



APPENDIX B9

Construction Contaminated Land Management Plan

Additional Crossing of the Clarence River at Grafton Project

SEPTEMBER 2016



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2		
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5		

Contents

1	Introduction.....	1
	1.1 Context.....	1
	1.2 Background.....	1
	1.3 Environmental management document system.....	1
2	Purpose and objectives.....	2
	2.1 Purpose.....	2
	2.2 Objectives.....	2
3	Environmental requirements.....	3
	3.1 Relevant legislation and guidelines.....	3
	3.2 Minister’s Conditions of Approval.....	3
4	Consultation.....	5
5	Existing environment.....	6
	5.1 EIS.....	6
	5.2 Contaminated Site Investigation.....	9
	5.3 Groundwater Investigation.....	13
	5.4 Contamination Strategy – Construction Purposes.....	13
6	Environmental aspects and impacts.....	15
	6.1 Construction Activities.....	15
	6.2 Potential Impacts.....	15
	6.3 Issues and Strategies.....	15
7	Environmental control measures.....	18
8	Compliance management.....	25
	8.1 Roles and responsibilities.....	25
	8.2 Training.....	25
	8.3 Monitoring and inspection.....	25
	8.4 Auditing.....	25
	8.5 Reporting.....	26
9	Review and improvement.....	27
	9.1 Continuous improvement.....	27
	9.2 CCLMP update and amendment.....	27

Annexures

Annexure A Schedule A – Recommended general process for assessment of site contamination (NEPM, 2013)

Annexure B Figure 1 – Ongoing Monitoring (Cavvanba Consulting, 2016)

Annexure C Unexpected Discovery of Contaminated Land Procedure

Annexure D Areas A-F from the Contaminated Site Investigation (October 2015)

Tables

Table 3-1: Conditions of Approval relevant to the CCLMP	3
Table 5-1: Areas of potential contamination and acid sulfate soil risk within or next to the Project area	7
Table 5-2: Contaminated Site Investigation Area Summary	9
Table 5-3: Former Rail Land Summary	9
Table 5-4: Commercial area summary	11
Table 5-5: Proposed compound area summary	12
Table 5-5: Groundwater investigation summary	13
Table 6-1: Potential Issues and Management Strategies	15
Table 7-1: Environmental management measures for contaminated land impacts.....	19
Table 7-2: Additional mitigation measures for contaminated land impacts	21
Table 8-1: Contaminated Land Monitoring	25

Glossary / Abbreviations

CCLMP	Construction Contaminated Land Management Plan
CEMP	Construction Environmental Management Plan
CSM	Conceptual site model
CWEMP	Construction Waste and Energy Management Plan
BoM	Bureau of Meteorology
CoA	Condition of Approval
EIS	Environmental Impact Statement
CL	Contaminated Lands
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPL	Environment Protection Licence
EWMS	Environmental Work Method Statements
LNAPL	Light Non Aqueous Phase Liquid
N/A	Not applicable
NEPC	National Environment Protection Council
PESCP	Progressive Erosion and Sediment Control Plan
POEO Act	<i>Protection of the Environment Operations act 1997</i>
Project, the	Additional Crossing of the Clarence River at Grafton
RMS	Roads and Maritime Services
SSI	The state significant infrastructure as generally described in Schedule 1 (SSI-6103) of the Infrastructure Approval.

1 Introduction

1.1 Context

This Construction Contaminated Land Management Plan (CCLMP) forms part of the Construction Environmental Management Plan (CEMP) for the Additional Crossing of the Clarence River at Grafton Project (the Project).

This CCLMP has been prepared to address the requirements of:

- the Infrastructure Approval;
- the environmental measures listed in the *Additional Crossing of the Clarence River at Grafton Environmental Impact Statement* (EIS) (ARUP, 2014) and *Additional Crossing of the Clarence River at Grafton Submissions Report* (RMS, 2014); and
- all applicable legislation.

1.2 Background

The EIS assessed potential land contamination impacts from construction of the Project. The EIS identified 16 parcels of land which have the potential to be contaminated within or near the Project boundary. The EIS also identified potential impacts during construction; primarily relating to the mobilization of surface and subsurface contaminants during excavation, earthworks and demolition, and the migration of such contaminants to sensitive receivers (ecological and human receptors).

Following the EIS, additional investigations were conducted as detailed in Section 4 of this CCLMP.

The implementation of the management and mitigation measures in this CCLMP will assist to mitigate contaminated land risks.

1.3 Environmental management document system

The Project Environmental Management System is described in Section 4.1 of the CEMP. The CCLMP is part of Fulton Hogan's environmental management framework for the Project.

Management measures identified in this CCLMP will be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMSs will be developed and signed off by environment and management representatives prior to the commencement of the associated works. Construction personnel will be required to undertake works in accordance with the mitigation and management measures identified in the EWMS.

The combination of the CEMP, issue-specific plans, strategies, procedures and EWMS identify the required environmental management actions for implementation by Fulton Hogan's personnel and contractors.

The review and document control processes for this CCLMP are described in Chapter 10 of the CEMP.

2 Purpose and objectives

2.1 Purpose

The purpose of this CCLMP is establish a set of best practice procedures for the identification and management of contaminated land (CL) if encountered during works undertaken for the Project.

This plan has been prepared to address the applicable statutory requirements and aims to ensure that the commitments with regard to CL are met.

2.2 Objectives

The key objective of the CCLMP is to ensure that impacts to ecological and human receptors from the disturbance of contaminated land are minimised and managed. Specific objectives include:

- Avoid and minimise the environmental and human health risks arising from the disturbance of CL encountered during construction of the Project.
- follow the guidelines set out in the statutory requirements for managing CL and the transport of contaminated goods,
- no degradation to the receiving environment as a result of disturbance of CL, and
- no contamination of soil, air or water as a result of spillages or other impacts arising from construction activities.

3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

Legislation relevant to contaminated land includes:

- *Environmental Planning and Assessment Act 1979 (EP&A Act).*
- *Contaminated Land Management (CLM) Act 1997*
- *Protection of the Environment Operations Act 1997*
- *Environmentally Hazardous Chemicals Act 1985*
- *Environmentally Hazardous Chemicals Regulation 2008*
- *Pesticides Act 1999*
- *Pesticides Regulation 2009*

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 CCLMP include:

- *DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition). DEC, Sydney.*
- *EPA (1995) Contaminated Sites: Sampling Design Guidelines. NSW EPA, Sydney.*
- *EPA (2014) Waste Classification Guidelines – Part 1: Classification of waste.*
- *NEPM (amended 2013) Guidelines for the Assessment of Site Contamination.*
- *Office of Environment and Heritage (OEH) (2011) Guidelines for Consultants Reporting on Contaminated Sites. NSW Office of Environment and Heritage, Sydney.*
- *RMS QA Specification D&C G36 – Environmental Protection (Management System), adjusted for this project).*
- *Environmental investigations should be conducted in accordance with the flowchart provided in Appendix A – Schedule A: Recommended General process for assessment of site contamination, sourced from NEPM, 2013.*
- *RMS Guidelines for the Management of Acid Sulphate Materials, April 2005.*
- *NSW Acid Sulphate Soils Manual (ASSMC, 1998); and*
- *NSW EPA publication “Assessing and Managing Acid Sulphate Soils”.*

3.2 Minister’s Conditions of Approval

The CoAs relevant to this CCLMP are listed in Table 3-1 below. A cross reference is also included to indicate where the condition is addressed in this Plan or other project / environmental management documents.

Table 3-1: Conditions of Approval relevant to the CCLMP

CoA No.	Condition Requirements	Reference
B11	In the event that remediation of contaminated soils is required, the Proponent shall engage a suitably qualified and experienced	Not applicable at this stage - No areas identified as requiring

CoA No.	Condition Requirements	Reference
	contaminated land consultant to prepare a validation report upon completion of the remediation. The validation report shall verify that the site has been remediated consistent with the remediation action plan for the project and to a standard consistent with the clean-up criteria for the site.	remediation. Defined further in Chapter 7 mitigation measure ID CCLMM3.
B12	<p>The Proponent shall engage an accredited NSW Site Auditor to prepare a Site Audit Report and Site Audit Statement to determine the land use suitability. The Site Audit Report shall summarise the information reviewed by the auditor and provide the basis for the conclusions contained in the Site Audit Statement. The Statement and Report shall be submitted to the Secretary within seven days of the report being finalised and prior to the commencement of site preparation or excavation activities within areas identified as requiring remediation. A copy of the report shall also be submitted to Council for its information.</p> <p>Note: Terms used in this condition have the same meaning as in the Contaminated Land Management Act 1997.</p>	No areas identified as requiring remediation, and therefore no current requirements for an accredited NSW Site Auditor's involvement.

4 Consultation

This CCLMP has been developed in consultation with the Environment Protection Authority (EPA) and Clarence Valley Council.

A summary of consultation undertaken during the preparation of this CCLMP is provided in Appendix A2 of the CEMP.

5 Existing environment

Information on contamination has been obtained from the following documents:

- ARUP (August 2014) *Additional Crossing of the Clarence River at Grafton Environmental Impact Statement*;
- Cavvanba Consulting (October 2015) *Contaminated Site Investigation, Summerland Way – Additional Crossing of the Clarence River at Grafton, NSW* (Ref. 15003 R01)
- Cavvanba Consulting (February 2016) *Groundwater Investigation, ARTC Land, South Grafton, NSW* (Ref. 15003 R02)
- Cavvanba Consulting (April 2016) *Contamination Strategy – Construction Purposes, Former Rail Land, South Grafton, NSW* (Ref. 15003 R04)

The EIS findings formed the basis for the subsequent Contaminated Site Investigation by Cavvanba Consulting Pty Ltd (October 2015). However, a data gap remained with respect to potential groundwater contamination associated with the former fuel storage activities on the former rail land. To close the gap, Cavvanba Consulting Pty Ltd (Cavvanba) carried out a Groundwater Investigation (February 2016), and a Contamination Strategy (April 2016) to outline the management requirements for the site.

5.1 EIS

A preliminary soil contamination assessment was carried out for the EIS to identify past and present potentially contaminating activities and land uses along the proposed bridge alignment and involved:

- reviewing site condition and surrounding environment including topography, geology and hydrology;
- reviewing the land use history of the route alignment;
- search of databases: NSW EPA Contaminated sites, NSW Dept. of Primary Industries Cattle dip search, groundwater bore database, Clarence Valley Council contaminated land database;
- reviewing selected sites for Section 149 Certificates;
- reviewing Clarence Valley Council's planning documentation.

A search of NSW EPA records for notices under Section 58 of the *Contaminated Land Management Act* found no records for sites with a written notice from the EPA for contamination within or in close proximity to the Project (EIS, p336).

There are sixteen parcels of land that have the potential to be contaminated within or next to the Project area as listed in Table 5-1, shown on Figure 8-40 of the EIS and further described below.

Table 5-1: Areas of potential contamination and acid sulfate soil risk within or next to the Project area

Description	Ownership	Issue	Contaminants of concern
Grafton (within the Project area)			
Lot 100 DP 851143	Grafton TAFE campus	Contaminated soils Combustible and flammable liquids stored on-site	TPH, benzene, toluene, ethyl benzene, xylenes
Grafton (next to the Project area)			
Lot 5 DP 1068698	Private	Agricultural land uses	Heavy metals, organic contaminants
Lot 1 DP 1160909	Grafton Showground	Agricultural land uses	Heavy metals, organic contaminants
Lot 7007 DP 92967	Grafton Showground	Agricultural land uses	Heavy metals, organic contaminants
South Grafton (within the Project area)			
Not available	ARTC	Known contaminated soils	Confirmed presence of arsenic, cadmium, copper, lead, zinc and mercury, TPH c10-c36 exceeding the soil investigation level (sil), total Polycyclic Aromatic Hydrocarbons (PAHs), benzo(a)pyrene and asbestos (from one test pit 1.5 m deep).
Lot 2 and Lot 3 DP 1101889	Private	Contaminated soils Truck diesel distribution area	Asbestos, heavy metals, TPH, benzene, toluene, ethyl benzene, xylenes
Lots 384/ 385 DP 751385	Private	Agricultural land uses Acid sulfate soil risk area	Asbestos, heavy metals, TPH, organic contaminants. High risk of acid sulfate soil.
Lot 379 and Lot 380 DP 751385	Private	Acid sulfate soil risk area	Asbestos, heavy metals, TPH. High risk of acid sulfate soil
Lot 457 DP 823651	Private	Agricultural land uses	Heavy metals, organic contaminants
Lot 12 DP 858248	Public	Agricultural land uses	Heavy metals, organic contaminants
Lot 17 DP 858248	Private	Agricultural land uses	Heavy metals, organic contaminants
Lot 3 DP 586649	Private	Disused diesel/petrol tanks	TPH, benzene, toluene, ethyl benzene, xylenes
Pacific Highway on approach to South Grafton	Various	Acid sulfate soil risk area	High risk of acid sulfate soil
South Grafton (next to the Project area)			

Description	Ownership	Issue	Contaminants of concern
Lot 1 DP 859759	Private	Contaminated soils Disused diesel/petrol tanks	TPH, benzene, toluene, ethyl benzene, xylenes
Lot 346 and 347 DP 751385	Private	Contaminated soils Disused diesel/petrol tanks	TPH, benzene, toluene, ethyl benzene, xylenes
Lots 381/ 382/383 DP 751385	Private	Agricultural land uses Acid sulfate soil risk area	Asbestos, heavy metals, TPH, organic contaminants High risk of acid sulfate soil

Source: EIS Table 8-72, p337.

Grafton

There is potential for contamination within the Project area where there is, or has been, land uses such as automotive uses and agriculture (EIS, p337).

Residential areas within the proposed corridor in Grafton are not identified as high risk of contamination, although there is potential for localised contamination such as heavy metals, asbestos fragments and disused storage tanks. Due to the age of most dwellings in Grafton, there is a risk of asbestos being present and fibres being released during any demolition (EIS, p337).

The preliminary investigation did not identify any existing or former uses, or potentially contaminating events in the Clarence River that suggest contamination of the riverbed. Hence, there is a low risk of encountering contaminants on the section of Clarence River occupied by the below-water bridge foundations (EIS, p337).

It is noted, however, that the river channel where the bridge is to be constructed has a high probability of acid sulfate soils, as the soils are likely to contain estuarine bottom sediments within the river channel. Refer to Section 5.1.4 of the CSWQMP for additional details.

South Grafton

Potential for contamination on land occupied by the Project relates to existing and former industrial, automotive and agricultural land uses. In particular, the land occupied by the former locomotive depot is known to be contaminated (Coffey, 2004). The site was used as a locomotive depot between the 1920s and late 1960s. Facilities such as railway lines and sidings, a turntable, a diesel refuelling facility, coal store, offices, workshops and garages were built during this time. Many of the facilities were removed in the 1970s and the site ceased being used as a refuelling facility in the late 1980s. The site was leased to Manildra Sugars in 1989 and has been used for sugar loading operations since then (EIS, p337).

Within the existing Grafton and South Grafton levees, the fill material is likely to comprise virgin excavated natural material (VENM) as well as fill material of unknown quality. There is a minor risk of encountering contaminated fill during the levee raising work (EIS, p337). Disturbance to the levee will therefore be minimised where practicable (refer Chapter 7 mitigation measure ID CCLMM9). Should unexpected contamination be identified, the *Unexpected Discovery of Contaminated Land Procedure* included in Annexure C will be implemented (refer to Chapter 7 mitigation measure ID CCLMM12).

While no known cattle dip sites occur along the Project alignment, there is a possibility of encountering previously unknown cattle dips and associated contaminated soils (EIS, p337).

5.2 Contaminated Site Investigation

A contaminated site investigation was undertaken on this site by Cavvanba (October 2015) including:

- excavation of 164 testpits using excavators; and
- laboratory analysis of selected samples for a range of contaminants.

The site was split into six areas based on site history, land use, geographical location and proposed use. The site identification and landuse details are shown below. Areas A-F are shown graphically in Annexure D.

Table 5-2: Contaminated Site Investigation Area Summary

Area	Address	Title	Size (Ha - approximate)
South Grafton			
Area A - Former Rail Land	Bent Street, South Grafton.	Unknown - not described	0.89
Area B - North agricultural land	Iolanthe Street, South Grafton.	Lot 457 DP832651 Lots 379 & 380 DP751385	2
Area C - Commercial land	Iolanthe Street, South Grafton.	Lot 2 & 3 DP1101889	1.262
Area D - South Agricultural land	Iolanthe Street, South Grafton.	Lots 384 & 385 DP751385 Lots 12 & 17 DP 858248	2.4
Area E - Proposed site compound	Iolanthe Street, South Grafton.	Lots 2 and 3 DP1101889 Lots 379 and 380 DP751385 Lot 457 DP823651	4.472
Grafton			
Area F - TAFE	18 Clarence Street, Grafton.	Lot 100 DP851143	0.0483

A summary of the findings of each area are included in the following sub-sections.

Former rail land area (Area A)

A summary of the findings of the investigation with respect to the former rail land is provided below in Table 5-3. Area A is shown graphically in Annexure D.

Table 5-3: Former Rail Land Summary

Primary objective	EIS objective	Discussion
Define the extent of contamination identified in the EIS relevant to proposed construction works	Contaminant dispersal in air, surface water, groundwater, soil and dust. Off-site impacts on soil, sediment and biota (where applicable).	The land appears to have been subjected to a variety of industrial activities associated with the maintenance of locomotives and railway related materials. The primary issue is the filling of the site with various materials, including ash, coal, re-worked natural soil, and general material which may or may not have been sourced from the former buildings or activities on the site. This includes ACMs within fill material and on the ground surface. The contaminants identified at concentrations above investigation or screening levels are: Cu, PAHs, TRHs and ACMs and are typical of rail use. Without intensive sampling and analysis, delineation of contaminated areas is not possible and it should be considered likely that similar exceedances will be detected if further investigations are undertaken. These

Primary objective	EIS objective	Discussion
		<p>uncertainties must be managed appropriately to make the site suitable for commercial land use.</p> <p>In the vicinity of test pit location A11 there is residual, solidified tarry material mixed within the soil, the extent of which has not been delineated. Typically the contaminants in tar are naturally immobilised, however no laboratory tests have been undertaken on this particular material to confirm.</p> <p>The one groundwater well which was sampled during this investigation, is located adjacent to an area believed to have been used for fuel storage, however no significant evidence of spills was observed in the adjacent testpits A16 and A17. No significant groundwater contamination was identified.</p> <p>It is possible that contamination from the rail land is migrating via groundwater to the east, however there is insufficient information to ascertain to what extent.</p>
<p>Assess risks associated with worker safety, and management of the proposed construction works.</p>	<p>The potential effects of contaminants on public health, the environment and the project structures.</p>	<p>Any disturbance of the material has the potential to increase exposure via dust and direct contact.</p> <p>In Cavvanba's experience, ash has the potential to quickly create dust as it is coarse in texture, does not hold water, and is friable when mechanically disturbed. Exposure to hydrocarbons by dermal contact/ingestion is also increase by disturbance of the material.</p> <p>The immediate risk associated with ACMs can be managed through a program of hand-picking. That is, simply picking the pieces up and removing them from the site. Any disturbance of the soil surface may also expose fragments of ACM and ACM discoveries should be expected.</p> <p>Therefore, assuming the ACMs are handpicked prior to earthworks, increasing the degree of disturbance is likely to directly correlate to increasing the potential exposure risks.</p>
<p>Provide appropriate options to manage and mitigate impacts identified during construction and operational phases of the project</p>	<p>The adequacy and completeness of all information available to be used in making decisions on remediation.</p> <p>Evaluate remediation options that minimise disturbance and maximise re-use of material excavated during construction</p>	<p>There are inherent uncertainties associated with subsurface conditions on this part of the proposed project site, mainly associated with the variety of materials historically used to fill the land, which may pose a greater risk when disturbed during construction if not managed adequately.</p> <p>There is limited groundwater information available, however any groundwater contamination is unlikely to be disturbed during the proposed works, as it occurs at depths beyond the proposed excavation. The project must consider the implications of groundwater contamination which may be migrating underneath the site.</p> <p>Minimal disturbance is recommended.</p> <p>Cap the area and do not redistribute material to other portions of the construction site.</p> <p>Ensure cap is designed to last construction activities, and the roads ongoing operation.</p> <p>If offsite disposal is considered, the leachability of the material should be further investigated to assist with waste classifications.</p>

Agricultural area (Area B and Area D)

The agricultural land was considered to be suitable for commercial land use and is unlikely to pose unacceptable or additional risks to construction workers or the environment during the proposed construction. Standard environmental controls for sediments, dust, personal hygiene, soil tracking, unexpected finds and the like are considered sufficient to control potential contamination risks. Area B is shown graphically in Annexure D.

Commercial area (Area C)

A summary of the findings of the investigation with respect to the commercial area is provided below in Table 5-4. Area C is shown graphically in Annexure D.

Table 5-4: Commercial area summary

Primary objective	EIS objective	Discussion
Define the extent of contamination identified in the EIS relevant to proposed construction works	Contaminant dispersal in air, surface water, groundwater, soil and dust. Off-site impacts on soil, sediment and biota (where applicable).	The contamination, at this stage, appears to be limited to the north east portion of the site, associated with a waste burial. The contaminants identified are limited to zinc in soil at depth, and is associated with a burial that traverses the boundary between the commercial area and the former proposed site compound. In the current land use scenario there is limited ecological exposure risk. The zinc concentrations are less than the HIL. Whilst not observed within this portion of the site, there is a potential for ACMs to be present. Limited visual appraisal was possible due to the thick grass cover and stockpiles present. Similar to the former rail land portion of the site, the degree of risk is likely to be associated with the degree of disturbance. For this area, the primary concern is asbestos in surface soils, potential sub slab materials, variability of fill material and potential burials.
Assess risks associated with worker safety, and management of the proposed construction works.	The potential effects of contaminants on public health, the environment and the project structures.	Whilst minimal exceedances were reported in soil samples, there remains a high potential for unexpected finds to occur (e.g. burials). These may not necessarily lead to exceedances of contamination criteria, but pose a risk associated with building and demolition wastes which will require management. There is buried waste which traverses the boundary between the commercial area and the former proposed site compound.
Provide appropriate options to manage and mitigate impacts identified during construction and operational phases of the project	The adequacy and completeness of all information available to be used in making decisions on remediation. Evaluate remediation options that minimise disturbance and maximise re-use of material excavated during construction.	Minimal disturbance is recommended. Cap the area and do not redistribute material to other portions of the construction site. Ensure cap is designed to last construction activities, and the roads ongoing operation. If offsite disposal is considered, the leachability of the material should be further investigated to assist with waste classifications.

Proposed compound area (Area E)

A summary of the findings of the investigation with respect to the proposed compound area is provided below in Table 5-5. Area E is shown graphically in Annexure D.

Table 5-5: Proposed compound area summary

Primary objective	EIS objective	Discussion
Define the extent of contamination identified in the EIS relevant to proposed construction works	Contaminant dispersal in air, surface water, groundwater, soil and dust. Off-site impacts on soil, sediment and biota (where applicable).	Contamination appears to be limited to heavy metal exceedances in soil and the presence of ACMs and buried wastes. Three such areas have been identified, however there is potential that others exist, which have not been identified in this investigation. ACMs were observed in unvegetated areas, therefore there is a potential for ACMs to be present in other areas of the site which could not be visually appraised due to the presence of thick vegetation and stockpiles.
Assess risks associated with worker safety, and management of the proposed construction works.	The potential effects of contaminants on public health, the environment and the project structures.	The primary concern is associated with dust and direct contact with surface soils. Capping of the site would minimise the potential exposure.
Provide appropriate options to manage and mitigate impacts identified during construction and operational phases of the project	The adequacy and completeness of all information available to be used in making decisions on remediation Evaluate remediation options that minimise disturbance and maximise re-use of material excavated during construction.	The proposed use as a compound is unlikely to pose an unacceptable risk to human health or the environment. However the management of the site, particularly in regard to ACM on the surface, will require consideration. It is unlikely that placement of a cap will exacerbate any pre-existing issues, however a clear separation of existing site soil and the proposed cap should be made to minimise risk of mixing ACM with clean capping material. A marker layer is recommended. Furthermore, the site has a varied site history, and the presence of significant burials of building wastes should be considered in regard to potential unexpected finds.

TAFE (Area F)

The TAFE is considered suitable for commercial use, and is unlikely to pose unacceptable or additional risks to construction workers or the environment during the proposed construction. Standard environmental controls for sediments, dust, personal hygiene, soil tracking, unexpected finds and the like are considered sufficient to control potential contamination risks.

Area F is shown graphically in Annexure D.

Acid Sulfate Soils

The results of the acid sulfate soil testing demonstrated that five of the representative soil samples reported net acidity concentrations above the action threshold of 18 mole H⁺/t for disturbing more than 1,000 tonnes of material in the representative area. There were however no exceedances of the fine texture criteria, relevant if less than 1,000 tonnes of material were disturbed. Therefore, careful consideration should be given to the extent of excavation and the volume of soil to be disturbed during the works.

A brief summary of acid sulfate soil results exceeding the action criteria is provided below:

- Area A – no ASS identified, likely due to highly disturbed and filled nature of the site;
- Area B – one location at depth (i.e. 2.0 m);
- Area C – one location at depth (i.e. 1.0 m); and
- Area D – three locations at depths from 0.5 – 2.0 m.

Based on the current investigations for ASS conducted, if less than 1,000 tonnes is proposed to be excavated from the site, the threshold for ASS has not been exceeded and no

treatment is required. However, if > 1,000 tonnes is proposed to be excavated, consideration will need to be given to ASS.

Should the presence of ASS be confirmed, the *Acid sulfate soil management procedure* included in Annexure C of the CSWQMP will be followed (refer to Chapter 7 mitigation measure ID CCLMM13).

5.3 Groundwater Investigation

A groundwater investigation (February 2016) was undertaken at the former rail land portion of the site, including:

- advancement of six soil borings across the site using a drill rig and sampling of soils;
- installation of six additional groundwater monitoring wells, and sampling from nine groundwater monitoring wells in December 2015, and four in January 2016; and
- laboratory analysis of selected groundwater and soil samples for a range of contaminants.

This investigation focused on groundwater only, and did not preclude the conclusions and recommendations made in the Contaminated Site Investigation, refer to Section 5.2. The site is generally suitable for commercial land use, however proper consideration of groundwater contamination is required in order to maintain an acceptable level of risk. Table 5-6 highlights the issues from the investigation which should be addressed.

Table 5-6: Groundwater investigation summary

Previous uncertainty	Groundwater Investigation outcome	Recommendation
Residual hydrocarbon contamination in soil and groundwater	<p>Medium risk – hydrocarbon contamination identified in soil in proximity to the former waste oil AST and groundwater in excess of criteria in the vicinity of the former waste oil AST. In addition, impact associated with the former re-fuelling facilities is present.</p> <p>The waste oil and re-fuelling activities ceased at least 15 years ago, and it is likely that if impacts were to manifest at the surface in the adjacent drainage line, these would have already been observable as odours, stressed vegetation, iron/rust staining, etc. No such indicators are currently observable.</p> <p>Furthermore, the nature of contaminants (long chain hydrocarbons) and fine grained soils, are likely to limit migration.</p> <p>Subsurface soil and groundwater hydrocarbon contamination to the adjacent agricultural land is unlikely, however intrusive investigation has not been undertaken to confirm this.</p>	<p>Management of the soil and groundwater hydrocarbon impact is required during construction.</p> <p>This should include consideration of activities which may directly disturb the area, such as piling, and other subsurface activities beyond 2.5 m depth, within the former rail land.</p> <p>In regard to the adjacent agricultural land, a precautionary approach is recommended, so that works within an approximate 30 m radius from MW05 and which disturb soil beyond 1 m below ground surface, are undertaken with due consideration of the potential for exposing contamination.</p>

5.4 Contamination Strategy – Construction Purposes

A contamination strategy (April 2016) was developed by Cavvanba Consulting for the Roads and Maritime Services (RMS) construction of the road bridge Clarence River Crossing on the former rail land adjacent to the Clarence River in Grafton, NSW. The contamination is primarily related to petroleum hydrocarbons in soil and groundwater on the former rail land, which may also be present in the subsurface in the adjacent agricultural land.

This strategy also considers the risk of contamination from outside the land being acquired by RMS migrating onto RMS land.

Consideration was given to whether sufficient data was available to arrive at the required level of certainty. This is based on industry guidance which includes a CSM screening tool, which has been used to evaluate whether sufficient information has been collected to date. The score in the screening tool is 60%, which is between the ranges considered to be:

- 60% - 90%: The site is adequately characterised and may be suitable for remedial decision making. Increased certainty in some factors may be desired prior to remedy design.
- 30% - 60%: Site characterisation is inadequate for use as a basis for most remedial action decisions. Additional work is prudent to improve certainty.

Data gaps were identified associated with groundwater monitoring in the adjacent agricultural land, as well as hydraulic conductivity information, which need to be investigated. Additional investigations are outlined in this strategy to assist in the development of a CSM and re-evaluate risks and rate of Light Non Aqueous Phase Liquid (LNAPL) source zone attenuation. At this stage, there is a requirement to install monitoring wells in strategic locations to delineate the plume of contamination.

The contamination strategy also includes discussion with respect to groundwater quality monitoring. A minimum of four rounds of groundwater monitoring, consisting of biannual sampling conducted for two years should be undertaken. The ongoing monitoring requirements should be re-evaluated if concentrations of contaminants continue to decrease. The frequency may be reduced, or alternatively monitoring ceased, and the monitoring wells decommissioned appropriately. Monitored Natural Attenuation (MNA) parameters should also be analysed, in addition to contaminants of concern: Total Recoverable Hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN).

Based on a site specific review of current best practice with respect to the LNAPL management process, the site is likely to be classed as a Low Risk Site. Therefore management of the contamination is likely to consist of a non-active approach, consisting of risk management options which enable natural attenuation to meet long term-objectives, followed by no further action. This strategy assumes that all stakeholders are in agreement.

Alternatively, if an unacceptable risk is identified, the proposed management should be reviewed and active remediation technologies may be required.

6 Environmental aspects and impacts

6.1 Construction Activities

Key aspects of the Project that could result in adverse land contamination impacts include:

- initial removal of topsoil;
- temporary access roads during construction;
- clearing of vegetation;
- demolition;
- bulk earthworks;
- importing, handling, stockpiling and transporting of material resources;
- excavation, including for piling, removal of ballast and rail track, drainage works, utility relocations;
- material stockpiles including the treatment of acid sulfate soils;
- compound operation including fuel and chemical storage, refueling and chemical handling.

6.2 Potential Impacts

Disturbing contaminated land could have the following impacts:

- mobilisation of surface and subsurface contaminants;
- migration of contaminants into the surrounding area via leaching, overland flow and/or subsurface flow;
- mobilisation of groundwater and/or surface water contamination;
- exposure of contaminants to ecological receptors; and
- exposure of contaminated soils and/or groundwater to human receptors.

Strategies to prevent these impacts are introduced in Table 6-1 and discussed in further detail in Table 7-2.

6.3 Issues and Strategies

The table below describes management strategies that will be proposed to mitigate any possible issues facing the Project.

Table 6-1: Potential Issues and Management Strategies

Contaminated site	Issue	Treatment
Former rail land ID unknown – not described	Fill material, including ash, coal and ACMs.	Minimise disturbance to material during construction works to the extent practical. Further details are provided in CCLMM7 in Table 7-2.

Contaminated site	Issue	Treatment
Former rail land ID unknown – not described	Groundwater hydrocarbon plume	Do not disturb groundwater, no excavation or piling to the depth of groundwater or depths greater than 2.5 m in the former rail land. Fill material will be placed on top of the site to reach the required height for construction purposes, limiting the potential of exposure. Following further monitoring, a management plan will be required, which may include the provision for groundwater monitoring.
Levee ID unknown – not described on eastern portion. Partially transects Lots 382, 383, 384 DP 751385, Lot 17 DP 858248 and DP 858248	Potential fill material	Minimise disturbance to material during construction works to the extent practical.
Commercial Land Lot 2 & 3 DP1101889	Unexpected burials	Minimise disturbance to material during construction works to the extent practical.
Agricultural land Lot 457 DP 823651	Groundwater hydrocarbon plume	Further investigation is required on the agricultural land, including installation and sampling of monitoring wells. Fill material will be placed on top of the site to reach the required height for construction purposes, limiting the potential of exposure. If groundwater contamination is present on the agricultural land, a precautionary approach is necessary, and no disturbance below occur greater than 1 m below the surface should be conducted within a 30 m radius of MW05.
Proposed site compound Lots 2 and 3 DP1101889 Lots 379 and 380 DP751385 Lot 457 DP823651	Unexpected burials	Minimise disturbance to material during construction works to the extent practical.

Persons whose activities have contaminated land and owners of land who become aware, or ought reasonably to be aware, that the land has been contaminated must notify the EPA as soon as practicable after becoming aware of the contamination, if the contamination meets certain criteria. The duty to notify is a requirement under section 60 of the CLM Act 1997. A

person has a duty to notify if that person ought reasonably to have been aware of the contamination. The EPA can be notified using the Site Contamination Notification form.

The Guidelines on The Duty to Report Contamination under the CLM Act 1997 provide information on two key aspects of the duty to report contamination. The guidelines set out the duty of landowners and persons whose activities have contaminated land to report to the EPA. This includes a range of considerations for those who encounter land contamination (including particular trigger levels for various contaminants) and information on how to proceed where there is uncertainty. The guidelines also outline how the EPA assesses and determines whether or not contamination is significant enough to warrant regulation.

The RMS Representative, the Environmental Representative and relevant Authorities will be promptly notified of any additional suspected or potential contamination exposed during construction activities as required by the RMS Incident classification and reporting procedure.

7 Environmental control measures

A range of environmental requirements and control measures are identified in the EIS, Submissions Report, Conditions of Approval and RMS documents. Measures to address impacts on contaminated land are provided in Table 7-1 and Table 7-2.

Table 7-1: Environmental management measures for contaminated land impacts

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
Disturbance of contaminated soils					
CS1	<p>Detailed site investigation</p> <p>A detailed site investigation will be prepared for the areas of potential contamination identified in the EIS in accordance with Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011). The site investigation will provide detailed information on the type, extent and level of contamination and assess:</p> <ul style="list-style-type: none"> • Contaminant dispersal in air, surface water, groundwater, soil and dust • The potential effects of contaminants on public health, the environment and the project structures • Off-site impacts on soil, sediment and biota (where applicable) • The adequacy and completeness of all information available to be used in making decisions on remediation. 	<p>EIS Section 8.10 Submissions Report</p>	<p>Detailed design</p>	<p>Contractor</p>	<p>This Plan</p> <p>Cavvanba Consulting (October 2015) <i>Contaminated Site Investigation, Summerland Way – Additional Crossing of the Clarence River at Grafton, NSW</i> (Ref. 15003 R01)</p> <p>Cavvanba Consulting (February 2016) <i>Groundwater Investigation, ARTC Land, South Grafton, NSW</i> (Ref. 15003 R02)</p> <p>Cavvanba Consulting (April 2016), <i>Contamination Strategy – Construction Purposes, Former Rail Land, South Grafton, NSW</i> (Ref. 15003 R04)</p> <p>Further investigations required, but no areas currently identified as requiring remediation.</p>

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
CS2	<p>Site remedial action plan</p> <p>If the results of the detailed site investigation indicate a remedial action plan needs to be prepared and implemented, this plan will be prepared in consultation with Department of Planning and Environment and Office of Environment and Heritage. The plan will be prepared in accordance with <i>Guidelines for Consultants Reporting on Contaminated Sites</i> (OEH, 2011).</p>	EIS Section 810 Submissions Report G36	Pre-construction	Fulton Hogan	Chapter 7 mitigation measure ID CCLMM3. Further investigations required, but no areas currently identified as requiring remediation.
CS3	<p>Asbestos on demolished structures</p> <p>An asbestos survey will be conducted for structures to be demolished as part of the project.</p> <p>An asbestos certified disposal service will be engaged for properties identified as having asbestos materials.</p>	EIS Section 810 Submissions Report G36	Construction	Construction Manager	Refer to the CWEMP – Table 6-1, EMM WM6. CAQMP Section 6.1.2, Table A-1.
Soils, sediments, water and contaminated land					
SW3	<p>As part of the construction environmental management plan, a SWMP will be prepared in line with current Roads and Maritime specifications. The SWMP will include (but not limited to):</p> <hr/> <p>A risk assessment of the potential impacts on water quality and hydrological processes</p> <hr/> <p>Details of erosion and sediment controls to be implemented, including erosion and sediment control plans developed for the Project</p> <hr/> <p>Details of inspection frequency for control measures</p> <hr/> <p>Monitoring and maintenance of environmental control measures</p> <hr/> <p>Environmental work method statements for high risk activities such as dewatering and works within waterways</p> <hr/> <p>Procedures to manage stockpiles generated during construction</p> <hr/> <p>Tannin leachate management measures</p> <hr/> <p>Acid sulfate management measures</p>	EIS Section 10 Submissions Report S4	Pre-Construction	Fulton Hogan	CSWQMP CSWQMP CEMP App A3 CSWQMP CSWQMP CSWQMP CSWQMP CSWQMP CSWQMP

ID	Measure / Requirement	Reference	When to implement	Responsibility	Where Addressed
	Detailed consideration of measures to prevent (where possible) or minimise any water quality impacts				CSWQMP Table 7-2
	Measures to manage known and unexpected contamination during the construction stage				Table 7-2 Annexure C
	Consideration of water dissipation due to wick drains.				CSWQMP

Table 7-2: Additional mitigation measures for contaminated land impacts

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
GROUNDWATER CONTAMINATION – FORMER RAIL LAND (Area A)				
CCLMM1	<p>Conduct additional investigations, in accordance with the guidance documents outlined in Section 3.1.2. These investigations will aim to provide adequate information to evaluate the need for remediation and will include installation of six new groundwater wells down gradient of the plume, in the agricultural land. Three of these locations are close to the site boundary within the former rail land, and the other three are where contamination would be intercepted if migration towards sensitive receptors (Alipou Creek and Clarence River) occurs. These wells consist of PMW1 - PMW3 and Sentinel Wells 1 - 3. Proposed locations are shown on Annexure B - Figure 1.</p> <p>Collection of groundwater samples for contaminants associated with petroleum storage, as well as monitored natural attenuation parameters. In addition, slug tests will be undertaken for wells MW03, MW05 and MWA to get a better understanding of hydraulic conductivity. Following analysis of these results, the monitoring wells which are likely to be destroyed during construction will be decommissioned.</p>	✓		Environmental Manager
CCLMM2	<p>Following the additional sampling, a more robust evaluation of the extent and risk posed by contamination will be conducted and developed into a long term management plan document.</p> <p>Management is likely to consist of a non-active approach to LNAPL, consisting of structured development of risk management options enabling source zone natural attenuation to meet long term-objectives, followed by no further action. This strategy assumes that all stakeholders are in agreement.</p> <p>Alternatively, if an unacceptable risk is identified, active remediation technologies may be required.</p>		✓	Environmental Manager

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
CCLMM3	If remediation is required, a remedial action plan will need to be developed, and a validation report will be required upon completion of the remediation, if contamination is found to pose unacceptable risks to human health or the environment, in accordance with the OEH Guidelines for Consultants Reporting on Contaminated Sites. In addition, an accredited NSW Site Auditor will be engaged to prepare a Site Audit Report and Site Audit Statement to determine the land use suitability. Remediation works should be conducted in consultation with the EPA.		✓	Environmental Manager Project Engineers Foreman
CCLMM4	Except where piling, excavation should be conducted at depths no greater than 2.5 m on the former rail land where practicable as there is a risk of disturbing contaminated groundwater.		✓	Environmental Manager Project Engineers Foreman
CCLMM5	Implement the long term management plan, which will likely consist of ongoing biannual monitoring for contamination during the length of the construction phase, consisting of sampling of seven monitoring wells: MW04, MW05, MW06, PMW01 and Sentinel Wells 1 - 3.		✓	Environmental Manager
FILL CONTAMINATION – FORMER RAIL LAND (Area A)				
CCLMM6	Topsoil on-site is contaminated with ACM. The risk of ACM should be managed through a program of hand-picking following removal of topsoil across the former rail land, i.e. simply picking up the pieces of potential ACM and removing them from the site prior to commencement of the construction. Asbestos waste will be handled in accordance with the <i>Fulton Hogan Work Health Safety Management Plan</i> . Disposal of asbestos waste will be in accordance with Table 6-1 of the CWEMP.	✓		Environmental Manager
CCLMM7	<p>During construction works in the former rail land, minimise disturbance to the ground to the extent practicable.</p> <p>Removal of the rail line and associated ballast is estimated to require excavation of soil to a maximum depth of 1.5 m below the current ground surface in a limited area. Based on this, the following should be taken into consideration:</p> <ul style="list-style-type: none"> • creation of dust should be kept to a minimum, including wetting down if necessary; • ACM discoveries should be expected and handled in accordance with the <i>Fulton Hogan Work Health Safety Management Plan</i>. Disposal will be in accordance with Table 6-1 of the CWEMP; • soil should be reused within the former rail land area; • if soil is to be removed off-site, it will need to be classified in accordance with NSW EPA 2014, <i>Waste Classification Guidelines, Part 1: Classifying Waste</i>. 		✓	Environmental Manager

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
FILL CONTAMINATION – COMMERCIAL AREA (Area C)				
CCLMM8	Minimise disturbance in the commercial area, due to the potential of unexpected burials.		✓	Environmental Manager
FILL CONTAMINATION - LEVEE				
CCLMM9	Minimise disturbance associated with the levee, due to the potential of uncontrolled fill, including ACMs.		✓	Environmental Manager
FILL CONTAMINATION – PROPOSED SITE COMPOUND (Area E)				
CCLMM10	Minimise disturbance in the proposed site compound area, due to the potential of unexpected burials.		✓	Environmental Manager
GENERAL				
CCLMM11	<p>Appropriate induction and management procedures will need to be implemented as part of the construction environmental management plan, to minimise the risk from disturbance of the site during construction.</p> <p>This should include familiarization with the existing contamination issues known to be present on-site, including the presence of ash fill, ACMs, petroleum contamination.</p>		✓	Environmental Manager
CCLMM12	<p>In the event that unexpected contamination is identified, implement the <i>Unexpected Discovery of Contaminated Land Procedure</i> included in Annexure C of this CCLMP. Particular care should be taken in former rail and commercial land portions of the site.</p> <p>Specific to this project, this may include former buildings, ash fill, petroleum impact, asbestos containing materials, cattle tick dips, and contaminated material within the levee.</p> <p>Contaminated land investigations should be conducted in accordance with NEPM, amended 2013 Schedule A (see Annexure A)</p>	✓	✓	Environmental Manager
CCLMM13	<p>Based on the current investigations for ASS conducted, if less than 1,000 tonnes is proposed to be excavated from the site, the threshold for ASS has not been exceeded and no treatment is required. However, if > 1,000 tonnes is proposed to be excavated, consideration will need to be given to ASS.</p> <p>Should the presence of ASS be confirmed, the <i>Acid sulfate soil management procedure</i> included in</p>		✓	Environmental Manager Project Engineers Foreman

ID	Mitigation Measure	Timing		Responsibility
		PC ¹	C ²	
	Annexure C of the CSWQMP will be followed.			
CCLMM14	If soils are required to be disposed of off-site, then sampling should be conducted by a suitably qualified environmental consultant to assess the material in accordance with NSW EPA 2014, <i>Waste Classification Guidelines, Part 1: Classifying Waste</i> . Soils from the former rail land will specifically need to take into consideration the presence of asbestos in fill material, as well as requiring additional leachability testing.		✓	Environmental Manager
CCLMM15	Surface runoff control measures should be implemented immediately when required, to divert surface water run off away from contaminated land. In addition, these measures should capture and manage any surface runoff contaminated by exposure to contaminated land.		✓	Environmental Manager

8 Compliance management

8.1 Roles and responsibilities

Fulton Hogan's Project Team 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 Chapter 7 of this CCLMP.

8.2 Training

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

- existence and requirements of this CCLMP;
- relevant legislation;
- roles and responsibilities for contaminated land management;
- contaminated land mitigation and management measures;
- actions to be taken in the event that contaminated land is discovered or suspected; and
- familiarisation with the existing contamination issues known to be present on-site, including the presence of ash fill, ACMs, petroleum contamination.

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

- practices and controls to avoid pollution incidents from Contaminated Land
- rapid response to and reporting of all environmental incidents.

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

8.3 Monitoring and inspection

General requirements and responsibilities in relation to monitoring are documented in Section 8.2 of the CEMP. Specific requirements are identified in the table below.

Table 8-1: Contaminated Land Monitoring

Item	Frequency	Applicable standards	Responsibility
Monitoring of groundwater	Biannual	As detailed in Table 7-2 of this document	Environmental Manager
If required, sampling of excess soil material	If required, once prior to removal of soil material offsite	EPA NSW 2014, <i>Waste Classification Guidelines</i>	Environmental Manager

8.4 Auditing

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

It should be noted that this does not refer to an Audit under the *Contaminated Land Management (CLM) Act*, unless remediation is required.

Audit requirements are detailed in Section 8.4 of the CEMP.

8.5 Reporting

General reporting requirements and responsibilities are documented in the Section 8.5 of the CEMP.

9 Review and improvement

9.1 Continuous improvement

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

The continuous improvement process will be designed to:

- identify areas of opportunity for improvement of environmental management and performance;
- determine the cause or causes of non-conformances and deficiencies;
- develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies;
- verify the effectiveness of the corrective and preventative actions;
- document any changes in procedures resulting from process improvement; and
- make comparisons with objectives and targets.

9.2 CCLMP 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 CCLMP. This will occur as needed.

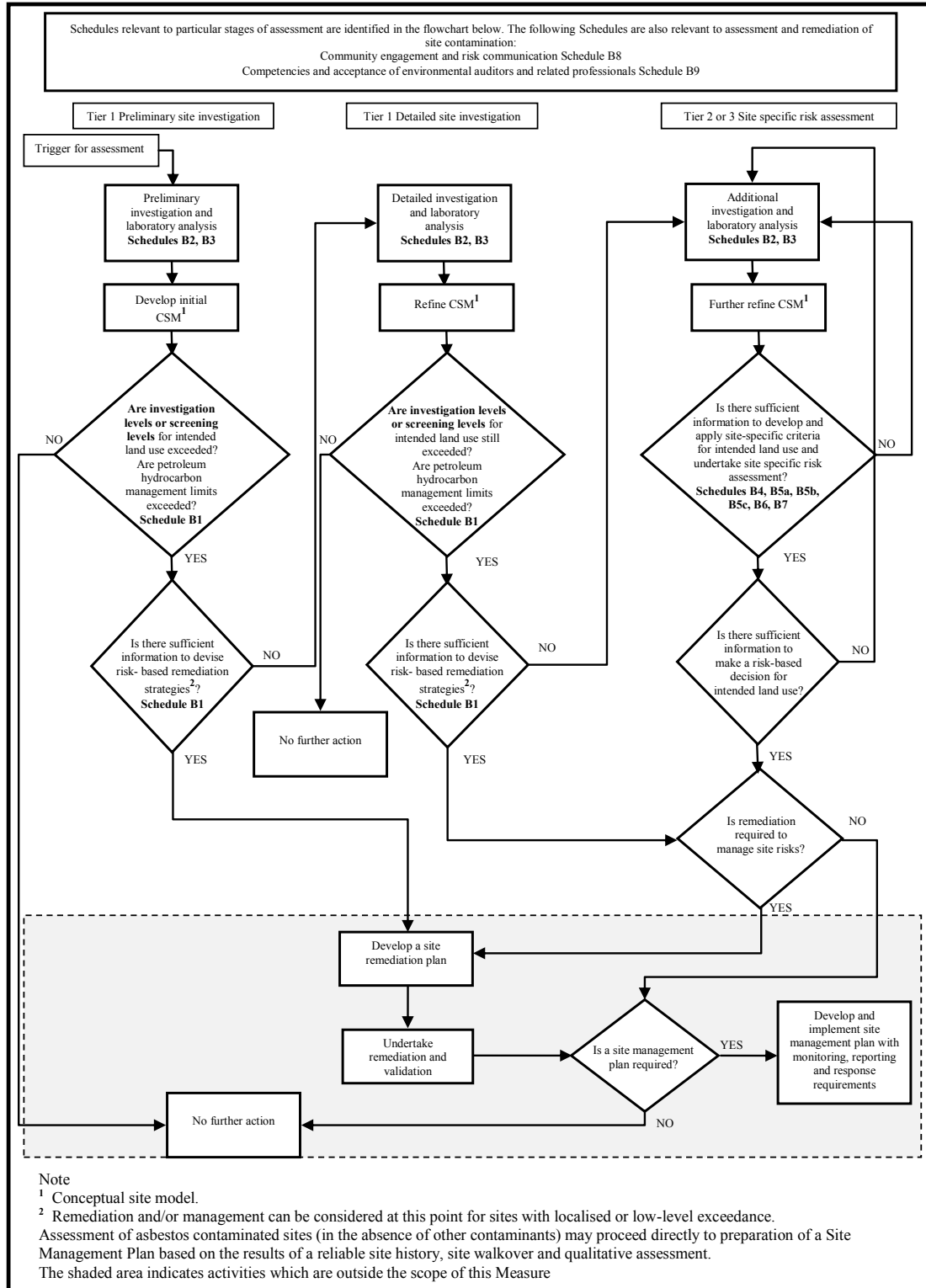
Any revisions to this Plan will be in accordance with the process outlined in Section 1.6 of the CEMP and as required, be provided to RMS, ER and other relevant stakeholders for review and comment and forwarded to the Secretary of DP&E for approval.

A copy of the updated CCLMP 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.

Annexure A

Schedule A – Recommended general process for assessment of site contamination (NEPM, 2013)

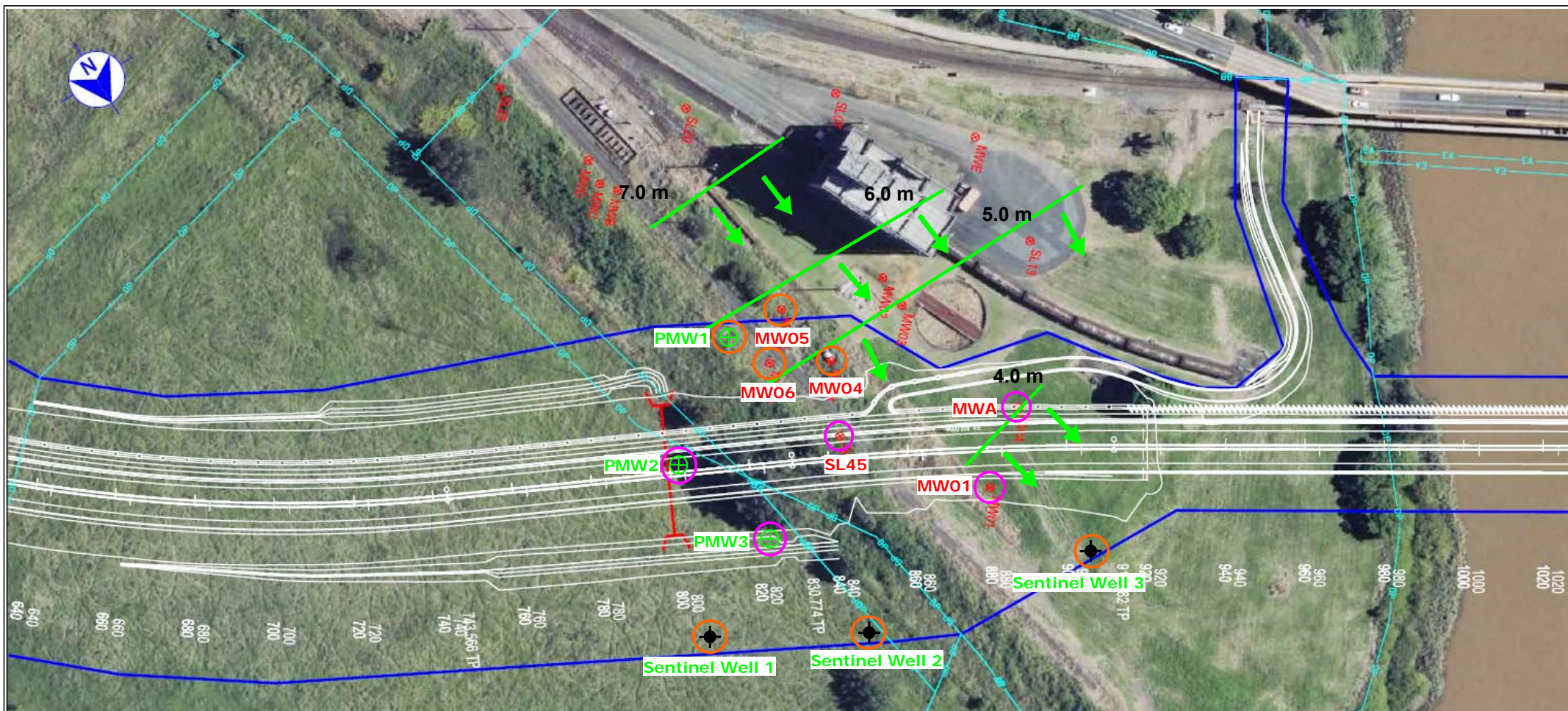
Schedule A—Recommended general process for assessment of site contamination



33 Schedule B

Annexure B

Figure 1 – Ongoing Monitoring (Cavvanba Consulting, 2016)




Key

- ⊕ Pre construction investigation wells
Installed to delineate current plume
- ⚓ Proposed long term monitoring wells (sentinel wells)
These provide a long term risk management/identification
of potential migration towards sensitive receptors.
- Wells to be decommissioned for construction
- Wells to be monitored long term

Figure 1. Ongoing Monitoring **Ref. 16050 R01**

CCLMP
Additional Crossing of the
Clarence River at Grafton

Client: Fulton Hogan
Drawn: RN 27/07/16
Source: Six Maps



Annexure C

Unexpected Discovery of Contaminated Land Procedure



Transport
Roads & Maritime
Services

Unexpected discovery of contaminated land procedure

MAY 2012



Document control

File name	[20150706 Appendix B4 SWMP_Grafton_Rev0.docx]
Report name	Unexpected discovery of contaminated land procedure
Revision number	Rev0

Plan approved by:

[signed]

[signed]

[signed]

Name

Name

Name

Contractor PM

Contractor EM

RMS representative

Revision history

Revision	Date	Description	Approval
0	8/05/12	Issued for stakeholder review	
1			
2			

1 Distribution

There are no restrictions on the distribution/circulation of this Procedure within the Project.

2 Purpose

This Procedure details the actions to be taken when potential contaminated soil / material is encountered during excavation/construction activities.

3 Induction / Training

Where required, personnel will be trained in the identification of potential contaminated soil / material including the requirements of this Procedure during the Project induction and / or regular toolbox talks.

4 Scope

This Procedure is applicable to all activities conducted by personnel on the Project that have the potential to uncover/encounter contaminated soil/material.

5 Procedure

1. Potential Contaminated Soil / Material Encountered during Construction Activities

If potential contaminated soil / material is encountered during excavation / construction activities:

- STOP ALL WORK in the immediate / affected area.
- Immediately notify the Environment Manager (EM).
- Recommence works in an alternate area where practicable.

2. Personal Protective Equipment (PPE)

Prior to any contamination investigation/management, appropriate personal protective equipment (PPE) is to be worn as per the relevant Material Safety Data Sheet(s) (MSDS).

This may include, but not be limited to:

- Eye goggles.
- Face mask.
- Rubber boots.
- Rubber gloves.
- Work clothes (i.e. long sleeve shirt/pants and steel capped boots).

3. Undertake a Site / Area Contamination Investigation

The G36 Hold Point for CI 4.2 Contaminated Land must be implemented.

The EM or Environmental Officer (EO) is to assess the situation and if considered necessary, commission a suitably qualified contamination specialist to undertake a contamination

investigation in the area of the find.

The material is to be classified in accordance with the *Waste Classification Guidelines* (DECCW, 2009).

If necessary, the EM will liaise with the relevant authorities to determine the appropriate management options.

The EM (in consultation with specialists) will determine the appropriate management measures to be implemented. This may include treatment or offsite disposal. If the material is to be disposed of offsite, ensure the waste facility is appropriately licensed.

If the material is determined to be acid sulfate soil or potential acid sulfate soil, the Acid Sulfate Soil Management Procedure (ASSMP) (Annexure C of the CSWQMP) is to be followed.

4. Remedial Action

Remedial actions are to be incorporated into specific Environmental Work Method Statements (EWMS) and training provided to site personnel and subcontractors through inductions and toolbox training sessions.

Remedial works are to be undertaken in line with the EWMS.

5. Recommence Works

Recommence works once remedial works have been implemented. The EM grants approval once hold point is released.

Figure D-1 is a summary of the procedure as a flow chart. It details the steps to be taken in the event of the unexpected discovery of contaminated land.

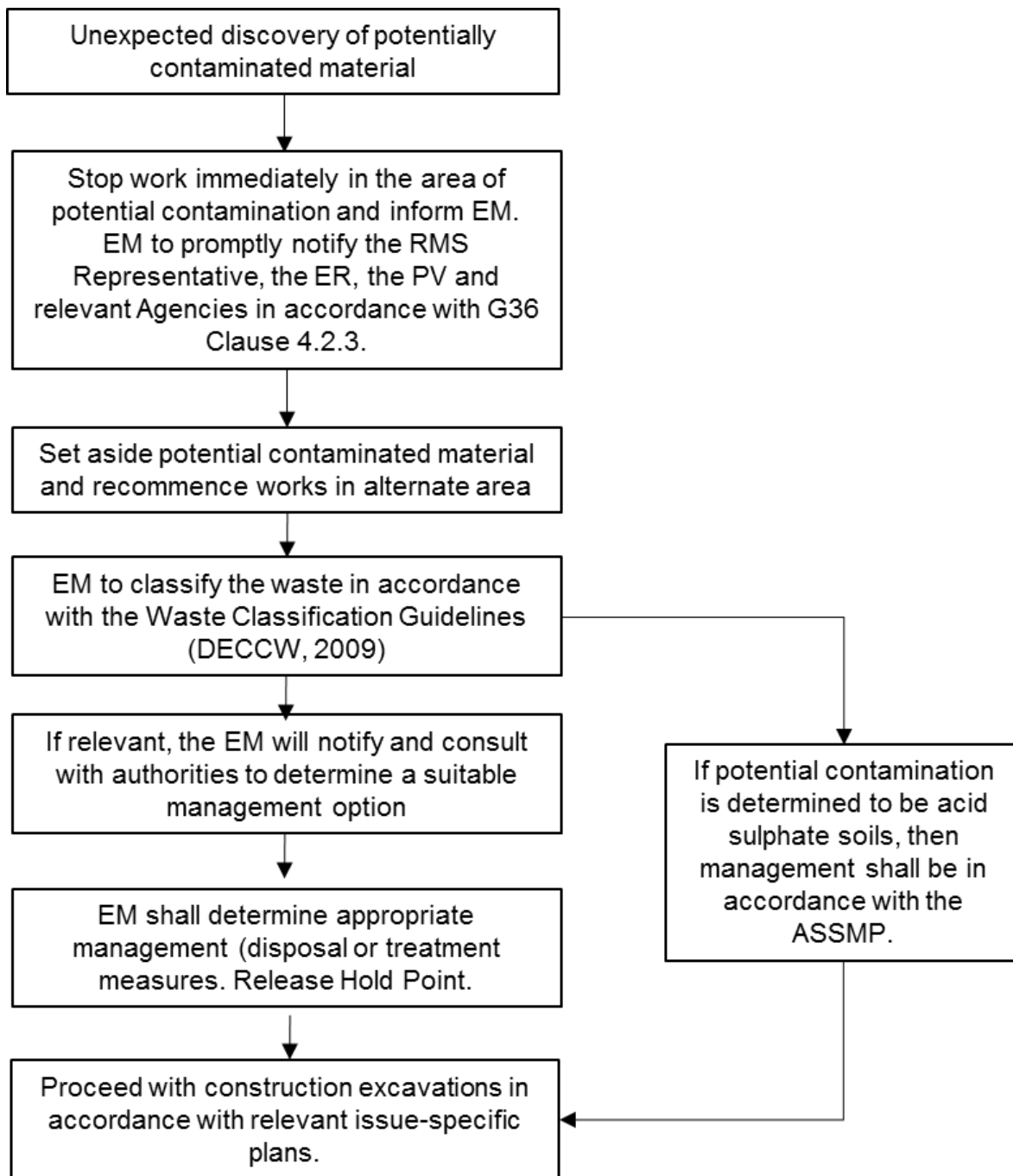


Figure D-1 Unexpected discovery of contaminated land procedure flow chart

Annexure D

Areas A-F from the Contaminated Site
Investigation (October 2015)

Potentially Contaminated Sites-South Grafton

Adjacent Rail Land
 Former above ground structures:
 - Coal stage
 - Large volume refuelling
 - Carriage Shed
 Lease to Manildra sugar

Proposed site compound (Area E)
 Truck distribution

Commercial Land within site boundary (Area C)
 Truck distribution

Charles Street roadworks



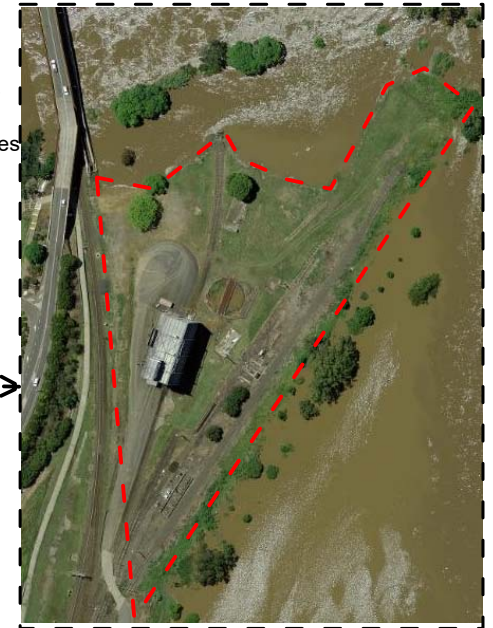
Rail Land within site boundary (Area A)
 Former above ground structures
 - Engine Shed
 - Turntable
 - Workshop
 - Store
 - Garage

Likely to have been filled

Agricultural Land within site boundary (Area B, Area D)

Low potential for contamination

Previous investigation (RMS)



Flood picture indicates filled area - - -

Figure 1. Site Plan

Ref. 15003

Grafton Bridge
 Clarence River Crossing
 Contract No. 15.2537.0451

Client: RMS
 Drawn: BW 16/07/15
 Source: RMS



A

Key

- + Test pits
- ⊕ Asbestos Sample
- Approximate monitoring well location
- ▲ Ash fill encountered
- ↔ Fill batter, slope down

ACMs > 50% ground cover around power pole

ARTC Rail Land = 20 samples
Grid = 21.2 m
Hotspot dia = 20.6 m

Figure 2. Sampling Plan Area A Ref. 15003

Grafton Bridge
Clarence River Crossing
Contract No. 15.2537.0451

Client: RMS
Drawn: BW 28/05/15
Source: Six Maps





B

Agricultural Land North = 30 samples
 Grid = 25.8 m
 Hotspot dia = 30.5 m

Figure 3. Sampling Plan Area B

Ref. 15003

Grafton Bridge
 Clarence River Crossing
 Contract No. 15.2537.0451

Client: RMS
 Drawn: BW 28/05/15
 Source: Six Maps





Area Tool [?] [] [X]

Area: 1.262 ha
Perimeter: 718 m

Depth = 0.4
Zn = 1,510 mg/Kg
Buried fill material

Levee
(NO DIG)

DP 1101889

1:2,257

0 30 60m



Commercial Land = 22 samples
Grid = 22.9 m
Hotspot dia = 27.1 m

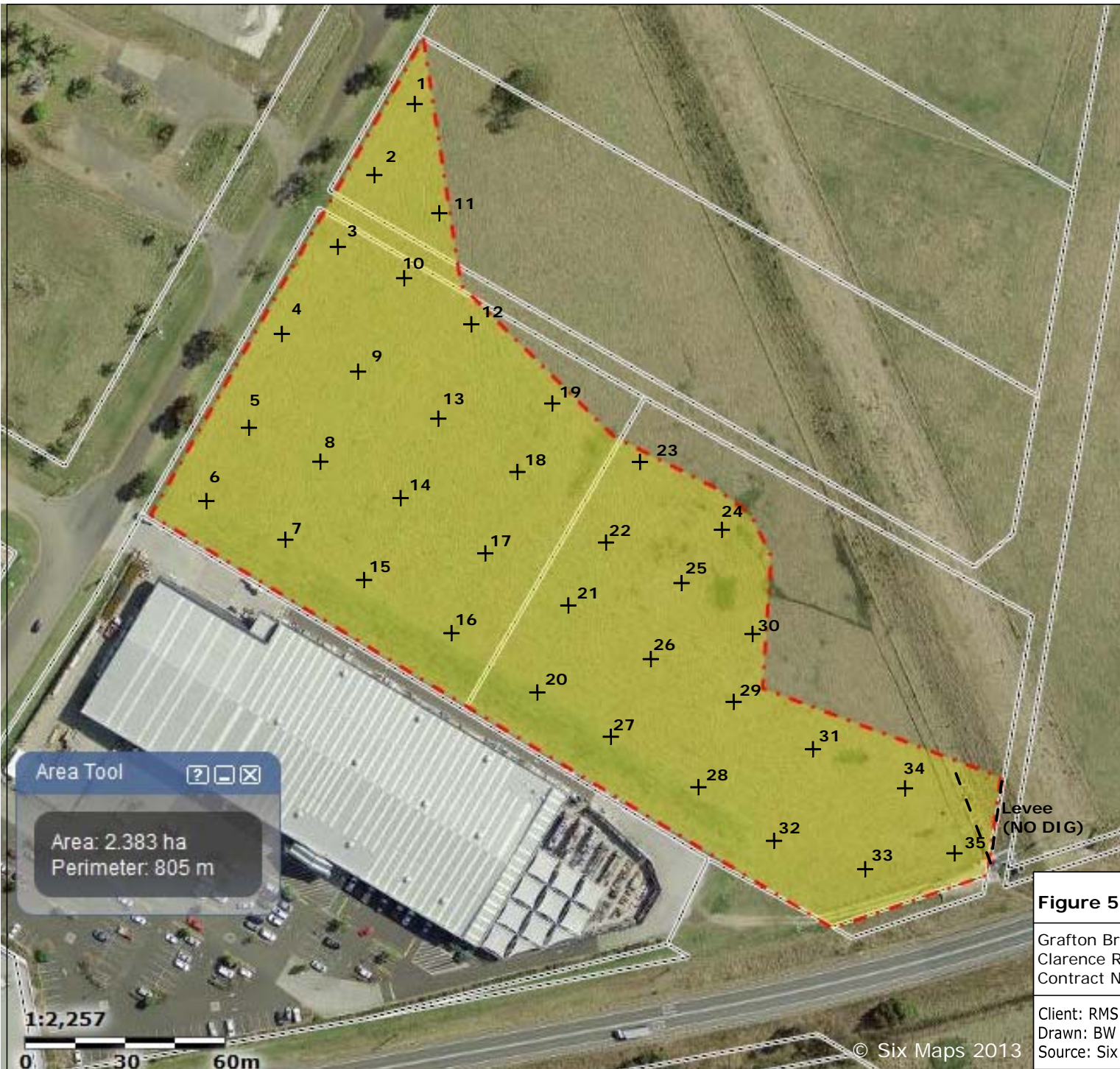
Figure 4. Sampling Plan Area C Ref. 15003

Grafton Bridge
Clarence River Crossing
Contract No. 15.2537.0451

Client: RMS
Drawn: BW 28/05/15
Source: Six Maps



D



Area Tool

Area: 2.383 ha
Perimeter: 805 m

Agricultural Land South = 35 samples
Grid = 26.7 m
Hotspot dia = 31.5 m

Figure 5. Sampling Plan Area D Ref. 15003

Grafton Bridge
Clarence River Crossing
Contract No. 15.2537.0451

Client: RMS
Drawn: BW 28/05/15
Source: Six Maps





E

Key

- + Test pits
- ⊕ Asbestos Sample
- ⊞ Location C01
- [- - -] Area exceeding site criteria and/or burial

Depth = 0.9 m
 Cu = 11,300 mg/kg
 Pb = 6,490 mg/kg
 Zn = 5,700 mg/kg

Depth = Surface
 Cu = 977 mg/kg

Depth = Surface
 Cu = 941 mg/kg

Compound Area = 52 samples
 Grid = 29.3 m
 Hotspot dia = 34.6 m

Area Tool

Area: 4.394 ha
 Perimeter: 957 m



© Six Maps 2013

Figure 6. Sampling Plan Area E

Ref. 15003

Grafton Bridge
 Clarence River Crossing
 Contract No. 15.2537.0451

Client: RMS
 Drawn: BW 28/05/15
 Source: Google Earth



F



TAFE Land = 5 samples
Grid = 10 m
Hotspot dia = 11.8 m

Area Tool



Area: 455 m²
Perimeter: 198 m

Figure 7. Sampling Plan Area F TAFE

Ref. 15003

Grafton Bridge
Clarence River Crossing
Contract No. 15.2537.0451

Client: RMS
Drawn: BW 28/05/15
Source: Six Maps

© Six Maps 2013

CAVVANBA
consulting