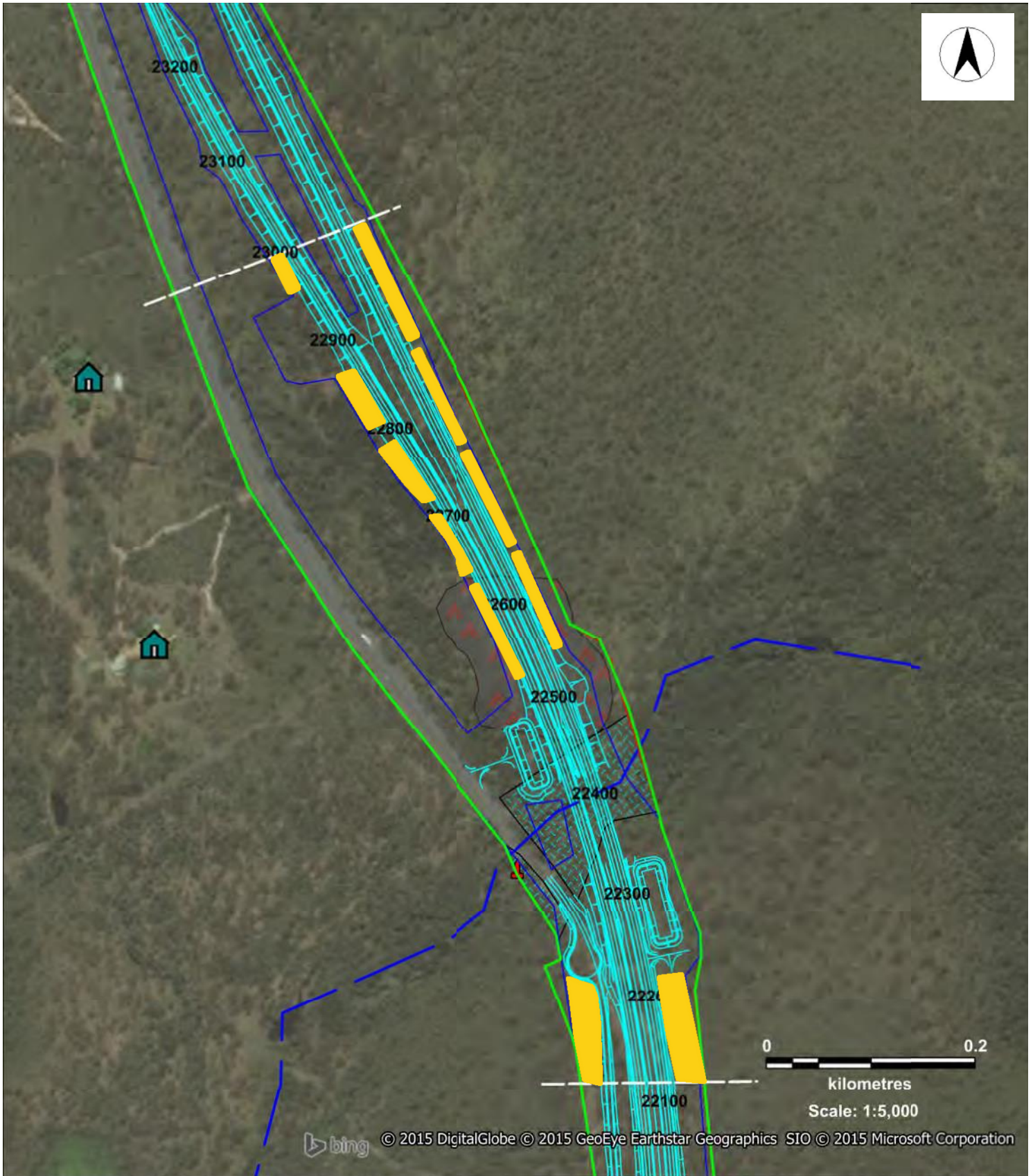
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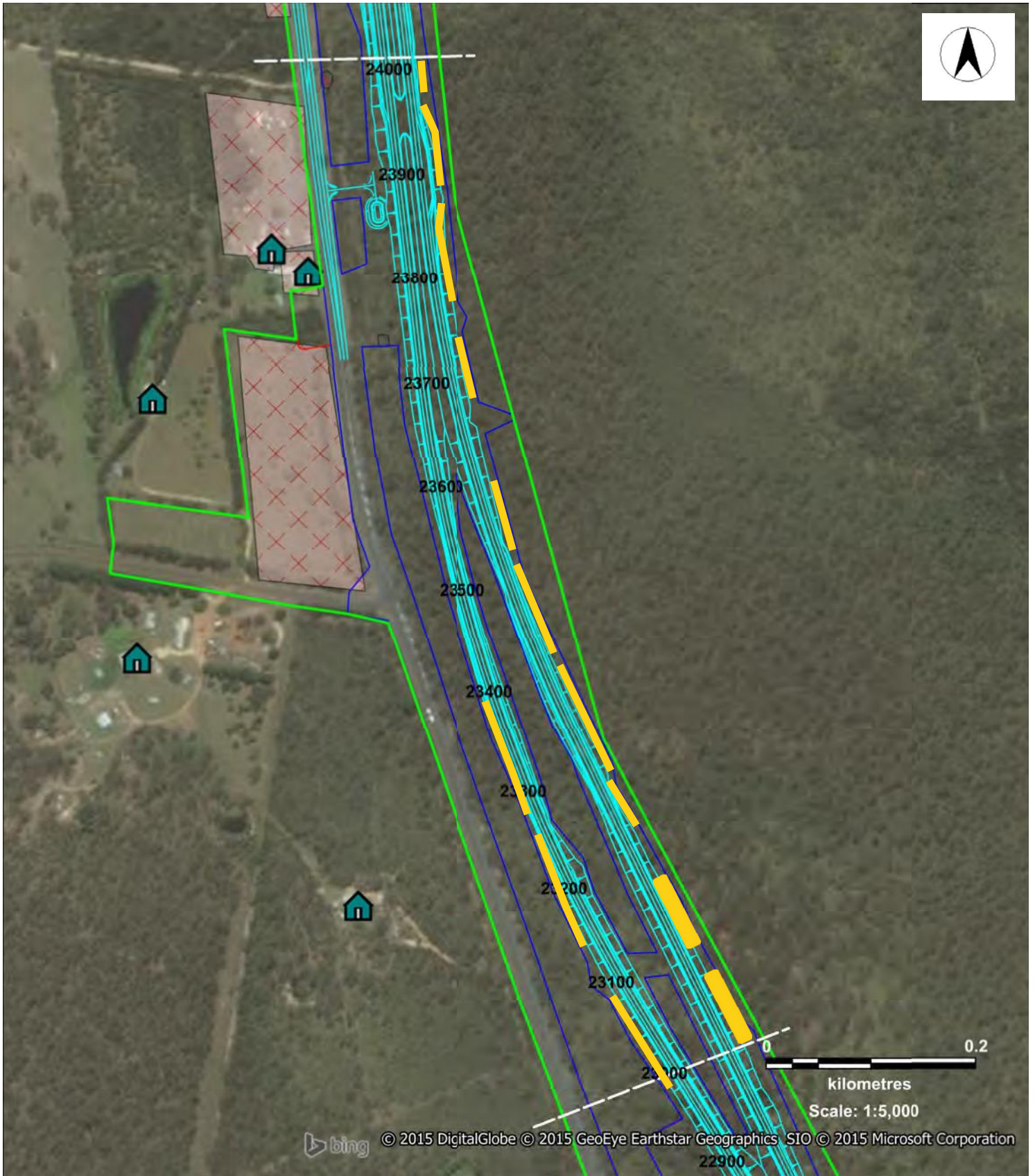
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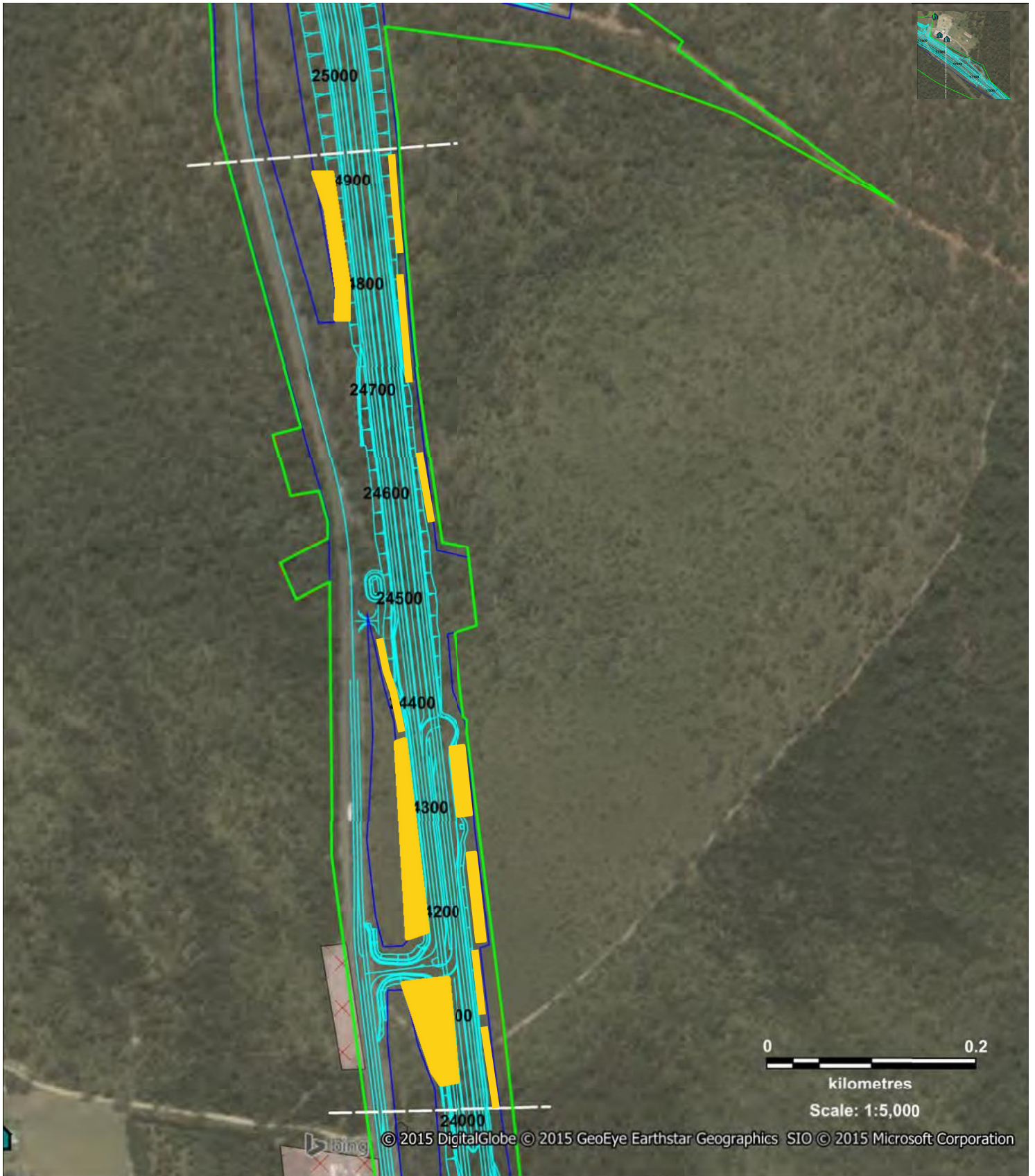
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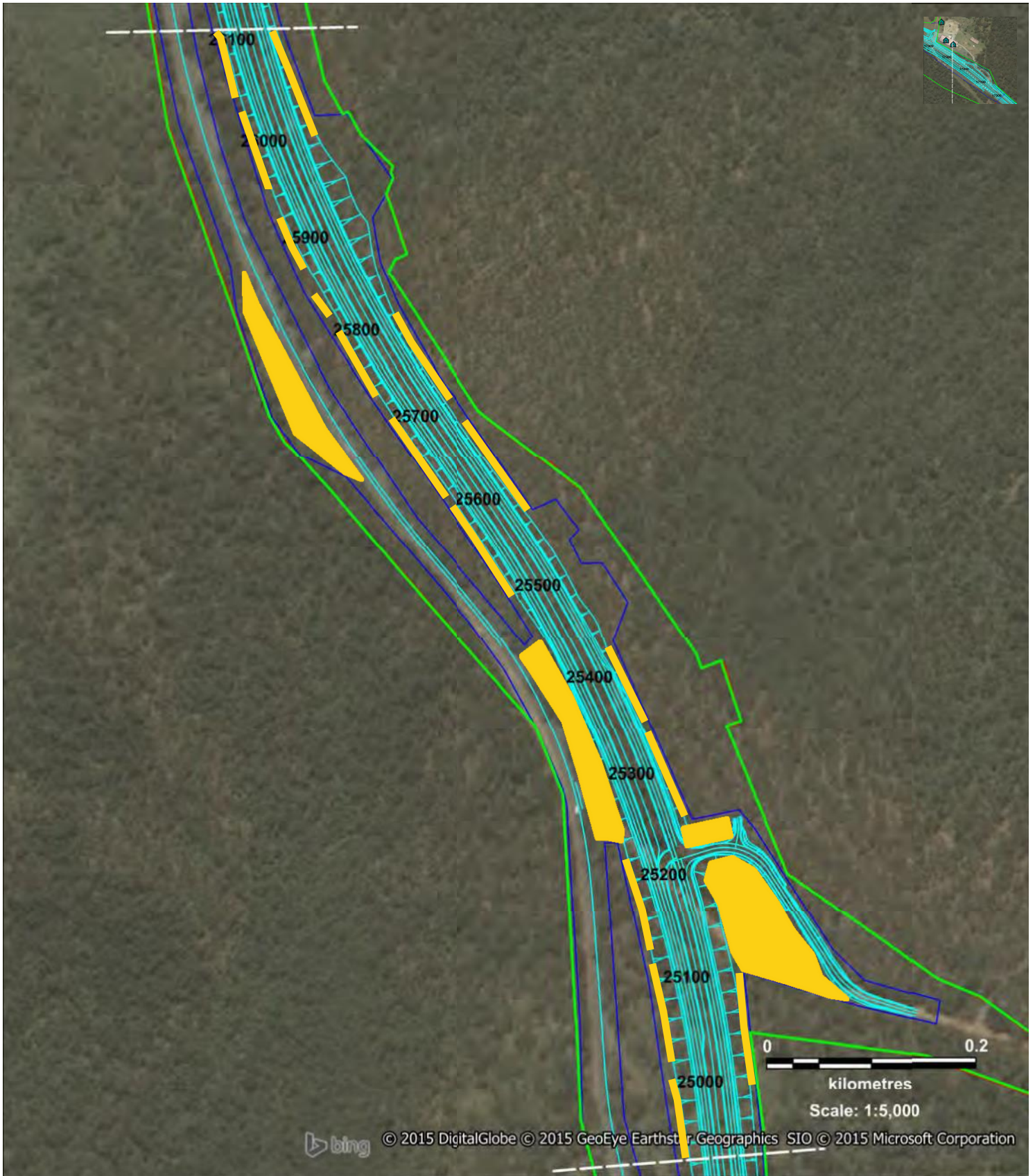
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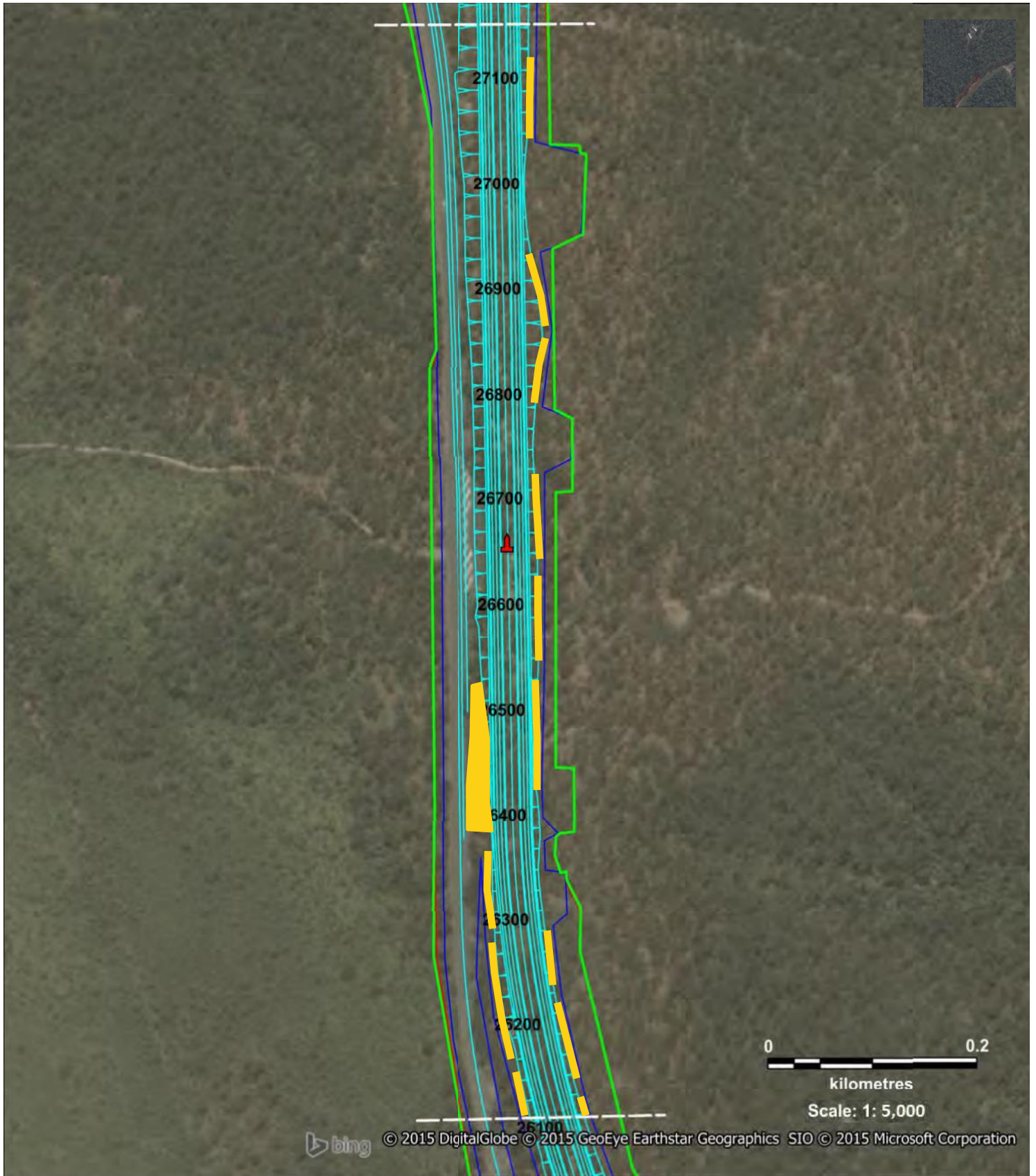
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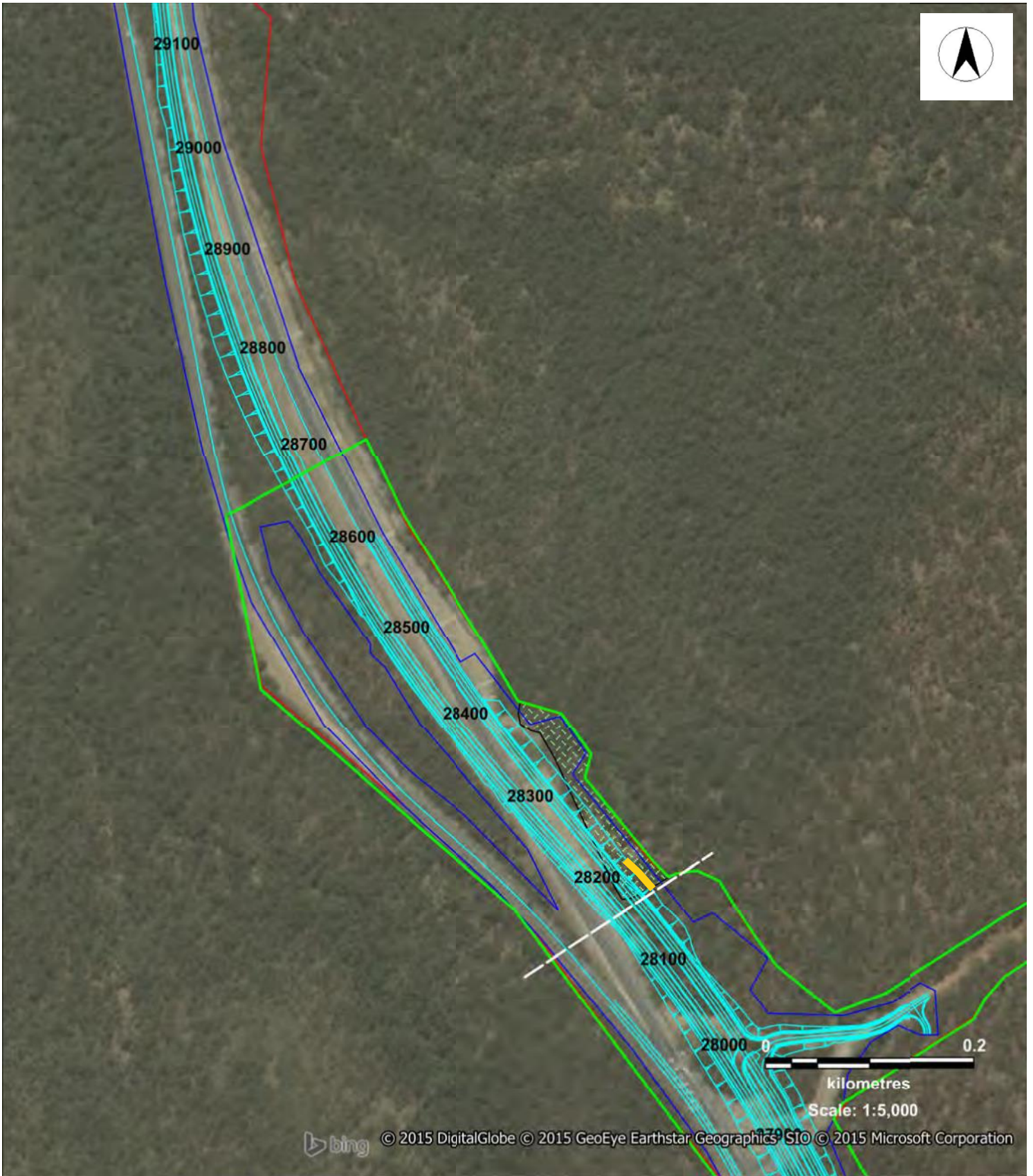
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Appendix J
Emergency Spill Response Plan



Purpose and scope

The purpose of this procedure is to detail the actions to be taken in response to environmental spills and accidents involving solid and liquid contaminants.

This procedure applies to all CMC Pty Ltd activities.

All response procedures are based on the SCARR method: safety, contain, absorb, remove, report.

This procedure is to be read in conjunction with the Emergency Preparedness and Response Procedure (*CIV-HS-PRO-0007_EmergencyPreparedness*) and any other relevant procedures.

Contacts

Position / Contact	Name / Company	Number
Project Manager		
Site Supervisor		
Environmental Officer		
Emergency Services	Fire / police / ambulance	000 or 011
Pollution hotline		
Liquid spill contractor	Transpacific	1800 7745575(SPILLS)



Identification and containment

Procedure	Details	Responsibility
Identify the material	<ul style="list-style-type: none"> • Immediately inform the Supervisor and / or EnvO of spilt material • Where possible, identify the spilt product and take precautions as per the MSDS • Approach the spill with the wind behind you checking for dangerous goods labels, Hazchem signage or U.N. number on packaging • Treat any unmarked packages as a hazardous substance • If the material presents a significant explosion threat (e.g. petrol or kerosene) or a nother serious hazard to workers, undertake all safe and practical means to remove any ignition sources and shut off or control the source of the spillage 	All Site Personnel
Isolate the Hazard	<ul style="list-style-type: none"> • If the spill creates a hazard to the general public (e.g. oil on road), isolate the area and if necessary establish traffic control 	Site Supervisor
External agency notification	<ul style="list-style-type: none"> • Major spills or those impacting public safety – contact Emergency Services & provide details of the material, quantity and environment (water, drains, etc.) • Ring pollution hotline 	Site Supervisor/ EnvO
Contain and Absorb the Spill – On Land	<ul style="list-style-type: none"> • If possible, prevent more material from being spilt (e.g. turn off taps, plug up leaks, turn container upright) • Construct bunding around the immediate area to prevent the flow reaching stormwater systems • Blocking off inlets to drainage lines, nearby waterbodies and the stormwater system and bunding of table-drains within the proximity of the spillage • Where possible absorbent spill kits and other specific absorbent products should be used in preference to cement, sand and sawdust • Different absorbents absorb different materials (e.g. some are designed for hydrocarbon, some are designed for acids) – make sure you use the right kind of absorbent, REFER MSDS 	Site Supervisor
Contain and Absorb the Spill – On Water	<ul style="list-style-type: none"> • If possible, prevent more material from being spilt (e.g. turn off taps, plug up leaks, turn container upright) • Place an absorbent boom downstream of the spill and progress back towards the source of the spill, and/or construct a bund using clean fill material • Ensure that the length of floating (hydrophobic) absorbent boom and pad is at least 1.5 times the width of the waterway • Only those absorbents designed specifically for use in water should be used 	Site Supervisor



Site clean up and reporting

Procedure	Details	Responsibility
LIQUID spills	<ul style="list-style-type: none"> • Use a suitable absorbent to soak up the spilt liquid • Work the absorbent into the liquid using a broom or rake • Allow sufficient time for the liquid to be soaked up by the absorbent • Sweep up the absorbent or pick up using a shovel or front end loader • Place the absorbent in a leak proof container for disposal • If the liquid has soaked into the ground, the contaminated soil may have to be removed or treated using in-situ bioremediation 	Site Supervisor
SOLID spills	<ul style="list-style-type: none"> • Sweep up the spilt material or pick up using a front end loader or shovel and then sweep up any remaining residue • Do not wash the spill away or bury it 	Site Supervisor
Spills on WATER	<ul style="list-style-type: none"> • Cast a absorbent net or a absorbent boom over the surface of the spill • If using a boom, spread the absorbent while drawing in the booms to reduce the surface area of the spill • Caution must be taken to ensure the spill remains contained at all times • If the shoreline is contaminated the area must be treated using in-situ bioremediation 	Site Supervisor
Disposal / Reuse of material	<ul style="list-style-type: none"> • If unsuitable for reuse, arrangements should be made for the material to be promptly disposed of in accordance with the requirements of the DEHP and local Shire Council. Contact the DEHP or the Local Authority for advice on disposal • Material awaiting disposal is to be stored in a way that prevents or minimises the likelihood of contaminants re-entering the environment • Examples include storing in suitably labelled drums/containers; bunding and covering contaminated stockpiles 	Site Supervisor
Incident Reporting	<ul style="list-style-type: none"> • Investigation into causes and actions to prevent recurrences and shall ensure that the incident is reported and recorded in accordance with CMC's incident reporting procedure (CIV-HS-PRO-0004_IncidentReporting) 	PM/ Site Supervisor



Map of spill response equipment *(for each stage of project)*