Sapphire to Woolgoolga Upgrade

Environmental Review

Material Re-use Strategy

May 2016
Revision 0.8

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1 Introduction

1.1 Introduction

The NSW Roads and Maritime Services (Roads and Maritime) are upgrading the Pacific Highway on the Mid North Coast of NSW between Sapphire and Woolgoolga. The upgrade consists of:

- A new southern section, 15 km dual carriageway, between Sapphire and South Woolgoolga largely within the existing highway corridor. The existing highway is being upgraded to provide a local traffic access route without the need to mix with high speed through traffic (refer to Figure 1.1)
- A new 'greenfield' northern section, 10 km bypass from South Woolgoolga to the west of Woolgoolga which re-joins the existing highway alignment in the vicinity of Arrawarra Beach Road (refer to Figure 1.1)

The principle objectives of the Pacific Highway Upgrade Program are detailed within Section 3.1 of the Sapphire to Woolgoolga Environmental Assessment (Connell Wagner, 2007) and specified below:

'The principal objectives of the Pacific Highway Upgrade Program are to:

- *Significantly reduce road accidents and injuries.*
- *Improve transport efficiency by reducing travel times and freight costs.*
- *Develop a route that involves the community and considers their interests.*
- *Provide a route that supports economic development.*
- *Manage the upgrading of the route in accordance with Ecologically Sustainable Development principles.*
- *Provide the best value for money.'*

On the 5th of December 2006, the NSW Minister for Planning declared the Sapphire to Woolgoolga upgrade (S2W) a major project under Section 75B(1)(b) of the Environmental Planning and Assessment Act and a critical infrastructure project under section 7C of the Act.

The Roads and Maritime completed an Environmental Assessment (EA) of the Sapphire to Woolgoolga Pacific Highway Upgrade (the Project) in November 2007. The EA identified a range of environmental, social and planning issues associated with the construction and operation of the Sapphire to Woolgoolga Pacific Highway Upgrade and proposed measures to mitigate or manage those potential impacts.

The EA was publicly exhibited between November 2007 and February 2008. Following public exhibition, submissions from stakeholders were received and addressed by the RTA in the Submissions Report which was lodged with the Director-General in July 2008.

After consideration of the EA and Submissions Report, the Minister for Planning approved the Sapphire to Woolgoolga Pacific Highway Upgrade project under Part 75J of the *Environmental Planning & Assessment Act 1979* (EP&A Act) on 15 January 2009, subsequently issuing a set of approval conditions for the project.

A significant project activity is the excavation, storage and management of excavated materials and the project team aims to beneficially re-use as much of the excavated materials as possible. Material that can be used for beneficial reuse for engineering purposes is deemed suitable. Material that does not meet engineering specifications is deemed to be unsuitable material. Unsuitable material must be placed in permanent locations within the road corridor or off site.

Due to a number of significant constraints including the size of the project, hilly terrain, land availability, tight road corridor, high rainfall, geotechnical conditions and the sensitive environment the management of unsuitable material has presented a significant challenge to the project team and a strategic approach must be applied to ensure sustainable outcomes are achieved.

The project is proposing to reuse excess material generated during construction of the project at various sites outside the Pacific Highway alignment. The material will be beneficially reused to ensure that the local landform suits its proposed use or to improve the amenity alongside the project, and provide beneficial future re-use opportunities at each of the sites. Re-use opportunities within the Project alignment have been maximised to date and are further detailed in Section 3.2.

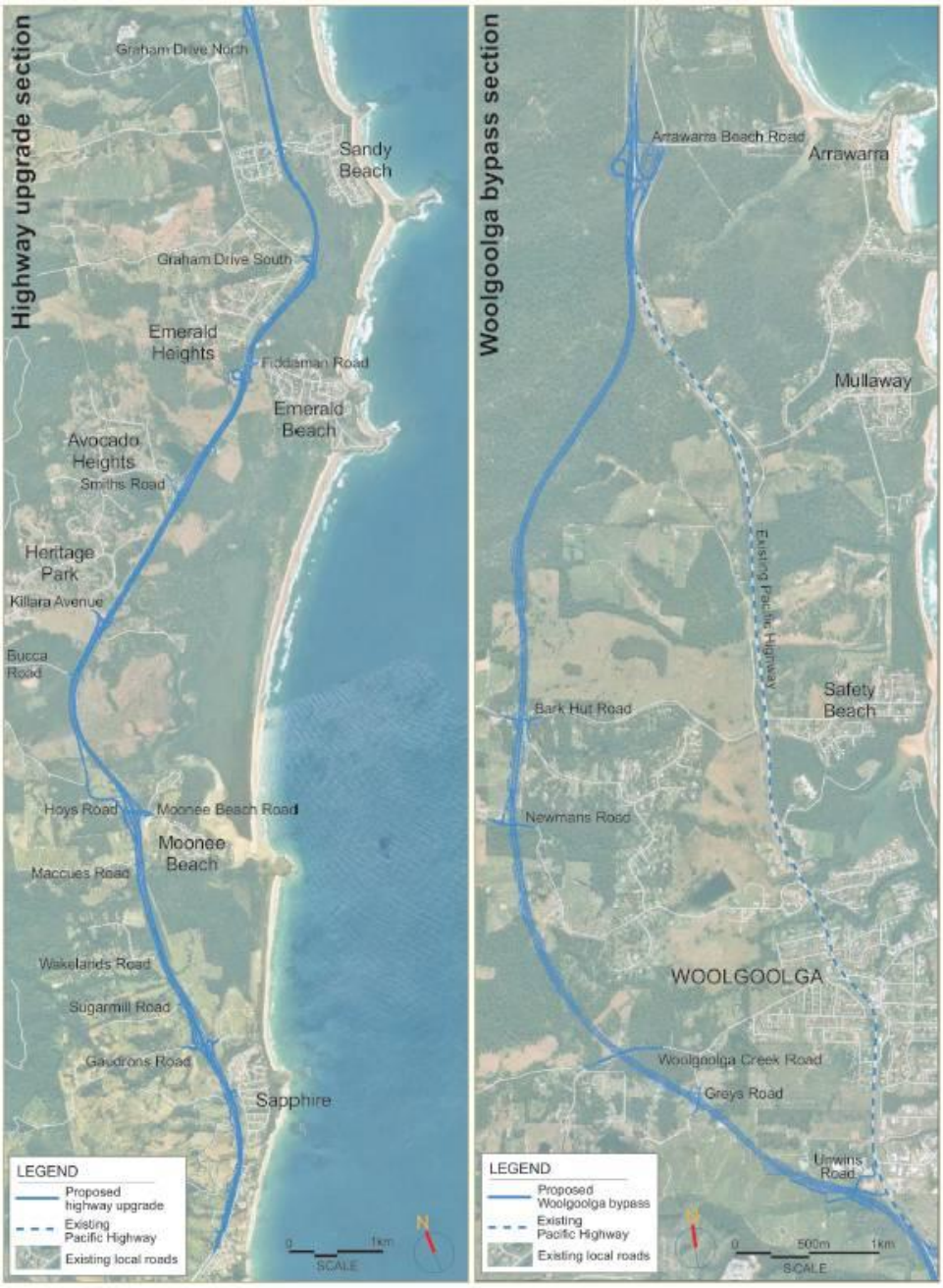


***Figure 1.1*:** Sapphire to Woolgoolga Pacific Highway Upgrade Locality Plan.

1.2 Background

Ancillary temporary facility stockpiles were established during the first half of the Sapphire to Woolgoolga Pacific Highway upgrade due to insufficient space available within the tight road corridor alignment. The requirement for placement locations for surplus unsuitable material far exceeded estimations prior to project commencement, primarily associated with the effects of the record breaking La Nina weather event of 2010-2012 – "*April 2010 to March 2012 was Australia's wettest two-year period on record*" (BoM, 2012). These stockpiles were previously assessed and approved in November 2010 and January 2011, respectively as part of the Ministers Condition of Approval 2.34 *Ancillary Facility*. These approvals provided for twelve temporary stockpiles. The Ancillary Facility condition in the Minister's Conditions of Approval contemplates temporary construction stockpiles and do not provide a mechanism for beneficial re-use of a permanent nature.

The temporary status of the southern stockpiles has been reviewed by the Sapphire to Woolgoolga Pacific Highway Upgrade project to ascertain where material can be

beneficially reused with minimal environmental impacts. The Project is proposing to permanently retain unsuitable material at five (5) sites that provide a beneficial reuse, which were previously assessed as part of the temporary stockpile approval submitted to Department of Planning and Infrastructure (DP&I) on 23 November 2010 and approved on 6 January 2011. The surplus material has been placed as proposed in this modification application and environmental review. These proposed sites are referenced as follows in the previous ancillary facility approval:

- SPW 1 (South) - 817 – 817a Pacific Highway, Korora (Lot 50 DP 847756)
- SPW 3 (South) - 18c The Mountain Way, Sapphire Beach (Lot 4 DP 249773)
- SPW 4 (South) – 10 Gaudrons Road, Sapphire Beach (Lot 22 DP 1030498)
- SPW 6 (South) - 16 Sugarmill Road, Sapphire Beach (Lot 11 DP 243972)
- SPW 7 (South) - 1225 Pacific Highway, Moonee Beach (Lot 4 DP 599177)

***Figure 1.2*:** Proposed beneficial reuse sites adjacent to project boundary for surplus unsuitable material

Further details of each site are provided in Section 2.

Section 3 describes the alternatives, need and justification for this proposal.

Stockpiled / other unsuitable material has been used on the project for:

- Where suitable engineering material, treated with lime and reused on site
- Landscaped mounds

- Subdivisions at Sapphire and Emerald
- Gun Club development
- Coffs Harbour City Council landfill day-cover material

This document assesses the environmental risks of the proposed beneficial reuse of surplus unsuitable material on Roads and Maritime land through earthworks to improve landform for potential future development or to improve amenity for adjacent landowners and describes the environmental management controls and safeguards to manage the risks.

1.3 Legislative Requirements

The Project was declared a critical infrastructure project under section 75C and a major project under section 75B (1) (b) of the *Environmental Planning and Assessment Act* 1979 through NSW Government Ministerial orders 10507 and 10509. The Minister for Planning approved the Sapphire to Woolgoolga Pacific Highway Upgrade project under Part 75J of the *Environmental Planning & Assessment Act 1979* (EP&A Act) on 15 January 2009, subsequently issuing a set of approval conditions for the project. These conditions were subsequently modified on 14 November 2009, 22 February 2010, 9 September 2010, 29 October 2010, 25 February 2011, 19 October 2012 and 5 June 2013.

The ministerial order specifies the Project would entail:

'Development for all associated or ancillary works, activities, uses, structures or facilities for the purposes of the Project, and includes (but is not limited to) works, activities, uses, structures or facilities for the following:

a) Construction (including demolition works) and operation (excluding maintenance) of the Project;
b) Access for construction and operation of the Project including access for pedestrians, public transport and vehicles;
c) Environmental management and pollution control for the Project;
d) Associated interchanges, intersections, bridges, overpasses, ramps, service roads and road modifications for the Project;
e) Any changes to the route of the existing carriageway or road for the Project;
f) Any re-alignment, modification, demolition or replacement of the existing carriageway or road for the Project; and
g) Any winning or obtaining extractive material as part of the construction work for the Project.

Development does not include activities comprising of surveys, test drilling, test excavations, preliminary geotechnical investigations or the like associated with the design and environmental assessments required for the Project prior to the commencement of construction.'

The proposal is consistent with the Ministerial Orders for the project, in particular items a) and c) specifically, to facilitate the construction of the Highway to a standard required by Roads and Maritime. Further, the preferred option

- has minimal environmental risk,
- has environmental benefits including beneficial reuse,
- minimises greenhouse gas emissions (in comparison to long distance haulage to other locations),
- improves visual amenity for some of the community;
- minimises operational noise impacts from the Highway traffic at some locations; and

In accordance with Section 4 O1.1 of the Environment Protection Licence (EPL) for the Project, all licensed activies must be carried out in a competent manner. This includes –

(a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and

(b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

All five sites are currently included in the EPL premises boundary and will be managed in accordance with EPL 13278 and the DP&I approved Construction Environment Management Plan (CEMP) until stabilised.

In accordance with the *Protection of the Environment Operations Act 1997,* a completed and signed notice under Section 143 (3A) is not required prior to transporting the material, as the land is either in the project boundary or owned by the Roads and Maritime. This material is on Roads and Maritime owned land.

1.4 Purpose of this Environmental Assessment

The purpose of this Environmental Assessment is to:

- Describe the proposed activity and scope of works;
- Assess the environmental impacts associated with undertaking the proposed works; and
- Identify the environmental management and mitigation measures outlined in the MCoA (Minister's Conditions of Approval), Statement of Commitments (SoC), Project EA, and approved CEMP and associated sub-plans that are relevant to the proposed works.

Roads and Maritime have reviewed the original approval and have determined that the requirement to manage surplus unsuitable material outside the project boundary was not considered previously in the approval documents, a modification to the project approval to facilitate the beneficial reuses identified in this assessment is therefore being submitted for determination by the Department of Planning and Infrastructure.

2 Description of Activity

2.1 Location and Setting

The Sapphire to Woolgoolga project proposes to permanently retain surplus material in five separate locations adjoining the Sapphire to Woolgoolga Pacific Highway Upgrade on Roads and Maritime owned land.

Each proposal provides site-specific benefits for future land uses or greater benefit to the community and surrounding environment. The associated benefits of retaining the surplus material include utilising the material as engineered fill, carrying out specific earthworks for approved landuse, noise attenuation, screening, and landscape aesthetics and take into account greenhouse gas generation where possible. In all cases the retention of the surplus material has been designed to ensure adjoining land holders are not adversely impacted.

Whilst all of the locations where the material is proposed to be retained currently lie within the EPL premises boundary and are approved ancillary facilities, eventually the locations will be re-sold and exist outside the road corridor. Thus, the importance of the material being verified that it satisfies the Excavated Natural Material (ENM) criteria as prescribed by the *Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption.* Documentation demonstrating that the material meets the Excavated Natural Material Exemption 2012 criteria is included in Appendix F.

In addition to the five below-listed locations where it is proposed to permanently retain surplus material, the project has implemented alternative reuse opportunities within the project boundary in parallel with the proposal described in this assessment. These locations are examined for environmental aspects and consistency with the Ministers Approval, Statement of Commitments, the Ministerial Order, project objectives, project environmental assessment and detailed design requirements. A listing of these reuse opportunities that have been determined as consistent by Roads and Maritime following consultation with the relevant agencies are included in Section 3.

The identified five areas that are suitable for the material to be beneficially retained are summarised in the Table 2.1 below, and also discussed in Sections 2.1.1 to 2.1.5 in further detail.

Table 2.1: Proposal and beneficial reuse issues for the five nominated areas.

Site Identification	Pre Existing Condition	Proposal for permanent retention of material	Re-Use Benefit	Quantity of Material (m^3)
Reuse Location 1 Roads and Maritime-owned land: 817 – 817a Pacific Highway, Korora (Lot 50 DP 847756).	The site was previously utilised as a banana plantation. The site is currently being utilised as a temporary stockpile site approved by DP&I as ancillary facility – SPW 1.	Material has been used to carry out earthworks to create an improved landform comprising of a level building pad/area.	Improved landform comprising of a level pad/area.	1,236
Reuse Location 2 Roads and Maritime-owned land: 18c The Mountain Way, Sapphire Beach (Lot 4 DP 249773).	The site was previously utilised as a banana plantation. The site is currently being utilised as a temporary stockpile site approved by DP&I as ancillary facility – SPW 3.	Material has been used to carry out earthworks to improve land for future development.	Improved landform comprising flat terraces for potential agricultural uses.	60,300
Reuse Location 3 Roads and Maritime-owned land: 10 Gaudrons Road, Sapphire Beach (Lot 22 DP 1030498).	The site was previously a rural residential parcel of land. The site is currently being utilised as a temporary stockpile site approved by DP&I as ancillary facility – SPW 4.	Material has been used to carry out earthworks to provide improvements to low-lying areas within the site and drainage benefits for residences to the west.	Improved landform by providing improvements to low-lying areas within the site and drainage benefits for residences to the west.	1,268
Reuse Location 4 Roads and Maritime-owned land: 16 Sugarmill Road, Sapphire Beach (Lot 11 DP 243972).	The site was previously a rural residential parcel of land. The site is currently being utilised as a temporary stockpile site approved by DP&I as ancillary facility – SPW 6.	Material has been used to carry out earthworks to provide an improved landform, screening and noise benefits for residences to the west.	Improved landform by providing a level section. Screening and noise attenuation.	4,219
Reuse Location 5 Roads and Maritime-owned land: 1225 Pacific Highway, Moonee Beach (Lot 4 DP 599177).	The site was previously a rural residential parcel of land. The site is currently being utilised as a temporary stockpile site approved by DP&I as ancillary facility – SPW 7.	Material has been used to carry out earthworks to provide a landscape mound for screening.	Screening, noise attenuation, landscape aesthetics.	16,084
TOTAL VOLUME OF BENEFICIAL RE-USES 1 TO 5				**83,107**

2.1.1 Reuse Location 1: 817 – 817a Pacific Highway, Korora (SPW1)

The property, 817 – 817a Pacific Highway, Korora, is currently owned by Roads and Maritime, and was the site of a temporary stockpile that was utilised throughout construction of the S2W project. This site was previously assessed as part of the temporary stockpile submission to DP&I in November 2010 – *Site SPW1* (approved 6 January 2011) in accordance with the Ministers Condition of Approval 2.34 Ancillary Facilities.

As the property is expected to be sold following project completion, the project is proposing to retain suitable (ENM) material in this location that has been placed to provide a level building pad that has been incorporated into the existing landform.

The area was already disturbed resulting from the area being previously utilised as a banana farm and subsequently as a temporary stockpile site. No further clearing was required to create the proposed level building pad, and approximately 1,236m³ of material has been utilised in this location. Table 2.1.1 summarises the potential environmental impacts and associated mitigation measures associated with SPW1.

The regraded landform does not change the original catchment boundaries and is located on land that sits above the 100 year ARI flood level. The regraded landform includes a catch drain to spread the flow on the downstream side of the regraded landform. The proposed regraded landform will have no significant impact to the local drainage or flood levels in the area.

Table 2.1.1 SPW 1 potential environmental impacts and mitigation measures

Environmental aspect	Potential impact	Mitigation measures
Noise & Vibration	Minor noise and vibration will occur during the reshaping works however these works will be temporary & and reshaping works have been complete.	Mitigation measures implemented as prescribed in the Noise and Vibration Management Plan.
Aboriginal Heritage	The area has already been disturbed whereby the potential impact to Aboriginal heritage is expected to be nil.	Mitigation measures implemented as prescribed in the Heritage Management Plan.
Non-Aboriginal Heritage	The area has already been disturbed whereby the potential impact to non-Aboriginal heritage is expected to be nil.	Mitigation measures implemented as prescribed in the Heritage Management Plan.
Flora & Fauna	No additional clearing required to complete the final shape, whereby the impact to flora and fauna is expected to be nil.	Mitigation measures implemented as prescribed in the Flora and Fauna Management Plan.

Water & Soil Management	Existing controls maintained throughout the reshaping until the site is stabilised to prevent any sediment from entering the farm dam which exists between the two mounds. Areas have been rectified.	Mitigation measures implemented as prescribed in the Soil Erosion and Water Management Plan.
Landscape & Visual Design	No further clearing required and the final shape was supported by the general consensus of residences within line of sight, whereby potential impact to visual amenity is expected to be minimal.	The landscape design plan has been implemented as per Appendix A.
Air Quality	Minor dust generation may occur during the reshaping works, however this is temporary and is expected have a negligible impact once completed. Works have been completed.	Mitigation measures implemented as prescribed in the Air Quality Management Plan.
Waste	Waste generation is expected to be minimal during construction. The proposal reduces waste material (unsuitable surplus) by reusing it to achieve a beneficial use (future development).	Mitigation measures implemented as prescribed in the waste, reuse, recycle and energy management plan.

There is unanimous support for the retention of the surplus material in this location from residents, with all 10 residents consulted agreeing to the permanent placement of material at this location.

Two residents did not support the original proposal on the grounds that they opposed a possible future dwelling being built on the land on the northern side. However, the northern mound has subsequently been removed from the proposal and the original landform reinstated to its original state. The retention of minor filling of the southern area (refer Figure 2.1) of the site to provide a level building pad is proposed.

Appendix A includes the regraded design and cross sections, which indicate the varying heights of the level pad/area. The shape and regrading of the site has been assessed through the Roads and Maritime/Joint Venture design change request (DCR) process through a series of reviews.

Figure 2.1 – Reuse Location 1: 817 – 817a Pacific Highway SPW1

Temporary stockpile condition (photo 1) and proposed permanent shape (photo 2) at SPW 1 (south)

2.1.2 Reuse Location 2: 18c The Mountain Way, Sapphire Beach (SPW3)

The property, 18c The Mountain Way, Sapphire Beach, is currently owned by Roads and Maritime, and was the site of a temporary stockpile that was utilised throughout construction of the Sapphire to Woolgoolga project. This site was previously assessed as part of the temporary stockpile submission to DP&I in November 2010 – *Site SPW3* (approved 6 January 2011) in accordance with the Ministers Condition of Approval 2.34 Ancillary Facilities.

As the property is expected to be sold following project completion, the Project is proposing to retain suitable (ENM) material in this location to provide a terraced landform suitable for future agricultural activities (e.g. horticulture as per surrounding landuses) that will increase the value of the land due to improved landform. The property includes a pre-existing dwelling which utilises the land parcel's building entitlement. As such, no potential for an additional dwelling exists under the current Local Environment Plan. The design of the terraced agricultural landform has been incorporated into the existing landform.

The area was already disturbed resulting from the area being previously utilised as a banana farm and subsequently as a temporary stockpile site. No further clearing was required to create the agricultural terraces, and approximately 60,300m³ of material is proposed to be retained in this location. Table 2.1.2 summarises the potential environmental impacts and associated mitigation measures associated with SPW3.

Table 2.1.2 SPW 3 potential environmental impacts and mitigation measures

Environmental aspect	Potential impact	Mitigation measures
Noise & Vibration	Minor noise and vibration will occur during the reshaping works however these works will be temporary. Reshaping works have been completed.	Mitigation measures prescribed in the Noise and Vibration Management Plan implemented.
Aboriginal Heritage	The area has already been disturbed whereby the potential impact to Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Non-Aboriginal Heritage	The area has already been disturbed whereby the potential impact to non-Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Flora & Fauna	No additional clearing required to complete the final shape, whereby the impact to flora and fauna is expected to be nil.	Mitigation measures prescribed in the Flora and Fauna Management Plan implemented.
Water & Soil Management	Existing controls maintained throughout the reshaping until the site is stabilised. Areas have been stabilised.	Mitigation measures prescribed in the Soil Erosion and Water Management Plan implemented.
Landscape & Visual Design	No further clearing required to complete the final shape.	The landscape design plan has been implemented as per Appendix A.
Air Quality	Minor dust generation may occur during the reshaping works, however this is temporary and is expected have a negligible impact once completed. Works complete.	Mitigation measures prescribed in the Air Quality Management Plan implemented.
Waste	Waste generation is expected to be minimal during construction. The proposal reduces waste material (unsuitable surplus) by reusing it to achieve a beneficial use (future agricultural purposes).	Mitigation measures prescribed in the waste, reuse, recycle and energy management plan implemented.

Four (4) residents with line of sight were consulted about the permanent placement of excess material at this location. One of the residents supported the proposal, one resident said they were not necessarily opposed and two provided feedback that they did not agree with the proposal. The two residents that did not support the proposal objected on the grounds that it will impact their coastal views. This issue was also raised by the resident who provided feedback that they did not necessarily oppose the proposal. Further consultation was undertaken by RMS with the two residents that opposed the proposal resulting in one of the residents supporting the proposal and the other still not supporting the proposal.

Survey assessment shows that the excess material will not interrupt the valued coastal views of the nearest property with line of sight to the proposed reshaped material. From this nearest property, the reshaped material will be located between 19.3 metres to 33 metres below their northerly views to the coastline. The greater risks to uninterrupted coastal views are trees that could naturally revegetate at the top roadside elevation of the Roads and Maritime owned residual land rather than the reshaped material metres below (refer Appendix C).

Appendix A contains a detailed layout of the earthworks to create the terraced agricultural benches. Cross sections are also included which indicate the varying heights of each mound. The shape and regrading of the site has been assessed through the Roads and Maritime/Joint Venture DCR process through a series of reviews.

This mound is free draining, whereby no additional drainage works have been required. The catchments are broadly unaffected with water continuing to fall towards the detention basin. This mound is also located on land that is situated above the 100 year ARI flood level so it will not impact on flood plain storage. The mound has no significant impact to the local drainage or flood levels in the area.

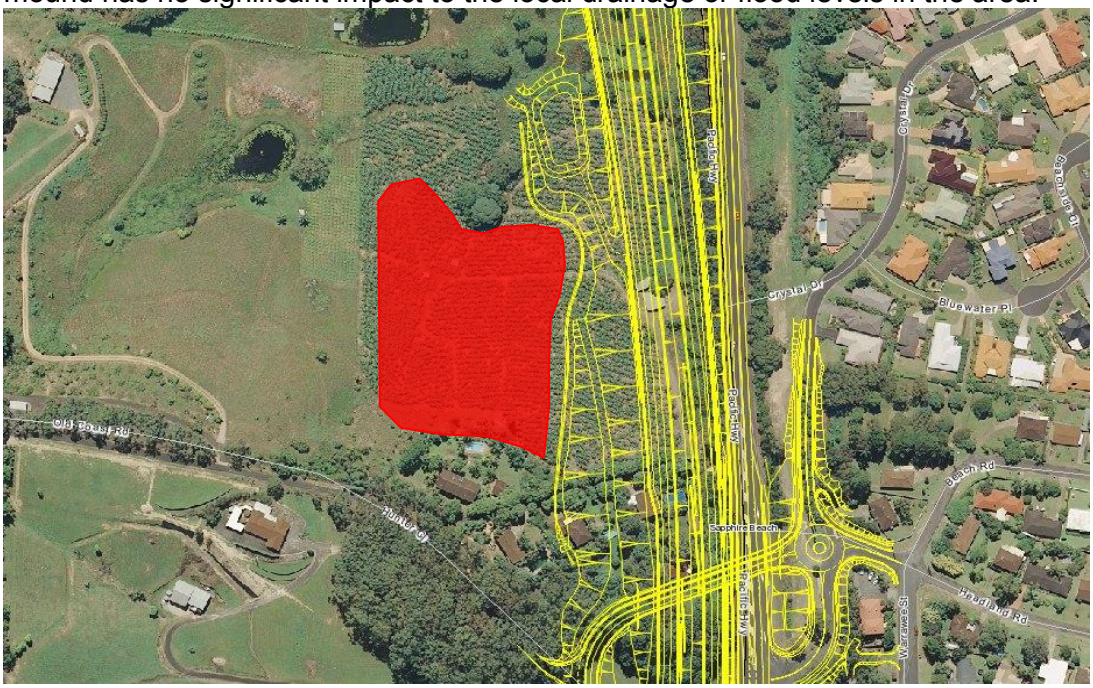


Figure 2.2 – Reuse Location 2: 18c The Mountain Way SPW3


Temporary stockpile condition (photo 1) and proposed permanent shape (photo 2) at SPW3

2.1.3 Reuse Location 3: 10 Gaudrons Road, Sapphire Beach (SPW4)

The property, 10 Gaudrons Road, Sapphire Beach, is currently owned by Roads and Maritime, and was the site of a temporary stockpile that was utilised throughout construction of the S2W project. This site was previously assessed as part of the temporary stockpile submission to DP&I in November 2010 – Site SPW4 (approved 6 January 2011) as part of the Ministers Condition of Approval 2.34 Ancillary Facilities.

As the property is expected to be sold following project completion, the project is proposing to permanently retain suitable (ENM) material in this location that provides a level area and an open channel that will increase the value of the land due to an improved landform that will reduce the duration that the block will be inundated by water. The design of the level area has been incorporated into the existing landform and approximately 1,268m³ of material is proposed to be utilised in this location. Table 2.1.3 summarises the potential environmental impacts and associated mitigation measures associated with SPW4.

Table 2.1.3 SPW 4 potential environmental impacts and mitigation measures

Environmental aspect	Potential impact	Mitigation measures
Noise & Vibration	Minor noise and vibration will occur during the reshaping works however these works will be temporary. These works have been completed.	Mitigation measures prescribed in the Noise and Vibration Management Plan implemented.
Aboriginal Heritage	The area has already been disturbed whereby the potential impact to Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Non-Aboriginal Heritage	The area has already been disturbed whereby the potential impact to non-Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Flora & Fauna	No additional clearing was required to complete the final shape, whereby the impact to flora and fauna is expected to be nil.	Mitigation measures prescribed in the Flora and Fauna Management Plan implemented.

Water & Soil Management	Existing controls maintained throughout the reshaping until the site is stabilised. These works have been completed.	Mitigation measures prescribed in the Soil Erosion and Water Management Plan implemented.
Landscape & Visual Design	No further clearing was required and the final shape was supported by all residents within line of sight, whereby potential impact to visual amenity is expected to be minimal.	The landscape design plan has been implemented as per Appendix A.
Air Quality	Minor dust generation may occur during the reshaping works, however this is temporary and is expected have a negligible impact once completed.	Mitigation measures prescribed in the Air Quality Management Plan implemented.
Waste	Waste generation is expected to be minimal during construction. The proposal reduces waste material (unsuitable surplus) by reusing it to achieve a beneficial use (property development).	Mitigation measures prescribed in the waste, reuse, recycle and energy management plan implemented.

Figure 2.3 – Reuse Location 3: 10 Gaudrons Rd, Sapphire Beach (SPW4)

Current condition at SPW4

2.1.4 Reuse Location 4: 16 Sugarmill Road, Sapphire Beach (SPW6)

The property, 16 Sugarmill Road, Sapphire Beach, is currently owned by Roads and Maritime, and was the site of a temporary stockpile that was utilised throughout construction of the S2W project. This site was previously assessed as part of the temporary stockpile submission to DP&I in November 2010 – *Site SPW6* (approved 6 January 2011) as part of the Ministers Condition of Approval 2.34 Ancillary Facilities.

As the property is expected to be sold following project completion, the project is proposing to retain suitable (ENM) material in this location to provide a level pad that will increase the value of the land due to an improved landform. The design of the level pad has been incorporated into the existing landform. Table 2.1.4 summarises the potential environmental impacts and associated mitigation measures associated with SPW6.

Table 2.1.4 SPW 6 potential environmental impacts and mitigation measures

Environmental aspect	Potential impact	Mitigation measures
Noise & Vibration	Minor noise and vibration will occur during the reshaping works however these works will be temporary. Reshaping works have been completed.	Mitigation measures prescribed in the Noise and Vibration Management Plan implemented.
Aboriginal Heritage	The area has already been disturbed whereby the potential impact to Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Non-Aboriginal Heritage	The area has already been disturbed whereby the potential impact to non-Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.

Flora & Fauna	No additional clearing required to complete the final shape, whereby the impact to flora and fauna is expected to be nil.	Mitigation measures prescribed in the Flora and Fauna Management Plan implemented.
Water & Soil Management	Existing controls maintained throughout the reshaping until the site is stabilised. Areas have been stabilised.	Mitigation measures prescribed in the Soil Erosion and Water Management Plan implemented.
Landscape & Visual Design	No further clearing required and the final shape was supported by the one resident within line of sight, whereby potential impact to visual amenity is expected to be minimal.	The landscape design plan has been implemented as per Appendix A.
Air Quality	Minor dust generation may occur during the reshaping works, however this is temporary and is expected to have a negligible impact once completed. Works have been completed.	Mitigation measures prescribed in the Air Quality Management Plan implemented.
Waste	Waste generation is expected to be minimal during construction. The proposal reduces waste material (unsuitable surplus) by reusing it to achieve a beneficial use (property development).	Mitigation measures prescribed in the waste, reuse, recycle and energy management plan implemented.

The one resident with line of sight to this reuse location agreed to the permanent placement of excess material on this site (refer Appendix C).

The area was already disturbed resulting from the area being previously utilised as a cleared pasture and subsequently as a temporary stockpile site. No further clearing was required to create a level pad, and approximately 4,219m³ of material is proposed to be retained in this location.

The proposed pad is located above the 8.45m 100 year ARI flood level. The mound will result in no significant impact to the local drainage and the 100 year ARI flood level.

Figure 2.4 – Reuse Location 4: 16 Sugarmill Road SPW6

Temporary stockpile condition (photo 1) and proposed permanent shape (photo 2) at SPW6

2.1.5 Reuse Location 5: 1225 Pacific Highway, Moonee Beach (SPW7)

The property, 1225 Pacific Highway Moonee Beach, is currently owned by Roads and Maritime, and was the site of a temporary stockpile that was utilised throughout construction of the S2W project. This site was previously assessed as part of the temporary stockpile submission to DP&I in November 2010 – *Site SPW7* (approved 6 January 2011) as part of the Ministers Condition of Approval 2.34 Ancillary Facilities.

As the property is expected to be sold following project completion, the project are proposing to retain suitable (ENM) material in this location to provide a landscape mound site that will increase the value of the land due to an improved landform.

The area was already disturbed resulting from the area being previously cleared for grazing activities and subsequently as a temporary stockpile site. No further clearing was required to create the landscaped mound, and approximately 16,084m³ of material is proposed to be retained in this location. Table 2.1.5 summarises the potential environmental impacts and associated mitigation measures associated with SPW7.

The proposed mound will have no significant impact to the local drainage and 100 year ARI flood levels.

Table 2.1.5 SPW 7 potential environmental impacts and mitigation measures

Environmental aspect	Potential impact	Mitigation measures
Noise & Vibration	Minor noise and vibration will occur during the reshaping works however these works will be temporary. Reshaping works have been completed.	Mitigation measures prescribed in the Noise and Vibration Management Plan implemented.
Aboriginal Heritage	The area has already been disturbed whereby the potential impact to Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Non-Aboriginal Heritage	The area has already been disturbed whereby the potential impact to non-Aboriginal heritage is expected to be nil.	Mitigation measures prescribed in the Heritage Management Plan implemented.
Flora & Fauna	No additional clearing required to complete the final shape, whereby the impact to flora and fauna is expected to be nil.	Mitigation measures prescribed in the Flora and Fauna Management Plan implemented.
Water & Soil Management	Existing controls maintained throughout the reshaping until the site is stabilised. Area has been restabilised.	Mitigation measures prescribed in the Soil Erosion and Water Management Plan implemented.
Landscape & Visual Design	No further clearing required and the final shape was supported by all residences within line of sight, whereby potential impact to visual amenity is expected to be minimal.	The landscape design plan has been implemented as per Appendix A.
Air Quality	Minor dust generation may occur during the reshaping works, however this is temporary and is expected have a negligible impact once completed. Works have been completed.	Mitigation measures prescribed in the Air Quality Management Plan implemented.
Waste	Waste generation is expected to be minimal during construction. The proposal reduces waste material (unsuitable surplus) by reusing it to achieve a beneficial use (property development).	Mitigation measures prescribed in the waste, reuse, recycle and energy management plan implemented.

Three residents with line of sight were consulted about the permanent placement of excess material at this location. All three residents supported the proposal (refer Appendix C).

Appendix A contains cross sections and the landscape design of the mound. The final shape and regrading of the site has been assessed through the Roads and Maritime/Joint Venture DCR process through a series of reviews.

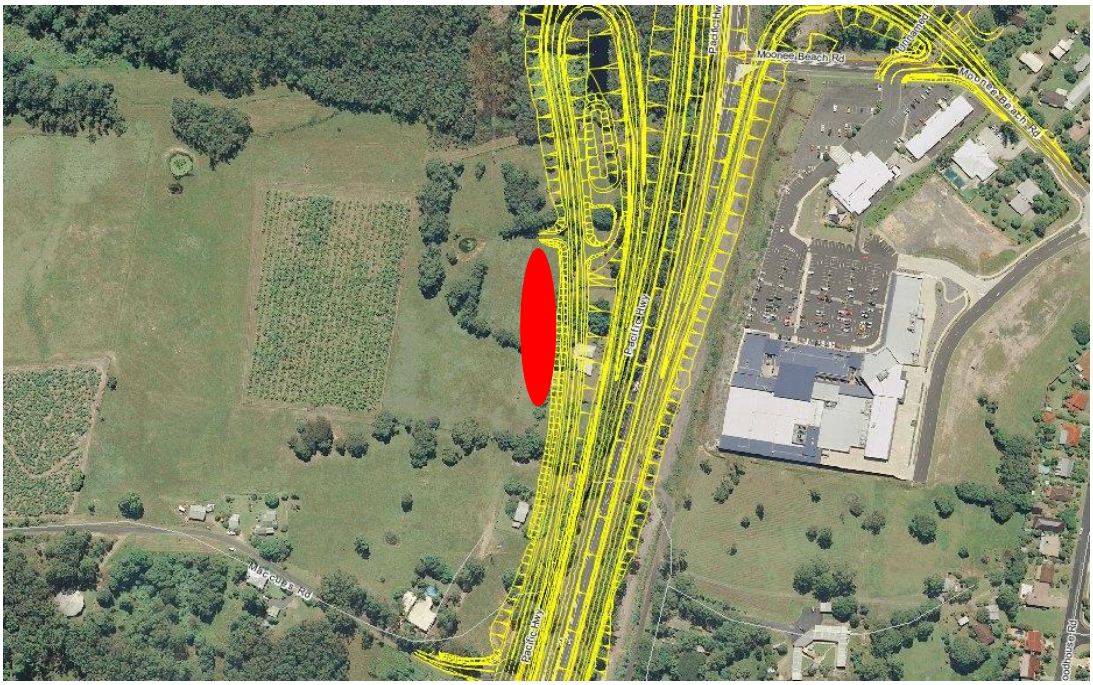


Figure 2.5 – Reuse Location 5: 1225 Pacific Highway SPW7

Temporary stockpile condition (photo 1) and proposed permanent shape (photo 2) at SPW7

2.2 Description of Works

The purpose of this Environmental Review is to evaluate if any of the proposed applications pose an unacceptable risk/s to the environment.

The project has identified five sites where it is proposed to permanently retain unsuitable material that provide a beneficial reuse,

No additional clearing was required to access each location.

The works were undertaken during approved standard construction working hours, consistent with the EPL and Project Approval.

An Erosion and Sediment Control Plan has been developed for each location, and erosion and sediment controls installed prior to works commencing. The stockpiles will be maintained until stabilised and revegetated, and the erosion and sediment controls removed.

2.3 Site Establishment

A series of onsite operational processes have been followed to ensure the relevant conditions and requirements are adhered to.

In summary, these consist of –

1. Delineation of reuse area boundary using flagging tape or pegs
2. Establish erosion and sediment controls
3. Placement and compaction of ENM reuse material as engineered fill
4. Following compaction shape and rehabilitate each area as per landscape design
5. Removal of erosion and sediment controls once surface stabilisation confirmed

A checklist has been established and implemented for the reshaping of the material, listing the above requirements and any post-use requirements, required by Roads and Maritime. The checklist has been managed by the LFHJV Environmental Coordinator / Engineer and saved on the records system for future reference or will be made available upon request.

2.4 Reuse specifications

The regrading of the spoil material on Roads and Maritime land adjacent to the S2W Upgrade has been undertaken in accordance with:

- Coffs Harbour City Council (CHCC) Development Specification Design, 0011 Development and Subdivision of Land; and
- *AS 3798 – Guidelines on earthworks for commercial and residential developments* Minimum Level 1 geotechnical inspection and testing
- *AS 2870 – Residential slabs and footings – construction (as required).*

Where required, the works have been supervised by a geotechnical investigation and testing authority (GITA) representative meeting the requirements of Cl 8.4 of AS 3798. At the completion of the works a works as executed (WAE) plan will be prepared showing the as-constructed surface profile and fill depths and will include all test reports. Where required, the WAE information is to also include a report prepared by the GITA as per the requirements of Cl 8.2 of AS 3798 and a site classification in accordance with AS2870.

In accordance with the Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A, all material utilised in accordance with this material reuse strategy has been tested in accordance with the EPA Excavated Natural Material Exemption October 2012 prior to works commencing,.

Documentation demonstrating that the material has been tested in accordance with and meets the *Excavated Natural Material Exemption October 2012* specifications has been obtained and provided to Roads and Maritime and EPA and is included as Appendix F.

Each site will be included in the Landscaping Maintenance Period unless otherwise disposed of by Roads and Maritime prior to the end of the Landscaping Maintenance Period.

3 Need and Options Considered

3.1 Need

Resulting from the project's cut and fill operations it has become apparent that there is excess material remaining once the project has been completed.

A total volume of 861,160m^3 of unsuitable material has been produced over the duration of the project. The placement of this extremely high volume of material has been a significant challenge to the project team in consideration of the project constraints including shortage of beneficial spoil re-uses sites, tight road corridor, sensitive environment and extreme rainfall. The LFHJV aims to beneficially re-use as much unsuitable material as far as practicable and to date, approximately 484,118m^3 of unsuitable material has been beneficially re-used for landscaping / noise mounds, flattening batters and lime stabilisation (Refer to Table 3.2). A further 377,042m^3 of unsuitable material requires placement in permanent locations.

3.2 Beneficial Reuses to Date

Table 3.2 below summarises the beneficial re-use opportunities of surplus unsuitable material implemented by the S2W project to date.

Table 3.2: Summary of Beneficial Reuses to Date

Site Identification	Background	Proposal	Re-Use Benefit	Quantity Material (m^3)
Fill 7 East	Batter widening	Widening of Fill 7 East within road reserve	Placement of surplus unsuitable material in available footprint within road reserve.	23,000
Cut 8 West	Landscape mound in gore area.	Landscape mound located in gore area, between western Moonee Interchange ramps within road reserve.	Aesthetic and acoustic screening for residents west of interchange.	8,930

Cut 18/Fill 18 East	Landscape mound and rehabilitation of temporary construction basin.	Landscape mound on eastern side of Cut 18 / Fill 18.	Aesthetic screening and noise reduction benefits.	29,690
Cut 21 borrow	Rehabilitation of borrow area	Re-use of unsuitable material to rehabilitate Cut 21 borrow and create house pad for future sale by Roads and Maritime property division.	Borrow rehabilitation and house pad	24,000
Cut 21 East	Landscape mound	Landscape mound on eastern side of Cut 21	Aesthetic screening and noise reduction benefits.	2,500
Cut 22 West	Landscape mound	Landscape mound on western side of Cut 22	Aesthetic screening including reduction of headlight glare and noise reduction benefits.	4,500
Fill 23 West	Noise mound	Noise mound replacing 200m of concrete noise wall	Acoustic benefits and beneficial reuse reducing demand on resources (concrete wall).	13,300
Fill 24 West	Landscape mound	Landscape mound on western side of Fill 24	Aesthetic screening and noise reduction benefits.	15,000
Cut 35 borrow	Rehabilitation of borrow area	Re-use of unsuitable material to rehabilitate Cut 35 borrow and create suitable landform for future sale by Roads and Maritime property division.	Borrow rehabilitation	145,000
Hoys Road, Moonee	Landscape Mound	Landscape mound on western side of Hoys road, Moonee	Aesthetic screening and noise reduction benefits.	10,698

North	Private	Earthworks for use in	Earthworks for	50,000

Sapphire Development	Development approved by DP&I	approved development	use in approved development	
Emerald Seniors Development	Private Development approved by CHCC	Earthworks for use in approved development	Earthworks for use in approved development	40,000
Coffs Harbour City Council landfill day cover	CHCC Englands Road landfill	Provision of surplus unsuitable to CHCC for beneficial re-use as day cover.	Day cover material required by CHCC to run municipal landfill.	15,000
Gun Club Emerald Beach	Private Development approved by CHCC	Earthworks for use in approved development	Earthworks for use in approved development.	2,500
Lime Stabilisation	Lime drying of wet material	Use of lime stabilisation where feasible to dry wet material for re-use in highway embankment.	Highway construction	100,000
TOTAL VOLUME BENEFICIALLY RE-USED TO DATE				**484,118**

While a huge effort has been applied to identify and utilise beneficial re-use opportunities for surplus unsuitable material totalling 484,118m^3 to date, there remains a need to identify solutions for the remaining 377,042m^3 of unsuitable material.

3.3 Proposed Solution

The solution for the balance of 377,042m^3 of unsuitable material comprises two primary components:

1. Proposed beneficial uses 1 to 5; and
2. Cut 29 Borrow Rehabilitation and Other

3.3.1 Proposed Beneficial Reuses 1 to 5

Proposed Beneficial Re-uses 1 to 5 are fully detailed in Section 2 and comprise the purpose of this Environmental Review. The total volume of beneficial re-uses 1 to 5 is 83,107m^3 (refer to Table 2.1). Therefore if these opportunities are realised the remaining volume of unsuitable material to be managed is 377,042 – 83,107 = 293,935m^3. This volume is addressed below in Section 3.3.2.

As noted in Section 1.4 this Environmental Review will be provided to the Department of Planning and Infrastructure for determination of a modification application to facilitate the permanent retention of material at beneficial re-use locations 1 to 5, following consultation with agencies in accordance with Section 4.2.

3.3.2 Cut 29 Borrow Rehabilitation and Other Re-use Opportunities

Cut 29 borrow area was developed in order to source the required concrete aggregates to construct the main line concrete pavements required by the Sapphire to Woolgoolga project specification. The rehabilitation of the extraction area along with some other re-use opportunities within the road reserve described in Table 3.3 provided sufficient capacity to re-use the remaining 293,935m3 of unsuitable material.

The Cut 29 borrow area has no more capacity to receive unsuitable material and all available opportunities within the road reserve have been utilised.

Table 3.3: Alternate re-use opportunities to minimise risks at Cut 29.

Site Identification	Background	Proposal	Re-Use Benefit	Quantity of Material (m^3)
Fill 8 West	Landscape mound	Landscape mound western side of Fill 8 on the northwest side of Cunningham's Creek.	Headlight screening and acoustic benefit for residences to the west.	11,000
Cut 10 - Hoys to Bucca Road	Batter widening	Widening batter Hoys Road	Batter widening within road reserve.	7,000
Cut 13 West	Landscape mounds	Landscape mounds west of Fiddaman Road interchange.	Areas available in gore and toe of western interchange.	4,000
Woolgoolga Creek Road west	Landscape mound	Landscape mound on redundant section of Woolgoolga Creek Road western abutment following opening of grade separated bridge.	Rehabilitation of old road pavement and revegetation with native species.	2,000
TOTAL VOLUME AVAILABLE WITHIN ROAD RESERVE				**24,000**

3.4 Rejected Solutions

For completeness, Table 3.4 below describes some of the potential beneficial re-use options which were investigated throughout the duration of the project. While several had positive benefits such as acoustic screening or beneficial re-use on other projects these additional opportunities were rejected for the reasons stated including unacceptable flora and fauna impacts associated with required clearing within the road reserve prior to enabling reuse and aesthetic impacts. The identified constraints led to rejection of these proposals due to unacceptable environmental impact, incompatibility with reuse requirements or lack of approvals for third party re-use.

Table 3.4: Rejected unsuitable material solutions.

Site Identification	Background	Proposal	Reason for rejection	Potential Quantity of Material (m^3)
CH 10600 to CH 10800 east	Potential location within road reserve east of south bound carriageway.	Clearing of 1 Ha of native vegetation to establish permanent landscape mound with acoustic benefits for proposed subdivision east of alignment.	Required clearing of a significant stand of 1.05ha of native forest including 16 potential hollow bearing trees. Medium term aesthetic impact associated with removal of a remnant stand of vegetation between the highway alignment and cleared agricultural land.	30,000
CH 30400 to CH 30600 east	Potential location within road reserve.	Clearing of 0.3 Ha of native vegetation between Little Arrawarra Creek and Embankment Road.	0.3 Ha clearing of native vegetation, aesthetic impacts and habitat connectivity.	5,000
CH 30600 to CH 30800 east	Potential location within road reserve of new alignment and old alignment.	Landscape and noise mound north of Embankment Road.	Conflict with power lines, aesthetic impacts.	10,000
Reuse on future Roads and Maritime projects	Re-use on future highway upgrades.	Re-use on future projects such as the Woolgoolga to Glenugie upgrade.	This option was also considered however due to the unsuitable nature of the material, it cannot be used in order to achieve the R44 Earthworks specification.	-

Private developments	A potential option being investigated is a private subdivision development north of Cunningham's Creek, Moonee Beach which is currently lodged with DP&I for determination under Part 3A of the EPAA 1979.	Note this subdivision is not approved and it is likely that approval may not be obtained by the developer with sufficient time for this opportunity to be pursued further. S2W will continue to liaise with the developer.	No suitable approved private development (e.g. Council or DP&I approved subdivision) have been identified in the area for potential reuse of the unsuitable material.	-

3.5 Summary

Section 3 provides a comprehensive analysis of the need and options considered with respect to the proposed five (5) beneficial re-use opportunities described in Section 2. In summary:

- The total volume of unsuitable material requiring management and solution on the Sapphire to Woolgoolga Project is 861,160m^3
- To date 484,118m^3 has been beneficially re-used as detailed in Section 3.2
- This left a volume of 377,042m^3.
- Of this 293,935m^3 has been beneficially re-used to rehabilitate Cut 29 borrow along with a series of small re-use opportunities identified within the road reserve as detailed in Table 3.3 at locations previously disturbed by construction.
- This environmental review has been prepared to assess the proposed beneficial re-use of 83,107m^3 of unsuitable material as described in Section 2 on Roads and Maritime owned land immediately adjacent to the road reserve

The five (5) beneficial re-use opportunities described in Section 2, accounting for 83,107m^3 of material, is the basis of this environmental review and forms an integral part of the overall project unsuitable strategy as detailed in Section 3.

As noted in Section 1.4, Roads and Maritime will submit this environmental review to the Department of Planning and Environment with a request to modify the conditions of approval to facilitate the nominated five beneficial re-use opportunities described in Section 2.

4 Consultation

4.1 Community

In consultation with Roads and Maritime, it was determined that residents who had line of sight to the proposed permanent placement sites needed to be consulted in regards to the proposed permanent placement of excess material on Roads and Maritime residual land that already had been used for temporary stockpiling. A ground-truthing exercise also was undertaken to confirm stakeholders.

Table 4.1: Summary of results of consultation

Reuse location	Stakeholder	Support? Y / N	Responses to objections
Reuse Location 1 Roads and Maritime-owned land: 817 – 817a Pacific Highway, Korora (Lot 50 DP 847756)	Stakeholder 1	Y	
	Stakeholder 2	Y	The potential impact cited on views from a future dwelling is pre-existing and, at the natural ground level of the land, will still occur. The northern mound has subsequently been removed from the proposal and the original landform reinstated therefore support for the proposal has changed.
	Stakeholder 3	Y	
	Stakeholder 4	Y	
	Stakeholder 5	Y	
	Stakeholder 6	Y	
	Stakeholder 7		Overseas
	Stakeholder 8	Y	
	Stakeholder 9	N	The potential impact cited on views from a future dwelling is pre-existing and, at the natural ground level of the land, will still occur. The northern mound has subsequently been removed from the proposal and the original landform reinstated therefore support for the proposal has changed.
	Stakeholder 10	Y	
			All of residents in favour of stockpile. Individual comments addressed in Appendix C.

Reuse Location 2 Roads and Maritime-owned land: 18c The Mountain Way, Sapphire Beach (Lot 4 DP 249773)	Stakeholder 11	N. Further consultation was undertaken by RMS however the objection is still current.	The potential impact cited on views to the coastline is unsubstantiated with survey assessment showing that reshaped material will sit at least 14.5 metres below the views of the nearest property to the coastline. (Refer Appendix C).
	Stakeholder 12	N. Further consultation was undertaken by RMS and they have agreed with the current proposal.	The potential impact cited on views to the coastline is unsubstantiated with survey assessment showing that reshaped material will sit at least 14.5 metres below the views of the nearest property to the coastline. (Refer Appendix C).
	Stakeholder 13	Not necessarily opposed.	
	Stakeholder 14	Y	
			Individual comments addressed in Appendix C.
Reuse Location 3 Roads and Maritime-owned land: 10 Gaudrons Road, Sapphire Beach (Lot 22 DP 1030498).	Stakeholder 15	Y	
Reuse Location 4 Roads and Maritime-owned land: 16 Sugarmill Road, Sapphire Beach (Lot 11 DP 243972).	Stakeholder 16	Y	Resident in favour of stockpile. Individual comments addressed in Appendix C.
Reuse Location 5 Roads and Maritime-owned land: 1225 Pacific Highway, Moonee Beach (Lot 4 DP 599177)	Stakeholder17	Y	
	Stakeholder 18	Y	
	Stakeholder 19	Y	
			All residents in favour of stockpile. Individual comments addressed in Appendix C.

The consultation with the stakeholders occurred in June and July 2013 and further consultation was undertaken in early 2014. The response to their submissions about the proposed permanent placement of material at the subject sites is provided in Appendix C. Appendix E provides a map indicating the residents consulted which is to be read in conjunction with Table 4.2.

For the residents concerned about view loss, Table 4.2 considers the views from these properties including photo's current views.

Table 4.2 View loss analysis

Stockpile	Issues	View Considerations
SPW1 (south)	No objections were lodged based on the information supplied.	Retention of ocean views is the prime consideration for all residents spoken to. Based on the proposed elevation of the southern stockpile all residents were comfortable with the proposal given their current elevation. Access to this portion of the total property is off the southern end of the newly constructed Hunter Close and is considered the principal potential home/building site.
SPW3	One property owner immediately to the south west objected to the stockpile based on potential loss of views	• A cross sectional view analysis was produced from each of the two properties using the "first glimpse" waterline at the beach as the minimum reference point. This vertical separation can then be used to assess the likelihood of future development impacting on the principal ocean view for each property. • The view separation for one property (P3A) ranges from a minimum of 14.5m to a maximum of 33m. • It is worth noting that the land on which SPW3 sits already has a house on it and under current LGA guidelines could not have another dwelling built on it whilst the other remained. • Whilst the potential to demolish and rebuild on the property may be possible the specification for remediation of the stockpile is to only re-compact the final three metres to enable its compliance with the current zoning for agricultural usage and not residential.

Photo 3 – Current property views at SPW3 (P3A)

4.2 Environmental Agencies

The proposal of the permanent placement of the material at the subject sites has been raised at the October, November and December 2012 and January, July and August 2013 ERG meetings. All proposed locations have been inspected during ERG inspections. This Environmental Review has been issued to the EPA for their comment and review. Comments and responses are provided in Appendix B.

Final review and endorsement will be sought from the Department of Planning and Environment through a request for modification to the approval.

4.3 Roads and Maritime Property Division

The project is liaising with Roads and Maritime property division in regard to their requirements for each specific Roads and Maritime owned property. Roads and Maritime property division, similarly to the agencies, requires that the type of material placed is ENM. Roads and Maritime property division also has input into the design of each area to ensure their long term viability, reduced maintenance, lessened risk of environmental harm, maximum community benefit, and maximum saleable value.

5 Environmental Review and Management

An assessment of the proposed works has been undertaken to determine the additional environmental impacts compared to those of the Approved Project. The proposed works have been assessed using the topics/issues discussed in the Project EA.

5.1 Environmental Risk Assessment

Construction hazards and risks considered as part of the Project EA include hazardous materials handling and storage (e.g. fuel). The reuse of material in these applications are deemed minor in this regard and will not result in a change which would influence the hazards and risks related to the Project. As such, the works will result in negligible additional hazard and/or risk.

5.2 Traffic, transport and economics

The reuse of material occurs at five locations adjoining the project alignment.

Fortunately, the material reused at each location was already located nearby. A small amount of material (e.g. topsoil) was transported at times however this was limited..

Due to the limited number of trucks, an effort to limit the distance that material was transported, and utilisation of the project alignment, there was minimal disturbance generated from construction traffic movement.

5.3 Noise and Vibration

Any potential noise and vibration impacts associated with the earthworks for beneficial reuse have been managed in accordance with the approved Construction Noise and Vibration Management Plan.

The amenity mound will provide noise advantages by increasing the attenuation between Highway traffic and landowners' properties at SPW6.

5.4 Aboriginal Heritage

There are no identified Aboriginal heritage areas affected by the proposed works. Due to the previous disturbance in each location and as each location was previously assessed prior to construction, risks of impact to heritage items are considered negligible.

5.5 Non-Aboriginal Heritage

There are no identified non-Aboriginal heritage items within the proposed locations.

5.6 Planning and Land Use

The general pattern of land use in the study area is controlled mainly through zoning provisions in the Coffs Harbour *Local Environmental Plan 2013* (LEP). The current zoning in the vicinity of the beneficial reuses are:

- Rural zone: RU2 Rural Landscape
- Residential zones: R5 Large Lot Residential
- Residential zones: 2A Low Density Residential

Each of the proposed beneficial reuses has been developed in line with the LEP land-use zoning for each lot.

Each site has been identified on the Coffs Harbour LEP 2013 maps, which is attached in Appendix D.

5.7 Agriculture

The proposed beneficial reuses will not have any significant effect on agricultural enterprise.

Following liaison with Roads and Maritime property section, property improvements at reuse location 2: 18c The Mountain Way, Sapphire Beach are expected to result in positive agriculture outcomes for potential high productivity horticultural activities.

5.8 Socio-economic analysis

The proposed works are designed so that excess material from the cut/fill operations can be reused resulting in a benefit to the surrounding area and residual property value. The improved property outcomes include screening, noise attenuation, aesthetics and amenity provided by the works. Changes to visual amenity associated with landform changes are considered with incorporation into the landscape plan.

5.9 Flora and Fauna

Flora and fauna impacts are negligible as the footprint has not changed and subsequently no vegetation is required for removal.

5.10 Hydrology, water and soil management

All project works must adhere to the provisions of Section 120 of the PoEO Act and water quality monitoring will be in accordance with the project EPL monitoring requirements.

The sites were managed in accordance with progressive erosion and sediment control plans and the project SWMP. All sites are all located above 100 year ARI flood level and are outside the Coffs Harbour City Council Flooding Extents.

Sections 2.1.1 to 2.1.5 provide additional information relating to overland flow paths for each site.

5.11 Landscape, visual and urban design

Each proposed site has undergone a thorough landscape and visual assessment undertaken by landscape architects TRACT (refer Appendix A), which has been reviewed by Roads and Maritime and the Joint Venture. The landscape assessment as summarised in Section 2.1 and 2.2 describes the visual impacts in further detail.

Residents and landowners have been consulted regarding the visual aspects of the proposal as detailed in Section 4.

5.12 Air Quality

The proposed works will result in negligible additional air quality impacts due to the nature of the works and the limited duration of ground disturbance and soil exposure during construction. Each area was immediately stabilised subsequent to construction.

To manage any potential dust generated during the transportation of the material between different stockpiling locations, the S2W *Construction Air Quality Management Plan* was followed which includes the implementation of best management practice air quality mitigation measures.

5.13 Waste

In accordance with the *Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A,* all material utilised in accordance with this material reuse strategy was tested in accordance with the EPA *Excavated Natural Material Exemption October 2012* prior to works commencing.

An analytical data and compliance validation review of the unsuitable material was undertaken in relation with Table 2 of the ENM exemption 2012. This determined that all sites generally complied with the relevant concentrations levels for ENM Exemption, except for Reuse Location 2, Mountain Way.

Initial sampling undertaken at Mountain Way showed arsenic was present in 5 initial samples at concentrations exceeding the absolute maximum concentration (ranging from 43 mg/kg to 117mg/kg) listed in Table 3 of the ENM Exemption. The exceedances were in samples from the base of the test pits and boreholes and considered that these samples may have included natural soils from beneath the placed material.

Subsequent sampling at Mountain Way in the vicinity of the locations with elevated results focused on fill / interface layer and indicated samples assessed to be in fill showed no exceedances of the absolute maximum criteria. However, samples assessed to be in a fill / mixing layer showed elevated arsenic concentrations (ranging from 53 to 150 mg/kg) exceeding the absolute maximum concentration in three (3) samples and four (4) samples (ranging from 65 to 120 mg/kg) of the assessed interface exceeded the absolute maximum concentration.

Based on results of subsequent additional investigations, elevated arsenic concentrations were only identified in the mixing and interface layers at the base of the fill and are likely to be sourced from arsenic contamination at the surface of the

residual soils, consistent with the behaviour of arsenic residues on former banana lands.

5.14 .Contaminated Land

The review of data exceedances of the absolute maximum concentrations in the ENM Exemption 2012 indicates the total concentrations measured are predominantly significantly below the current amended NEPM ASC (1999 as amended 2013) health criteria for the most sensitive residential land use (HIL-A). Overall, the analytical results show little evidence of significant contamination and the relatively low concentrations of contaminants indicate the results are likely to be consistent with natural background levels in the area of the S2W project.

Phase 2 contamination assessment undertaken in 2008 prior to commencement of construction supports the further investigation in relation to elevated residual arsenic levels. Initial investigations identified that sampling was undertaken on Property 66. Property 66 was later used as Mountain Way Stockpile (Reuse Location 2, SPW3). The results show arsenic levels at this location ranging up to 96mg/kg and with 5 of the 16 samples recording above the absolute maximum criteria.

The Phase 2 Contamination Assessment Sapphire to Woolgoolga Pacific Highway Upgrade considered the soil material at the four banana plantation sites to be suitable for beneficial reuse on the site during construction.

6 Matter of National Environmental Significance

The environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999* require the following matters of national environmental significance and impacts on Commonwealth land be considered for the proposed design refinements (refer *Table 6.1).*

Table 6.1 Matters of National Environmental Significance

Factor	Impact / Comment
Any impact on a World Heritage property?	There are no World Heritage properties that will be impacted by the proposed beneficial reuses.
Any impact on a National Heritage place?	There are no National heritage places that will be impacted by the proposed beneficial reuses.
Any impact on a wetland of international importance?	There are no wetlands of international importance that will be impacted by the proposed beneficial reuses.
Any impact on a listed threatened species or communities?	These areas are previously approved temporary stockpile areas and cleared/ heavily disturbed. They were selected as stockpile sites on past disturbance history. There are no impacts to flora or fauna. Revegetation will result in a positive for the environment.
Any impacts on listed migratory species?	No migratory species were identified or known in the proposed beneficial reuse locations.
Any impact on a Commonwealth marine area?	The proposed beneficial reuses will not impact on a Commonwealth marine area.
Does the proposal involve a nuclear action (including uranium mining)?	The proposed beneficial reuses do not involve a nuclear action.
Additionally, any impact (direct or indirect) on Commonwealth land?	The proposed beneficial reuses will not impact (direct or indirect) on Commonwealth land.

7 General Environmental Management

In addition to the specific management measures and controls prescribed above, the following general environmental management have been implemented.

1. Once the beneficial reuse locations have been shaped and completed, the exposed surface has been treated with native grass seed/hydro mulched as per the TRACT landscape plan.. Material suitable for revegetation has been used in the upper profiles (topsoil). The final surface will be as per the Landscape Plans provided in Appendix A. An inspection has been undertaken by Roads and Maritime upon completion of placement.

2. Establishment of the mounds was undertaken in accordance with the LFHJV *Progressive Erosion and Sediment Control Plan* (prepared by Soil Conservation Service) and the *Construction Soil Erosion and Water Management Plan.*

3. All project personnel, including subcontractors, underwent the project site induction. Similarly, work crews were toolboxed and trained on their environmental responsibilities and accountabilities as per the project's Environmental Management System, whereby all works will be undertaken in accordance with the projects approved Construction Environmental Management Plan (CEMP).

8 Conclusion

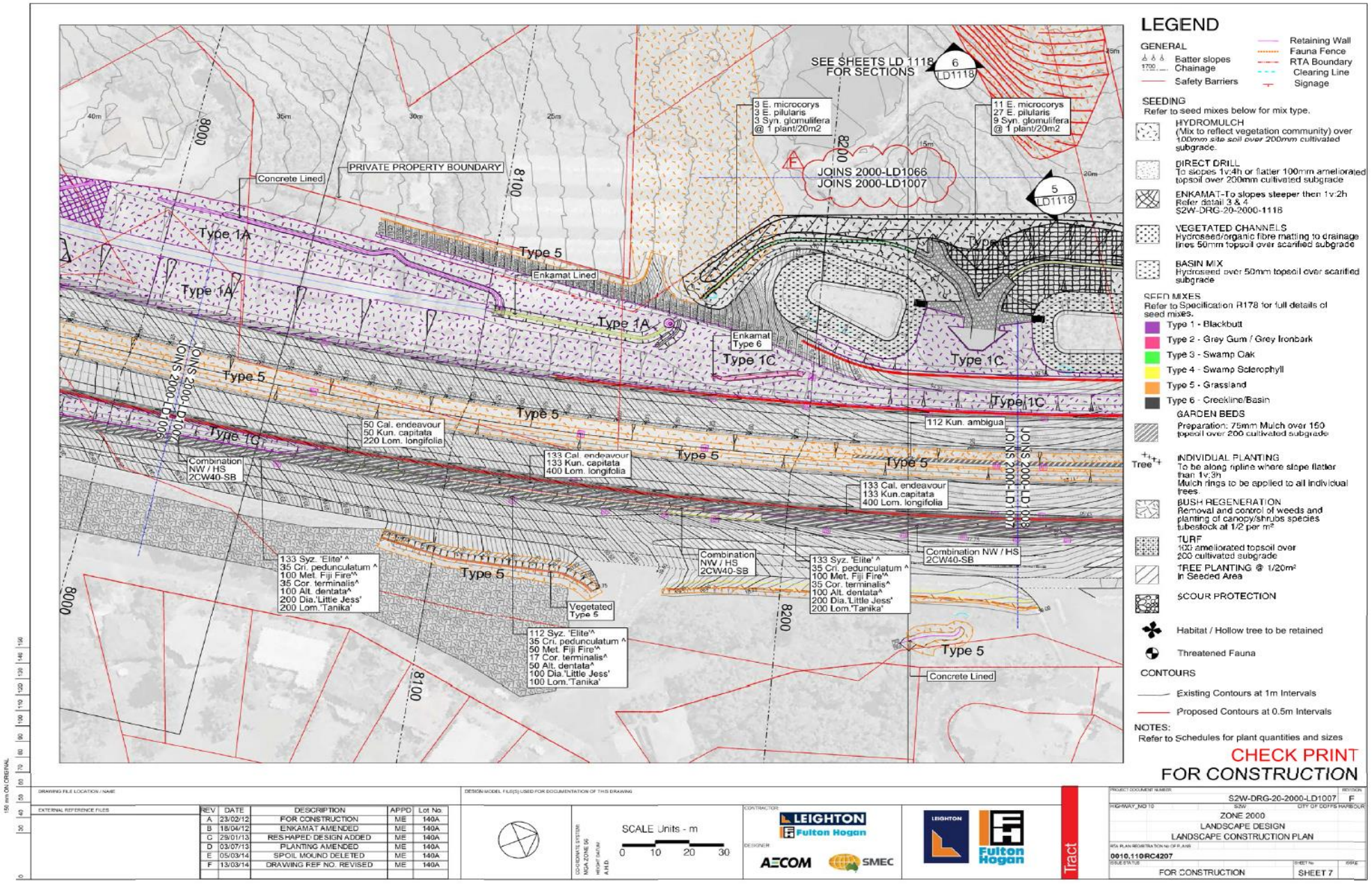
The environmental review undertaken for the proposed reuse of material has confirmed that the activity will have a negligible to low environmental impact.

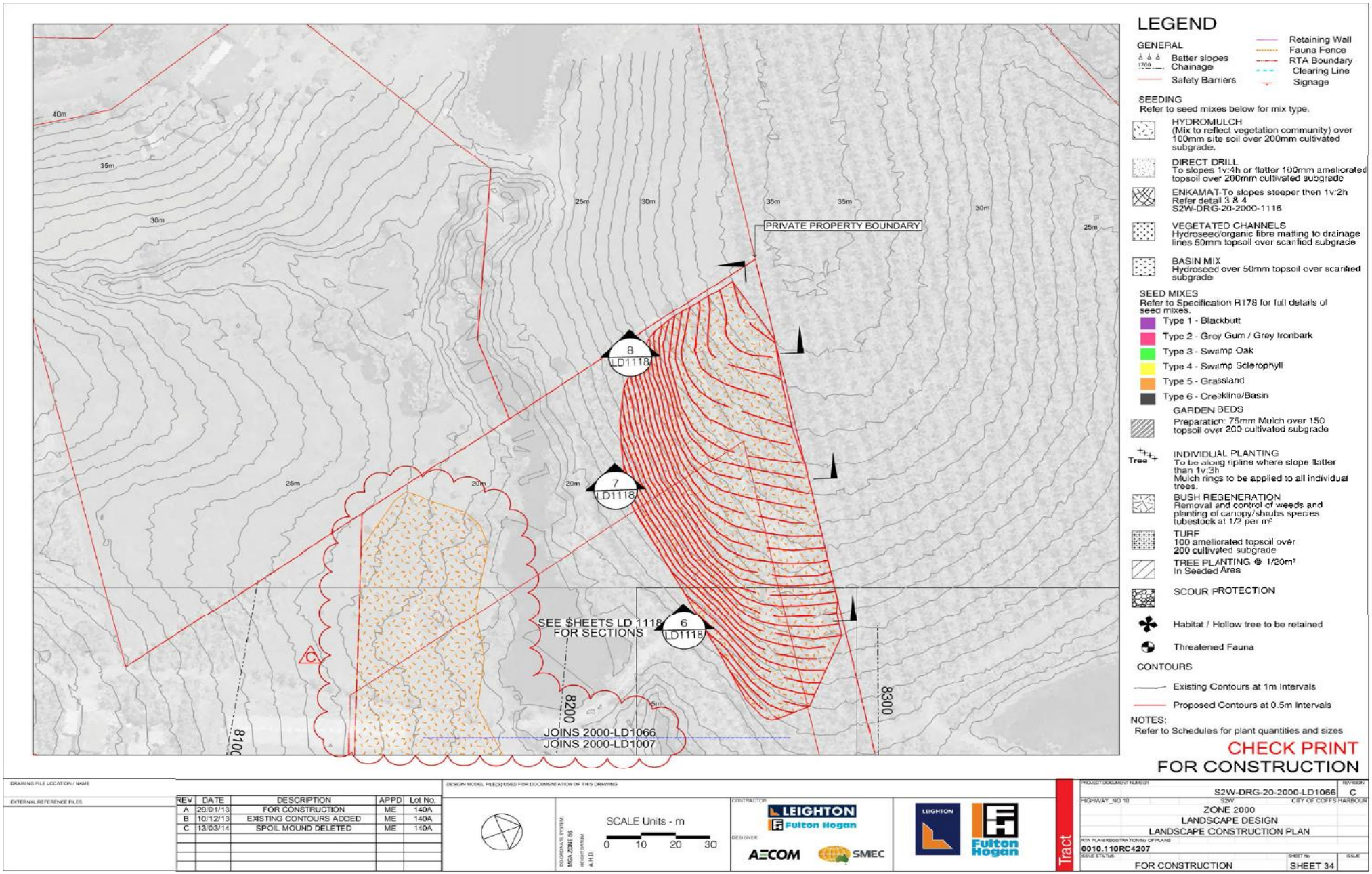
The five sites proposed in Section 2 have been selected based on their past disturbance history and low environmental and socio-economic impact. Subsequently, it is considered that with the implementation of the safeguards provided in the CEMP and the additional mitigation measures identified in this document, that the proposed permanent retention of unsuitable material will not result in any significant adverse impacts to the environment or the community.

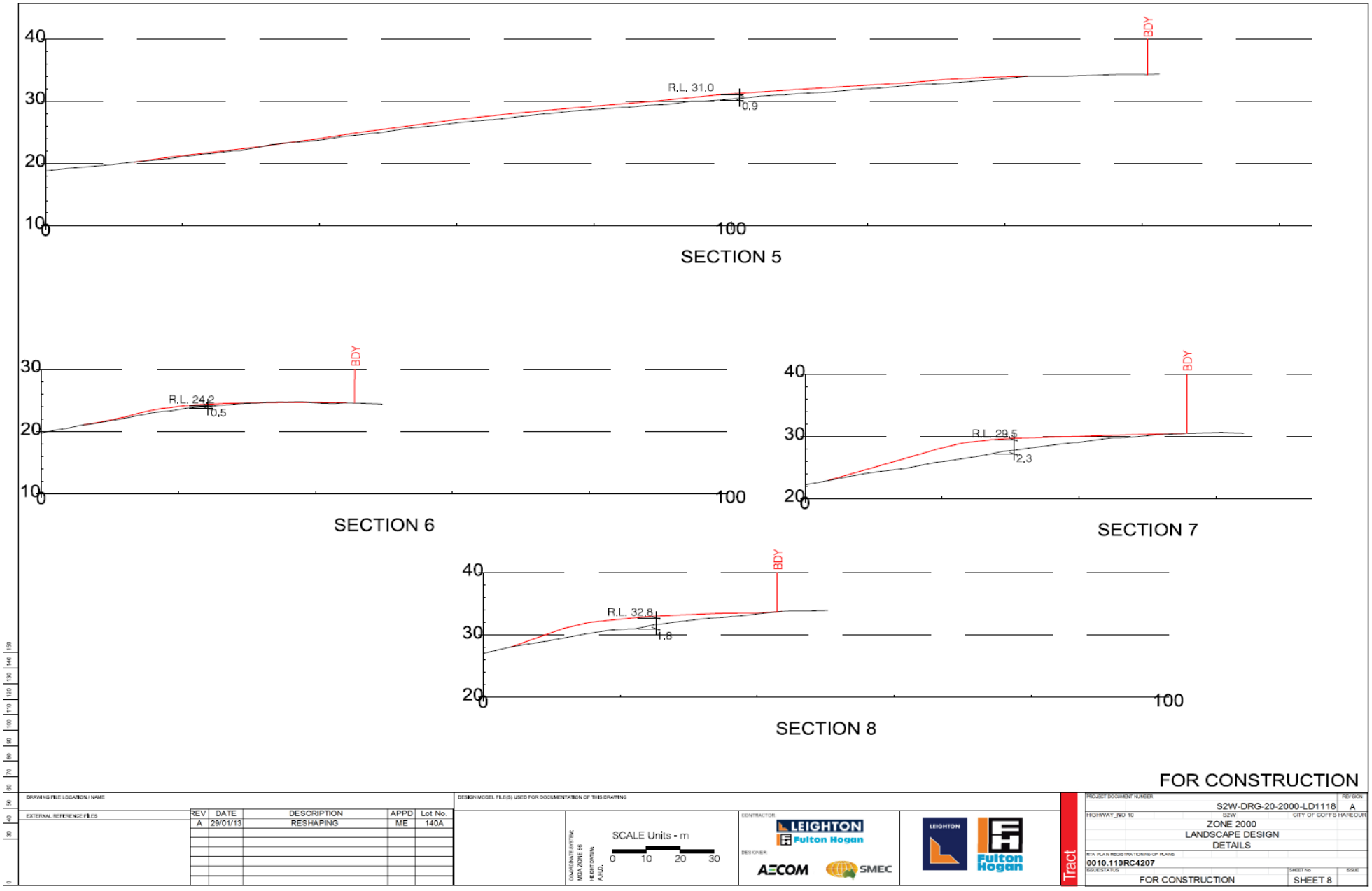
The project consider that the proposed regrading and establishment of the proposed beneficial reuses on Roads and Maritime residual land adjacent to the corridor has a number of advantages, including superior outcome on the waste hierarchy, landscape aesthetics, noise reduction, reducing disturbance of other lands, reducing greenhouse impacts and safety risks by preventing the need for long distance transport on the road network and improving the value of residual properties for potential future redevelopment.

Appendix A
Reuse Landscape Design Plans

SPW1 817-817A Pacific Highway, Korora


LEGEND
GENERAL
Batter slopes
Chainage
Safety Barriers
Retaining Wall
Fauna Fence
RTA Boundary
Clearing Line
Signage
SEEDING
Refer to seed mixes below for mix type.
HYDROMULCH
(Mix to reflect vegetation community) over 100mm site soil over 200mm cultivated subgrade.
DIRECT DRILL
To slopes 1v:4h or flatter 100mm ameliorated topsoil over 200mm cultivated subgrade
ENKAMAT-To slopes steeper then 1v:2h
Refer detail 3 & 4
S2W-DRG-20-2000-1118
VEGETATED CHANNELS
Hydroseed/organic fibre matting to drainage lines 50mm topsoil over scarified subgrade
BASIN MIX
Hydroseed over 50mm topsoil over scarified subgrade
SEED MIXES
Refer to Specification R178 for full details of seed mixes.
Type 1 - Blackbutt
Type 2 - Grey Gum / Grey Ironbark
Type 3 - Swamp Oak
Type 4 - Swamp Sclerophyll
Type 5 - Grassland
Type 6 - Creekline/Basin
GARDEN BEDS
Preparation: 75mm Mulch over 150 topsoil over 200 cultivated subgrade
Tree
INDIVIDUAL PLANTING
To be along ripline where slope flatter than 1v:3h
Mulch rings to be applied to all individual trees.
BUSH REGENERATION
Removal and control of weeds and planting of canopy/shrubs species tubestock at 1/2 per m²
TURF
100 ameliorated topsoil over 200 cultivated subgrade
TREE PLANTING @ 1/20m²
In Seeded Area
SCOUR PROTECTION
Habitat / Hollow tree to be retained
Threatened Fauna
CONTOURS
Existing Contours at 1m Intervals
Proposed Contours at 0.5m Intervals
NOTES:
Refer to Schedules for plant quantities and sizes
CHECK PRINT
FOR CONSTRUCTION
SEE SHEETS LD 1118 FOR SECTIONS
6 LD1118
5 LD1118
PRIVATE PROPERTY BOUNDARY
Concrete Lined
Enkamat Lined
Enkamat Type 6
JOINS 2000-LD1066
JOINS 2000-LD1007
JOINS 2000-LD1008
3 E. microcorys
3 E. pilularis
3 Syn. glomulifera
@ 1 plant/20m2
11 E. microcorys
27 E. pilularis
9 Syn. glomulifera
@ 1 plant/20m2
Type 1A
Type 1C
Type 5
Type 6
50 Cal. endeavour
50 Kun. capitata
220 Lom. longifolia
133 Cal. endeavour
133 Kun. capitata
400 Lom. longifolia
112 Kun. ambigua
Combination NW / HS 2CW40-SB
133 Syz. 'Elite' ^
35 Cri. pedunculatum ^
100 Met. Fiji Fire'^
35 Cor. terminalis^
100 Alt. dentata^
200 Dia.'Little Jess'
200 Lom.'Tanika'
112 Syz. 'Elite'^
35 Cri. pedunculatum ^
50 Met. Fiji Fire'^
17 Cor. terminalis^
50 Alt. dentata^
100 Dia.'Little Jess'
100 Lom.'Tanika'
Vegetated Type 5
8000
8100
8200
DRAWING FILE LOCATION / NAME
EXTERNAL REFERENCE FILES
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
REV | DATE | DESCRIPTION | APPD | Lot No.
A | 23/02/12 | FOR CONSTRUCTION | ME | 140A
B | 18/04/12 | ENKAMAT AMENDED | ME | 140A
G | 29/01/13 | RESHAPED DESIGN ADDED | ME | 140A
D | 03/07/13 | PLANTING AMENDED | ME | 140A
E | 05/03/14 | SPOIL MOUND DELETED | ME | 140A
F | 13/03/14 | DRAWING REF NO. REVISED | ME | 140A
SCALE Units - m
0 10 20 30
CONTRACTOR:
LEIGHTON
Fulton Hogan
DESIGNER:
AECOM
SMEC
Tract
PROJECT DOCUMENT NUMBER
S2W-DRG-20-2000-LD1007
REVISION
F
HIGHWAY_NO TO
S2W
CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
LANDSCAPE CONSTRUCTION PLAN
RTA PLAN REGISTRATION No OF PLANS
0010.110RC4207
ISSUE STATUS
FOR CONSTRUCTION
SHEET No
SHEET 7


LEGEND
GENERAL
Batter slopes
Chainage
Safety Barriers
Retaining Wall
Fauna Fence
RTA Boundary
Clearing Line
Signage
SEEDING
Refer to seed mixes below for mix type.
HYDROMULCH
(Mix to reflect vegetation community) over 100mm site soil over 200mm cultivated subgrade.
DIRECT DRILL
To slopes 1v:4h or flatter 100mm ameliorated topsoil over 200mm cultivated subgrade
ENKAMAT To slopes steeper then 1v:2h
Refer detail 3 & 4
S2W-DRG-20-2000-1116
VEGETATED CHANNELS
Hydroseed/organic fibre matting to drainage lines 50mm topsoil over scarified subgrade
BASIN MIX
Hydroseed over 50mm topsoil over scarified subgrade
SEED MIXES
Refer to Specification R178 for full details of seed mixes.
Type 1 - Blackbutt
Type 2 - Grey Gum / Grey Ironbark
Type 3 - Swamp Oak
Type 4 - Swamp Sclerophyll
Type 5 - Grassland
Type 6 - Creekline/Basin
GARDEN BEDS
Preparation: 75mm Mulch over 150 topsoil over 200 cultivated subgrade
INDIVIDUAL PLANTING
To be along ripline where slope flatter than 1v:3h
Mulch rings to be applied to all individual trees.
BUSH REGENERATION
Removal and control of weeds and planting of canopy/shrubs species tubestock at 1/2 per m²
TURF
100 ameliorated topsoil over 200 cultivated subgrade
TREE PLANTING @ 1/20m²
In Seeded Area
SCOUR PROTECTION
Habitat / Hollow tree to be retained
Threatened Fauna
CONTOURS
Existing Contours at 1m Intervals
Proposed Contours at 0.5m Intervals
NOTES:
Refer to Schedules for plant quantities and sizes
CHECK PRINT
FOR CONSTRUCTION
PRIVATE PROPERTY BOUNDARY
8 LD1118
7 LD1118
6 LD1118
SEE SHEETS LD 1118
FOR SECTIONS
JOINS 2000-LD1066
JOINS 2000-LD1007
40m
35m
30m
25m
20m
8200
8300
8100
REV DATE DESCRIPTION APPD Lot No.
A 29/01/13 FOR CONSTRUCTION ME 140A
B 10/12/13 EXISTING CONTOURS ADDED ME 140A
C 13/03/14 SPOIL MOUND DELETED ME 140A
SCALE Units - m
0 10 20 30
LEIGHTON
Fulton Hogan
AECOM
SMEC
Tract
S2W-DRG-20-2000-LD1066
C
ZONE 2000
LANDSCAPE DESIGN
LANDSCAPE CONSTRUCTION PLAN
0010.110RC4207
FOR CONSTRUCTION
SHEET 34


40
30
20
10
0
100
BDY
R.L. 31.0
0.9
SECTION 5
30
20
10
0
100
BDY
R.L. 24.2
0.5
SECTION 6
40
30
20
0
100
BDY
R.L. 29.5
2.3
SECTION 7
40
30
20
0
100
BDY
R.L. 32.8
1.8
SECTION 8
FOR CONSTRUCTION
DRAWING FILE LOCATION / NAME
EXTERNAL REFERENCE FILES
REV
DATE
DESCRIPTION
APPD
Lot No.
A
29/01/13
RESHAPING
ME
140A
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
SCALE Units - m
0
10
20
30
CONTRACTOR
LEIGHTON
Fulton Hogan
DESIGNER
AECOM
SMEC
Tract
PROJECT DOCUMENT NUMBER
S2W-DRG-20-2000-LD1118
A
HIGHWAY_NO 10
S2W
CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
DETAILS
RTA PLAN REGISTRATION No OF PLANS
0010.110RC4207
ISSUE STATUS
FOR CONSTRUCTION
SHEET No
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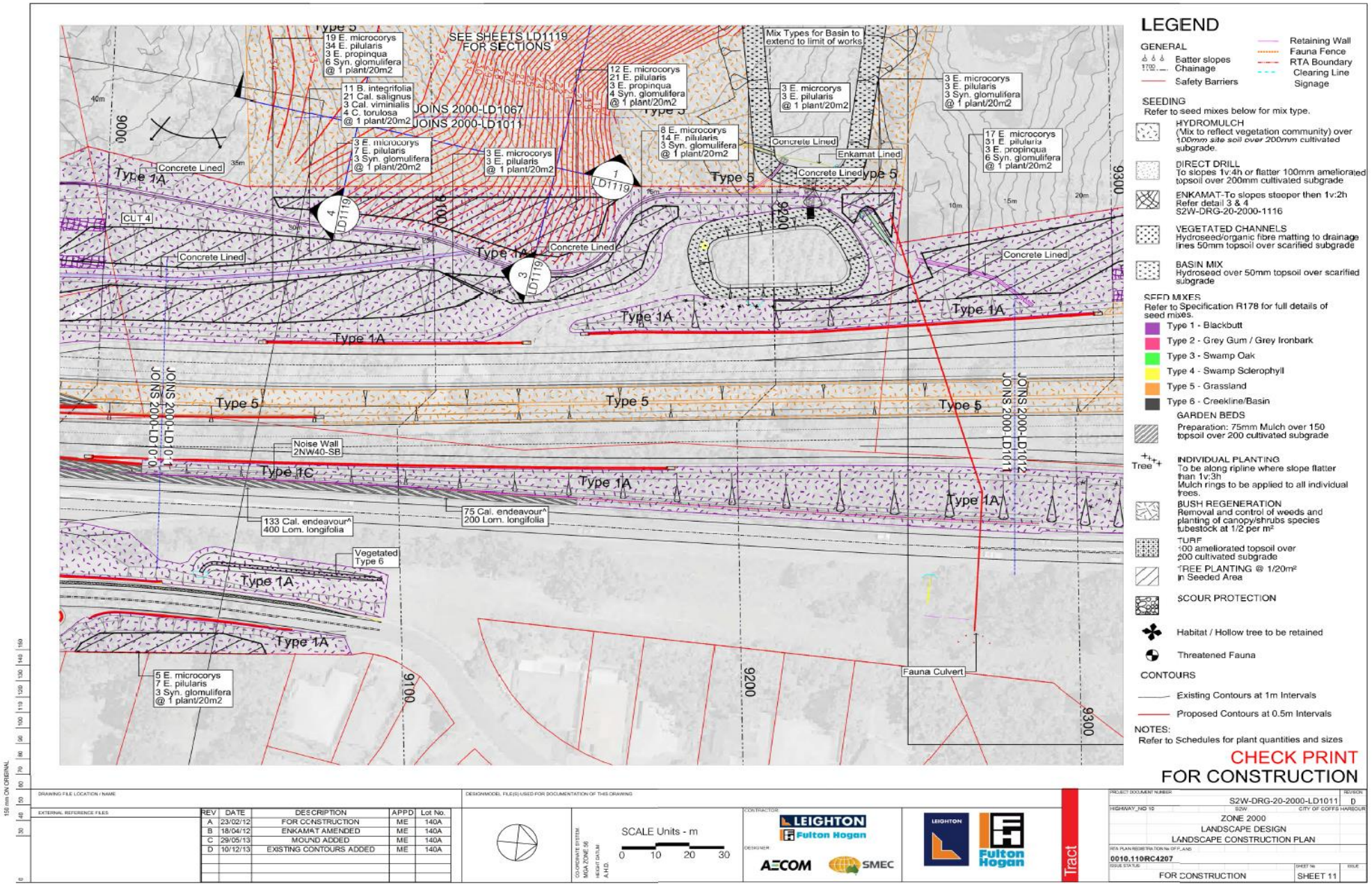
ISSUE

SPW 3 18C Mountain Way, Sapphire Beach


SEE SHEETS LD1119 FOR SECTIONS
Mix Types for Basin to extend to limit of works
19 E. microcorys
34 E. pilularis
3 E. propinqua
6 Syn. glomulifera
@ 1 plant/20m2
11 B. integrifolia
21 Cal. salignus
3 Cal. viminialis
4 C. torulosa
@ 1 plant/20m2
JOINS 2000-LD1067
JOINS 2000-LD1011
12 E. microcorys
21 E. pilularis
3 E. propinqua
4 Syn. glomulifera
@ 1 plant/20m2
3 E. mircorys
3 E. pilularis
@ 1 plant/20m2
3 E. microcorys
3 E. pilularis
Syn. glomulifera
@ 1 plant/20m2
3 E. microcorys
7 E. pilularis
3 Syn. glomulifera
@ 1 plant/20m2
8 E. microcorys
14 E. pilularis
3 Syn. glomulifera
@ 1 plant/20m2
17 E. microcorys
31 E. pilularis
3 E. propinqua
6 Syn. glomulifera
@ 1 plant/20m2
Concrete Lined
Enkamat Lined
Type 1A
Type 5
CUT 4
Noise Wall 2NW40-SB
Type 1C
133 Cal. endeavour^
400 Lom. longifolia
75 Cal. endeavour^
200 Lom. longifolia
Vegetated Type 6
5 E. microcorys
7 E. pilularis
3 Syn. glomulifera
@ 1 plant/20m2
Fauna Culvert
9000
9100
9200
9300
LEGEND
GENERAL
Batter slopes
Chainage
Safety Barriers
Retaining Wall
Fauna Fence
RTA Boundary
Clearing Line
Signage
SEEDING
Refer to seed mixes below for mix type.
HYDROMULCH
(Mix to reflect vegetation community) over 100mm site soil over 200mm cultivated subgrade.
DIRECT DRILL
To slopes 1v:4h or flatter 100mm ameliorated topsoil over 200mm cultivated subgrade
ENKAMAT-To slopes steeper then 1v:2h
Refer detail 3 & 4
S2W-DRG-20-2000-1116
VEGETATED CHANNELS
Hydroseed/organic fibre matting to drainage lines 50mm topsoil over scarified subgrade
BASIN MIX
Hydroseed over 50mm topsoil over scarified subgrade
SEED MIXES
Refer to Specification R178 for full details of seed mixes.
Type 1 - Blackbutt
Type 2 - Grey Gum / Grey Ironbark
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Type 4 - Swamp Sclerophyll
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Type 6 - Creekline/Basin
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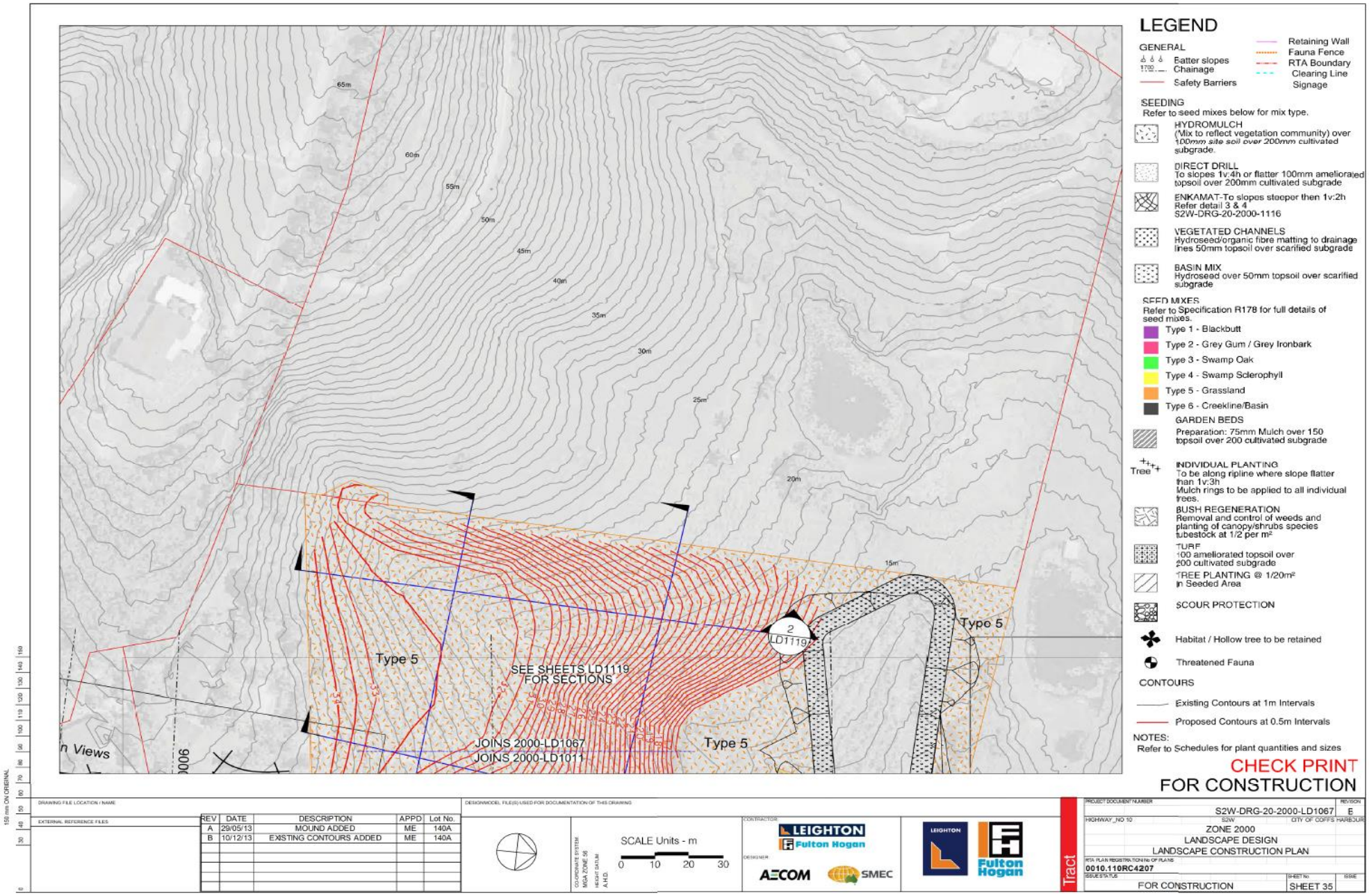
Removal and control of weeds and planting of canopy/shrubs species tubestock at 1/2 per m²
TURF
100 ameliorated topsoil over 200 cultivated subgrade
TREE PLANTING @ 1/20m²
In Seeded Area
SCOUR PROTECTION
Habitat / Hollow tree to be retained
Threatened Fauna
CONTOURS
Existing Contours at 1m Intervals
Proposed Contours at 0.5m Intervals
NOTES:
Refer to Schedules for plant quantities and sizes
CHECK PRINT
FOR CONSTRUCTION
SCALE Units - m
0 10 20 30
REV DATE DESCRIPTION APPD Lot No.
A 23/02/12 FOR CONSTRUCTION ME 140A
B 18/04/12 ENKAMAT AMENDED ME 140A
C 29/05/13 MOUND ADDED ME 140A
D 10/12/13 EXISTING CONTOURS ADDED ME 140A
LEIGHTON
Fulton Hogan
AECOM
SMEC
Tract
S2W-DRG-20-2000-LD1011
D
ZONE 2000
LANDSCAPE DESIGN
LANDSCAPE CONSTRUCTION PLAN
0010.110RC4207
FOR CONSTRUCTION
SHEET 11


LEGEND
GENERAL
Batter slopes
Chainage
Safety Barriers
Retaining Wall
Fauna Fence
RTA Boundary
Clearing Line
Signage
SEEDING
Refer to seed mixes below for mix type.
HYDROMULCH
('Mix to reflect vegetation community) over 100mm site soil over 200mm cultivated subgrade.
DIRECT DRILL
To slopes 1v:4h or flatter 100mm ameliorated topsoil over 200mm cultivated subgrade
ENKAMAT-To slopes steeper then 1v:2h
Refer detail 3 & 4
S2W-DRG-20-2000-1116
VEGETATED CHANNELS
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BASIN MIX
Hydroseed over 50mm topsoil over scarified subgrade
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Type 2 - Grey Gum / Grey Ironbark
Type 3 - Swamp Oak
Type 4 - Swamp Sclerophyll
Type 5 - Grassland
Type 6 - Creekline/Basin
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TURF
100 ameliorated topsoil over 200 cultivated subgrade
TREE PLANTING @ 1/20m²
In Seeded Area
SCOUR PROTECTION
Habitat / Hollow tree to be retained
Threatened Fauna
CONTOURS
Existing Contours at 1m Intervals
Proposed Contours at 0.5m Intervals
NOTES:
Refer to Schedules for plant quantities and sizes
CHECK PRINT
FOR CONSTRUCTION
65m
60m
55m
50m
45m
40m
35m
30m
25m
20m
15m
Type 5
Type 5
Type 5
SEE SHEETS LD1119
FOR SECTIONS
JOINS 2000-LD1067
JOINS 2000-LD1011
2
LD1119
n Views
9006
DRAWING FILE LOCATION / NAME
EXTERNAL REFERENCE FILES
DESIGN/MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
REV DATE DESCRIPTION APPD Lot No.
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B 10/12/13 EXISTING CONTOURS ADDED ME 140A
COORDINATE SYSTEM MGA ZONE 56
HEIGHT DATUM A.H.D.
SCALE Units - m
0 10 20 30
CONTRACTOR
LEIGHTON
Fulton Hogan
DESIGNER
AECOM
SMEC
LEIGHTON
Fulton Hogan
Tract
PROJECT DOCUMENT NUMBER
S2W-DRG-20-2000-LD1067
REVISION
E
HIGHWAY_NO 10
S2W
CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
LANDSCAPE CONSTRUCTION PLAN
RTA PLAN REGISTRATION No OF PLANS
0010.110RC4207
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FOR CONSTRUCTION
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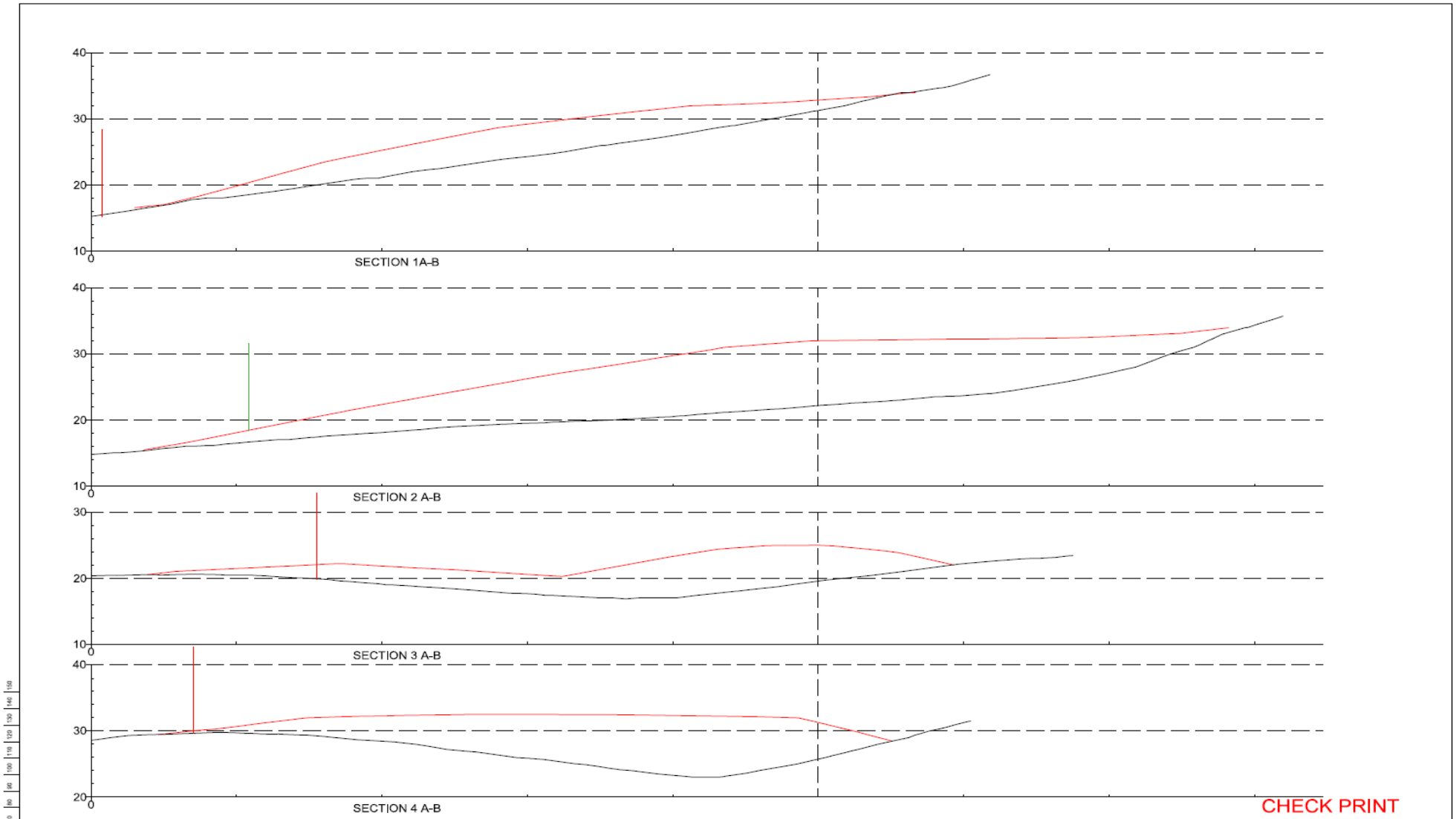
ISSUE


40
30
20
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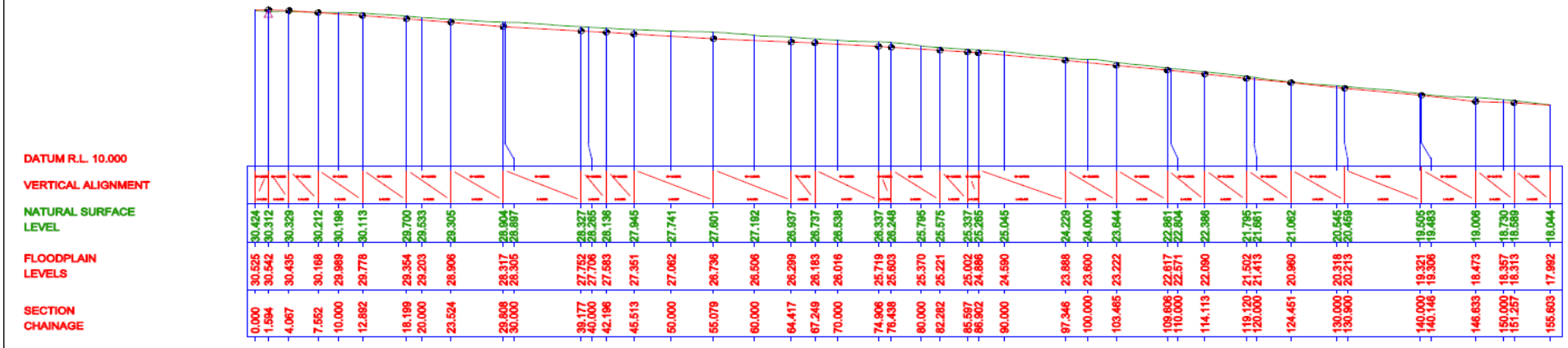
SECTION 1A-B
SECTION 2 A-B
SECTION 3 A-B
SECTION 4 A-B
CHECK PRINT
FOR CONSTRUCTION
DRAWING FILE LOCATION / NAME
EXTERNAL REFERENCE FILES
REV
DATE
DESCRIPTION
APPD
Lot No.
A
29-05-13
MOUND ADDED
ME
140A
DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
SCALE Units - m
0
10
20
30
CONTRACTOR
LEIGHTON
Fulton Hogan
DESIGNER
AECOM
SMEC
Tract
PROJECT DOCUMENT NUMBER
S2W-DRG-20-2000-LD1119
REVISION
A
HIGHWAY_MO 10
S2W
CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
DETAILS
RTA PLAN REGISTRATION No OF PLANS
0010.110RC4207
ISSUE STATUS
FOR CONSTRUCTION
SHEET No
SHEET 9
ISSUE

SPW 4 10 Gaudrons Road, Sapphire Beach



LONGITUDINAL SECTION ALONG CONTROL Section1

Issue	Description	Approved	Date

Scale
HORZ 1:500
VERT 1:500
Chainage
Ch 0.000 to Ch 155.603

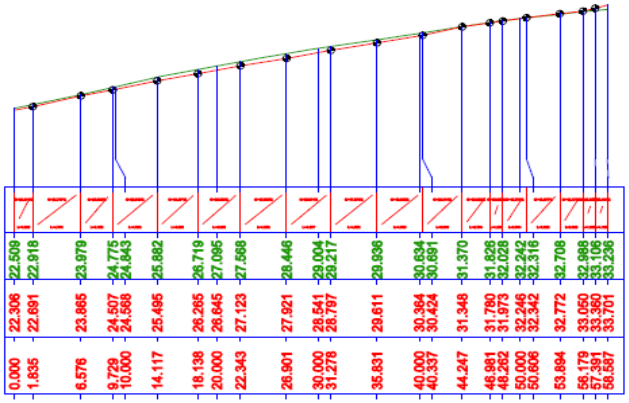
Drawn
Designed
Modelled
Project
Z2000 Earthworks

LEIGHTON
Fulton Hogan

Title
Gaudrons West floodplain sections

Dwg. No.
0
Job No.
Issue

Date plotted: 01/06/2014



LONGITUDINAL SECTION ALONG CONTROL Section2

Issue	Description	Approved	Date

Scale
HORZ 1:500
VERT 1:500
Chainage
Ch 0.000 to Ch 58.587

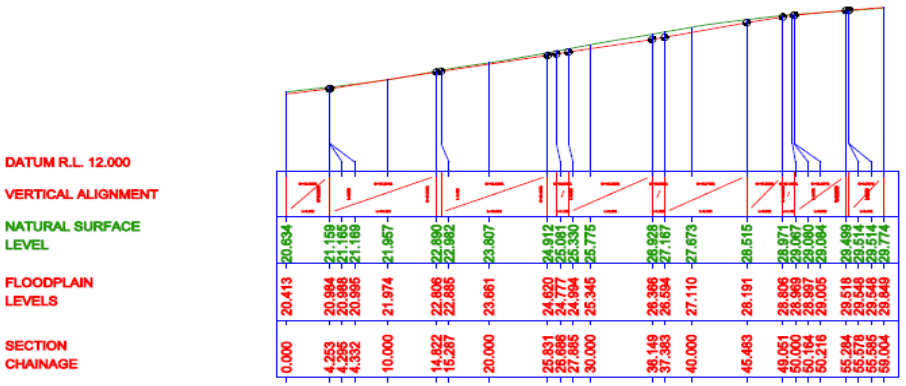
Drawn
Designed
Modelled
Project: Z2000 Earthworks

LEIGHTON
Fulton Hogan

Title: Gaudrons West floodplain sections

Dwg. No. 1
Job No.
Issue

Date plotted: 01/09/2014



LONGITUDINAL SECTION ALONG CONTROL Section3

Issue	Description	Approved	Date

Scale
HORZ 1:500
VERT 1:500
Chainage
Ch 0.000 to Ch 59.004

Drawn
Designed
Modelled
Project: Z2000 Earthworks

LEIGHTON
Fulton Hogan

Title: Gaudrons West floodplain sections

Dwg. No. 2
Job No.
Issue

Date plotted: 01/06/2014

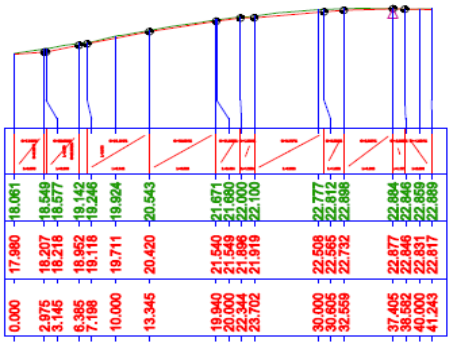
DATUM R.L. 10.000

VERTICAL ALIGNMENT

NATURAL SURFACE LEVEL

FLOODPLAIN LEVELS

SECTION CHAINAGE



LONGITUDINAL SECTION ALONG CONTROL Section4

Issue	Description	Approved	Date

Scale
HORZ 1:500
VERT 1:500

Chainage
Ch 0.000 to Ch 41.243

Drawn
Designed
Modelled
Project
Z2000 Earthworks

LEIGHTON

Fulton Hogan

Title
Gaudrons West
floodplain sections

Dwg. No.
3

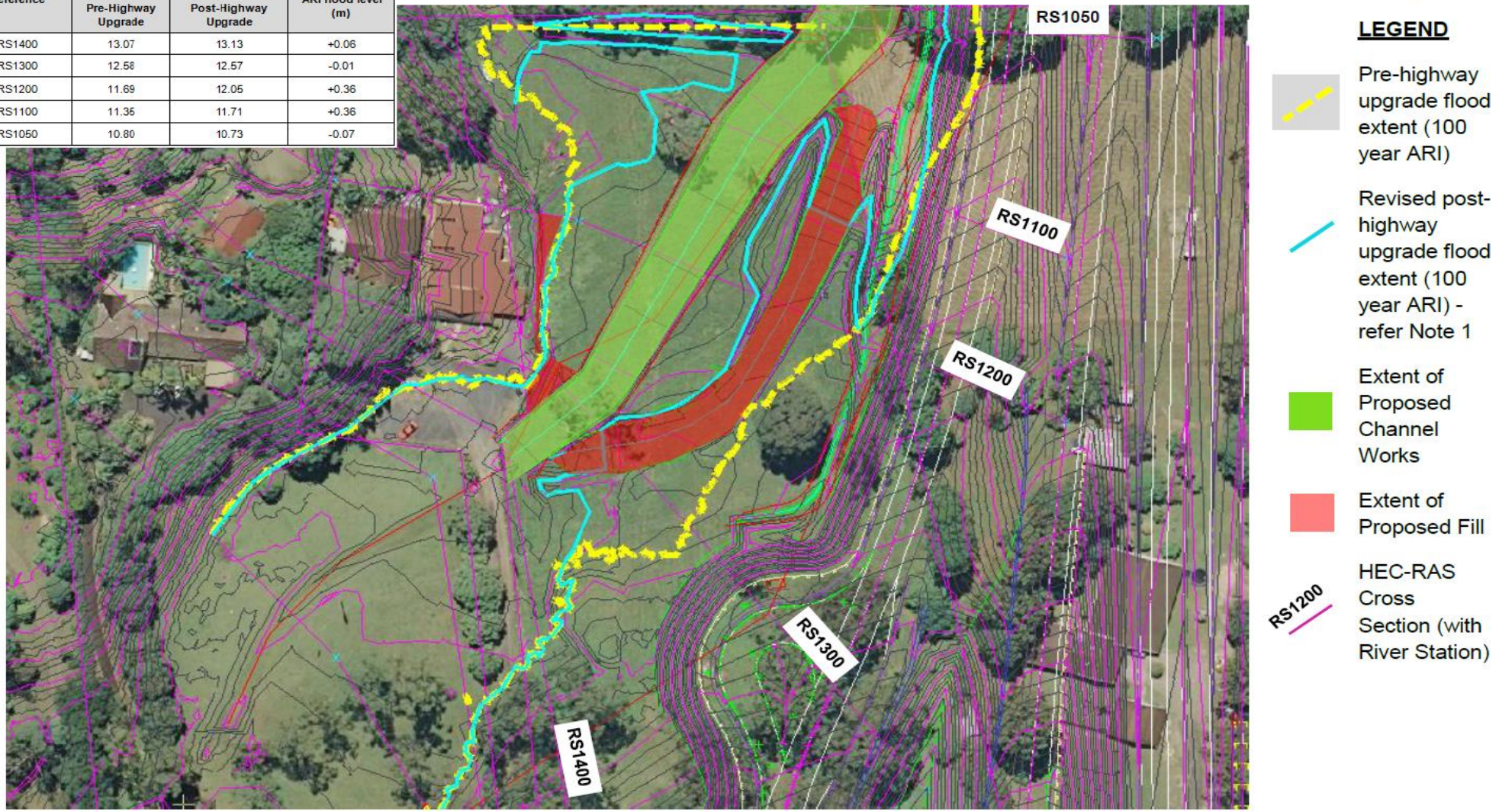
Job No.

Issue

Date plotted: 01/08/2014

HEC-RAS River Station (RS) Reference	Peak 100 year ARI flood level (m AHD)		Difference in peak 100 year ARI flood level (m)
	Pre-Highway Upgrade	Post-Highway Upgrade	
RS1400	13.07	13.13	+0.06
RS1300	12.58	12.57	-0.01
RS1200	11.69	12.05	+0.36
RS1100	11.35	11.71	+0.36
RS1050	10.80	10.73	-0.07

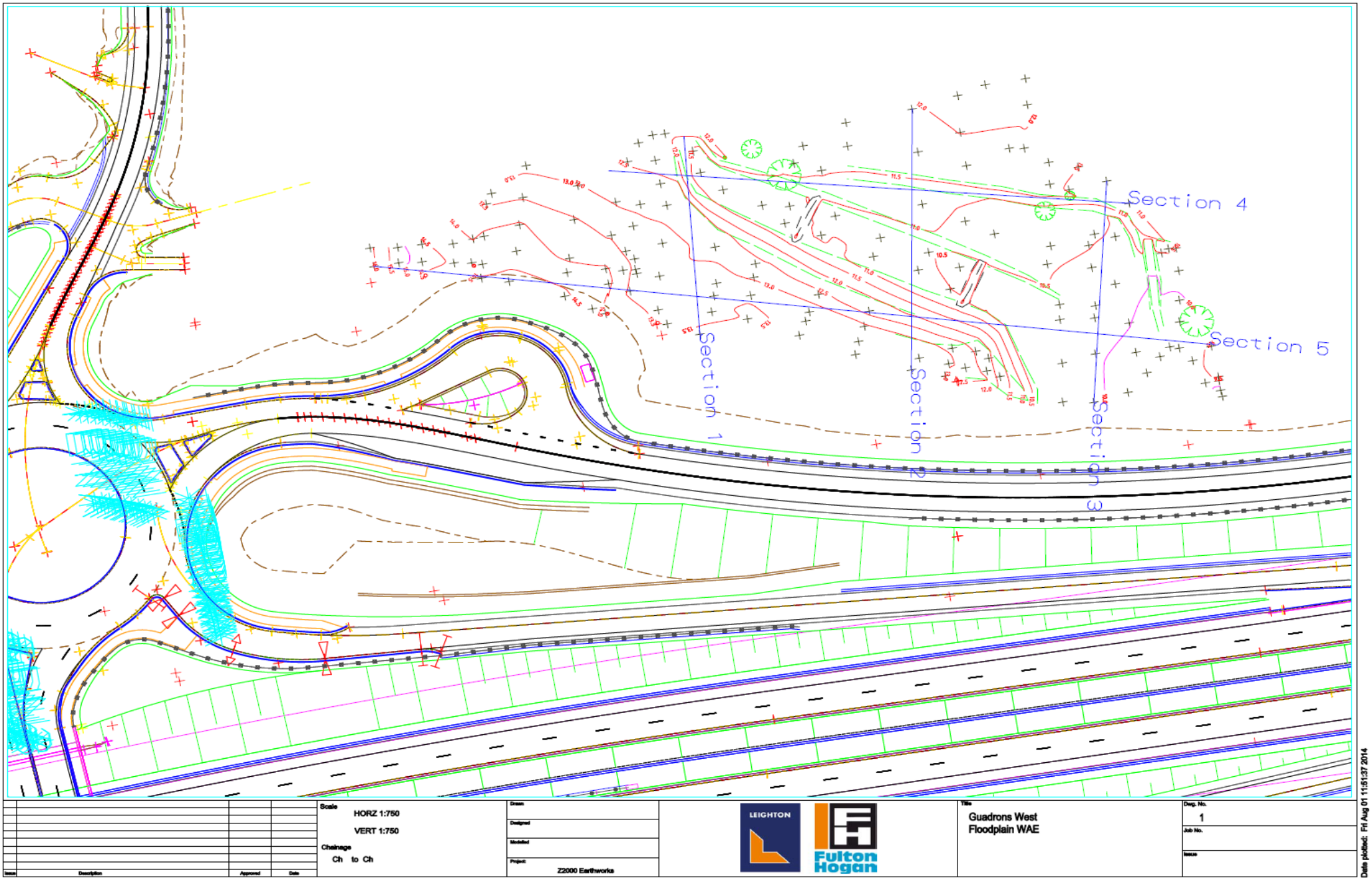
RFI 2927- Figure 2- Overview of Proposed Works and Impact on Flood Extents DJV.pdf



Notes

1. Revised post-highway upgrade scenario based on current site stockpile arrangement (at 29 May 2014) with proposed channel works and filling as shown above.

Figure 1
Overview of Proposed Works and Impact on Flood Extents


Section 1
Section 2
Section 3
Section 4
Section 5
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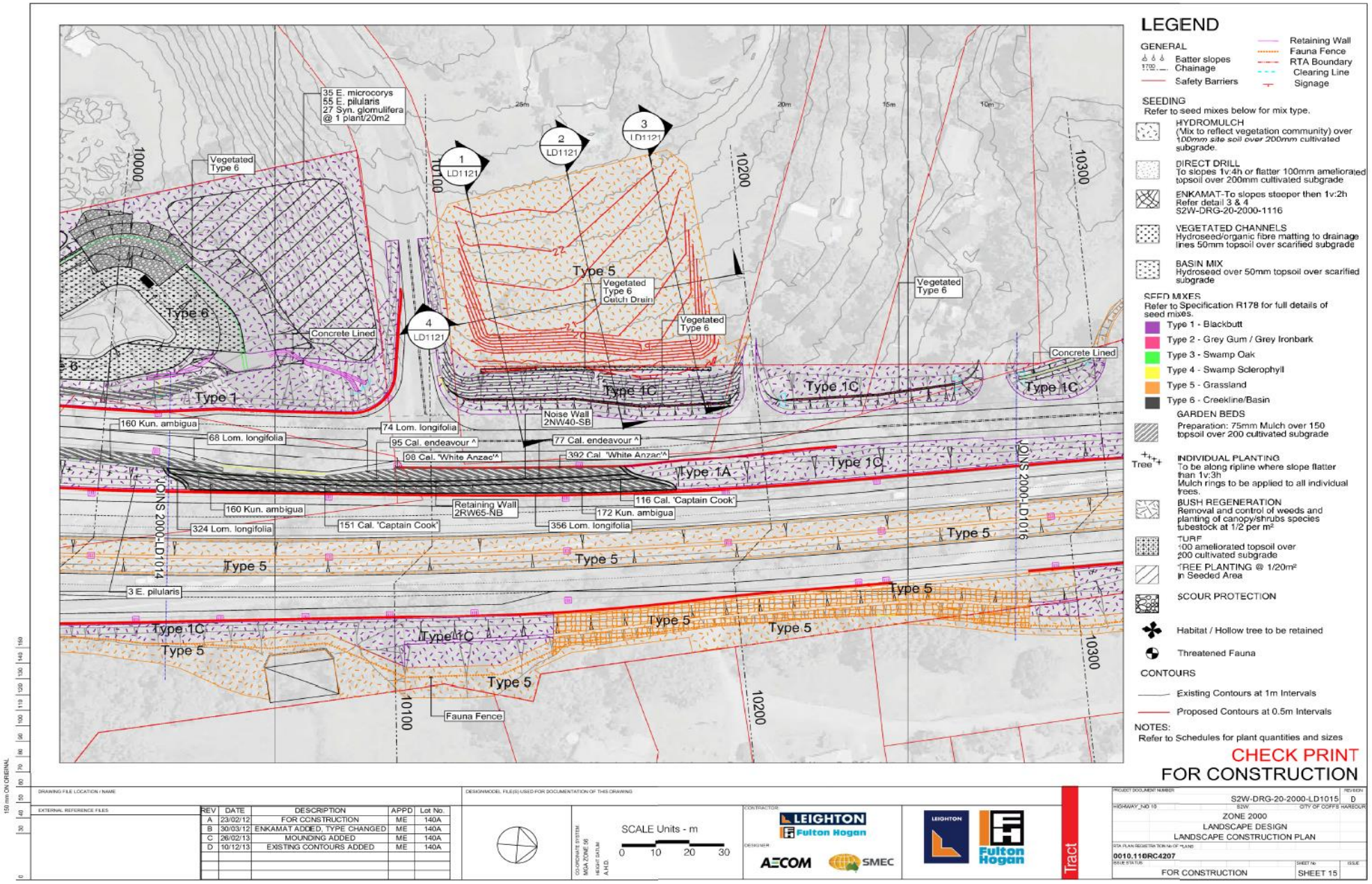
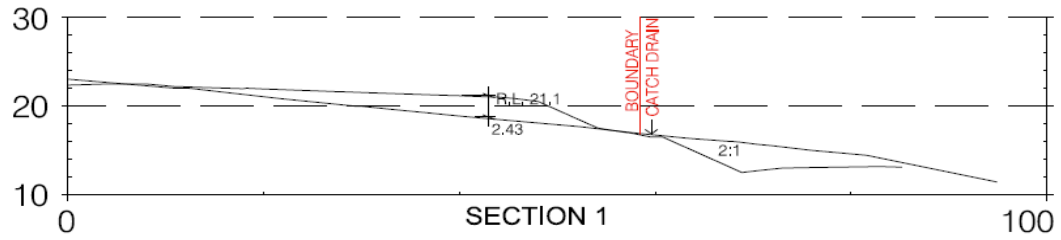
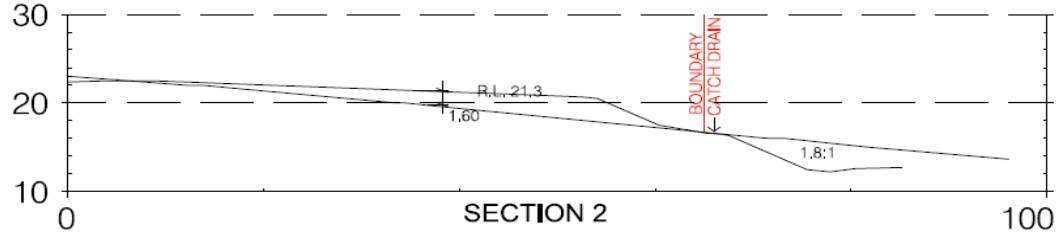
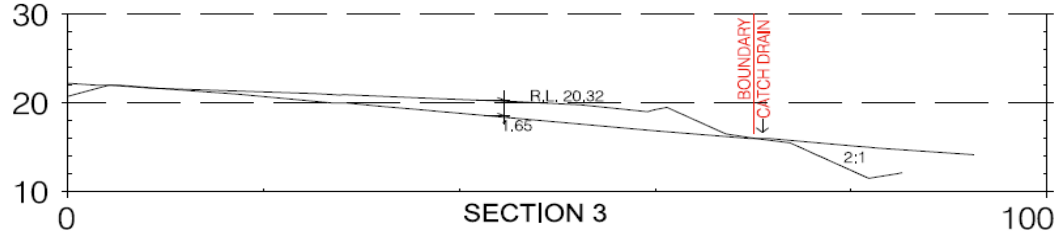
HORZ 1:750
VERT 1:750
Chainage
Ch to Ch
Project:
Z2000 Earthworks
LEIGHTON
Fulton Hogan
Title
Guadrons West
Floodplain WAE
Dwg. No.
1
Job No.
Issue
Date plotted: Fri Aug 01 11:51:37 2014

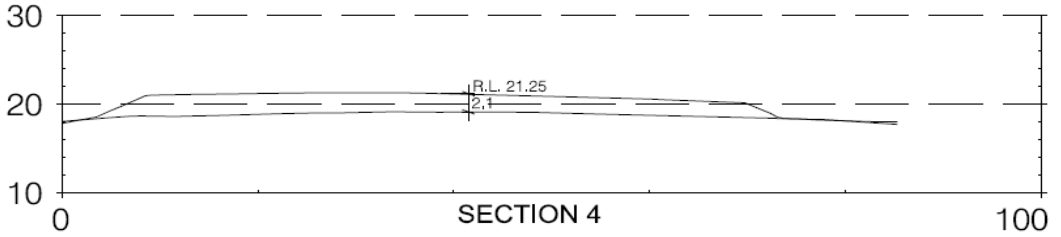
SPW6 16 Sugarmill Road, Sapphire Beach


LEGEND
GENERAL
Batter slopes
Chainage
Safety Barriers
Retaining Wall
Fauna Fence
RTA Boundary
Clearing Line
Signage
SEEDING
Refer to seed mixes below for mix type.
HYDROMULCH
(Mix to reflect vegetation community) over 100mm site soil over 200mm cultivated subgrade.
DIRECT DRILL
To slopes 1v:4h or flatter 100mm ameliorated topsoil over 200mm cultivated subgrade
ENKAMAT-To slopes steeper then 1v:2h
Refer detail 3 & 4
S2W-DRG-20-2000-1116
VEGETATED CHANNELS
Hydroseed/organic fibre matting to drainage lines 50mm topsoil over scarified subgrade
BASIN MIX
Hydroseed over 50mm topsoil over scarified subgrade
SEED MIXES
Refer to Specification R178 for full details of seed mixes.
Type 1 - Blackbutt
Type 2 - Grey Gum / Grey Ironbark
Type 3 - Swamp Oak
Type 4 - Swamp Sclerophyll
Type 5 - Grassland
Type 6 - Creekline/Basin
GARDEN BEDS
Preparation: 75mm Mulch over 150 topsoil over 200 cultivated subgrade
Tree
INDIVIDUAL PLANTING
To be along ripline where slope flatter than 1v:3h
Mulch rings to be applied to all individual trees.
BUSH REGENERATION
Removal and control of weeds and planting of canopy/shrubs species tubestock at 1/2 per m²
TURF
100 ameliorated topsoil over 200 cultivated subgrade
TREE PLANTING @ 1/20m²
In Seeded Area
SCOUR PROTECTION
Habitat / Hollow tree to be retained
Threatened Fauna
CONTOURS
Existing Contours at 1m Intervals
Proposed Contours at 0.5m Intervals
NOTES:
Refer to Schedules for plant quantities and sizes
CHECK PRINT
FOR CONSTRUCTION
35 E. microcorys
55 E. pilularis
27 Syn. glomulifera
@ 1 plant/20m2
Vegetated Type 6
Concrete Lined
Type 6
Type 1
Type 5
Type 1C
Type 1A
Noise Wall 2NW40-SB
Retaining Wall 2RW65-NB
Fauna Fence
160 Kun. ambigua
68 Lom. longifolia
74 Lom. longifolia
95 Cal. endeavour ^
98 Cal. 'White Anzac'^
77 Cal. endeavour ^
392 Cal. 'White Anzac'^
116 Cal. 'Captain Cook'
172 Kun. ambigua
356 Lom. longifolia
151 Cal. 'Captain Cook'
324 Lom. longifolia
3 E. pilularis
JOINS 2000-LD1014
JOINS 2000-LD1016
10000
10100
10200
10300
1 LD1121
2 LD1121
3 LD1121
4 LD1121
DRAWING FILE LOCATION / NAME
EXTERNAL REFERENCE FILES
DESIGN/MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
REV | DATE | DESCRIPTION | APPD | Lot No.
A | 23/02/12 | FOR CONSTRUCTION | ME | 140A
B | 30/03/12 | ENKAMAT ADDED, TYPE CHANGED | ME | 140A
C | 26/02/13 | MOUNDING ADDED | ME | 140A
D | 10/12/13 | EXISTING CONTOURS ADDED | ME | 140A
SCALE Units - m
0 10 20 30
CONTRACTOR
LEIGHTON
Fulton Hogan
DESIGNER
AECOM
SMEC
Tract
PROJECT DOCUMENT NUMBER
S2W-DRG-20-2000-LD1015
REVISION
D
HIGHWAY_NO 10
S2W
CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
LANDSCAPE CONSTRUCTION PLAN
RTA PLAN REGISTRATION No OF PLANS
0010.110RC4207
ISSUE STATUS
FOR CONSTRUCTION
SHEET No
SHEET 15
ISSUE









FOR CONSTRUCTION

REV	DATE	DESCRIPTION	APPD	Lot No.
A	26/02/13	RESHAPING	ME	140A

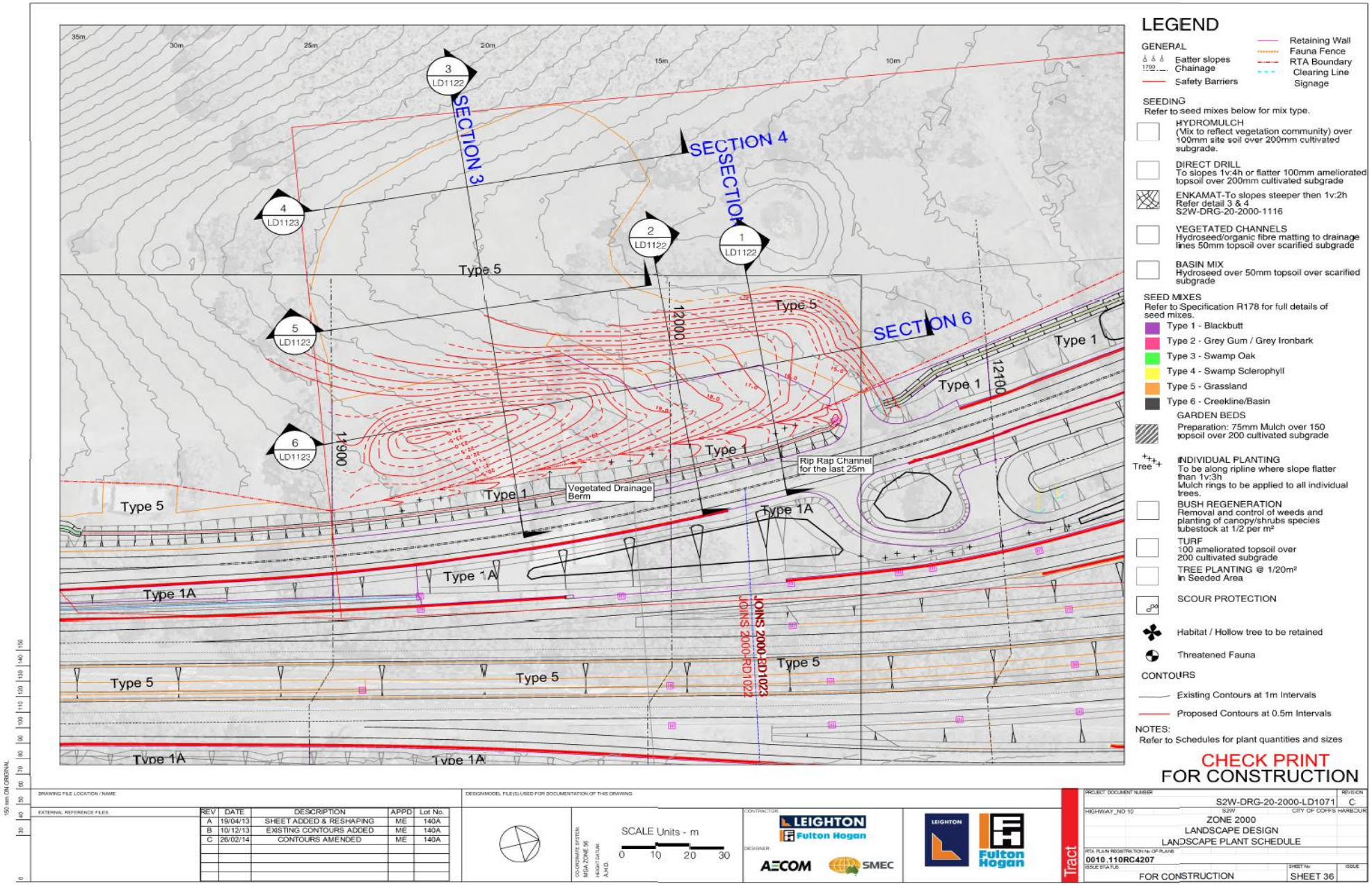
SCALE Units - m
0 10 20 30

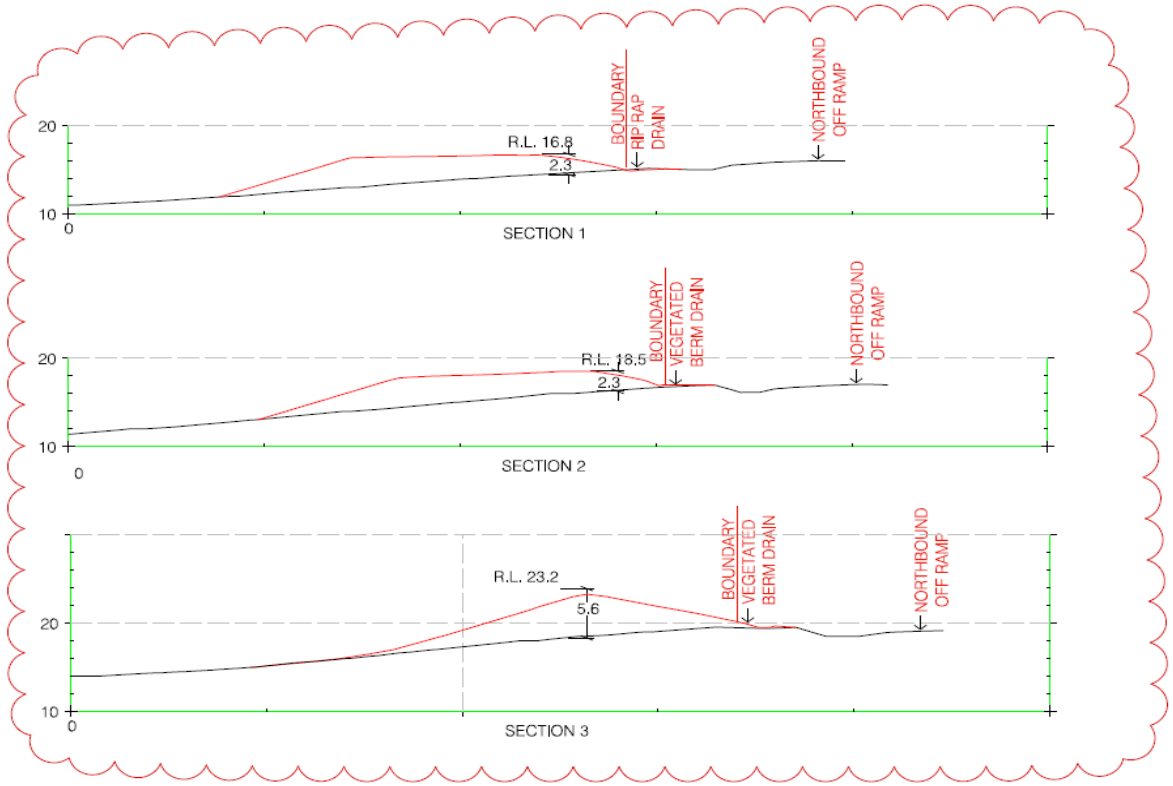
CONTRACTOR: LEICHTON Fulton Hogan
DESIGNER: AECOM SMEC

Tract

PROJECT DOCUMENT NUMBER: S2W-DRG-20-2000-LD1121 REVISION: A
HIGHWAY_NO 10 | S2W | CITY OF KOFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
DETAILS
RTA PLAN REGISTRATION NO OF PLANS: 0010.110RC4207
ISSUE STATUS: FOR CONSTRUCTION | SHEET No: SHEET 11 | ISSUE

SPW7 1225 Pacific Highway, Moonee Beach


SECTION 3
SECTION 4
SECTION 5
SECTION 6
Type 5
Type 1
Type 1A
Vegetated Drainage Berm
Rip Rap Channel for the last 25m
JOINS 2000-LD1023
JOINS 2000-RD1022
12000
11900
12100
LEGEND
GENERAL
Batter slopes
Chainage
Safety Barriers
Retaining Wall
Fauna Fence
RTA Boundary
Clearing Line
Signage
SEEDING
Refer to seed mixes below for mix type.
HYDROMULCH
(Mix to reflect vegetation community) over 100mm site soil over 200mm cultivated subgrade.
DIRECT DRILL
To slopes 1v:4h or flatter 100mm ameliorated topsoil over 200mm cultivated subgrade
ENKAMAT-To slopes steeper then 1v:2h
Refer detail 3 & 4
S2W-DRG-20-2000-1116
VEGETATED CHANNELS
Hydroseed/organic fibre matting to drainage lines 50mm topsoil over scarified subgrade
BASIN MIX
Hydroseed over 50mm topsoil over scarified subgrade
SEED MIXES
Refer to Specification R178 for full details of seed mixes.
Type 1 - Blackbutt
Type 2 - Grey Gum / Grey Ironbark
Type 3 - Swamp Oak
Type 4 - Swamp Sclerophyll
Type 5 - Grassland
Type 6 - Creekline/Basin
GARDEN BEDS
Preparation: 75mm Mulch over 150 topsoil over 200 cultivated subgrade
INDIVIDUAL PLANTING
To be along ripline where slope flatter than 1v:3h
Mulch rings to be applied to all individual trees.
BUSH REGENERATION
Removal and control of weeds and planting of canopy/shrubs species tubestock at 1/2 per m²
TURF
100 ameliorated topsoil over 200 cultivated subgrade
TREE PLANTING @ 1/20m²
In Seeded Area
SCOUR PROTECTION
Habitat / Hollow tree to be retained
Threatened Fauna
CONTOURS
Existing Contours at 1m Intervals
Proposed Contours at 0.5m Intervals
NOTES:
Refer to Schedules for plant quantities and sizes
CHECK PRINT
FOR CONSTRUCTION
REV DATE DESCRIPTION APPD Lot No.
A 19/04/13 SHEET ADDED & RESHAPING ME 140A
B 10/12/13 EXISTING CONTOURS ADDED ME 140A
C 26/02/14 CONTOURS AMENDED ME 140A
SCALE Units - m
0 10 20 30
CONTRACTOR:
LEIGHTON
Fulton Hogan
DESIGNER:
AECOM
SMEC
Tract
PROJECT DOCUMENT NUMBER
S2W-DRG-20-2000-LD1071
REVISION C
HIGHWAY_NO 10
S2W
CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
LANDSCAPE PLANT SCHEDULE
RTA PLAN REGISTRATION No OF PLANS
0010.110RC4207
ISSUE STATUS
FOR CONSTRUCTION
SHEET No
SHEET 36
ISSUE



CHECK PRINT
FOR CONSTRUCTION

REV	DATE	DESCRIPTION	APPD	Lot No.
A	19/04/13	SHEET ADDED & RESHAPING	ME	140A
B	20/03/14	RESHAPING	ME	140A

SCALE Units - m
0 10 20 30

CONTRACTOR: LEIGHTON Fulton Hogan
DESIGNER: AECOM SMEC

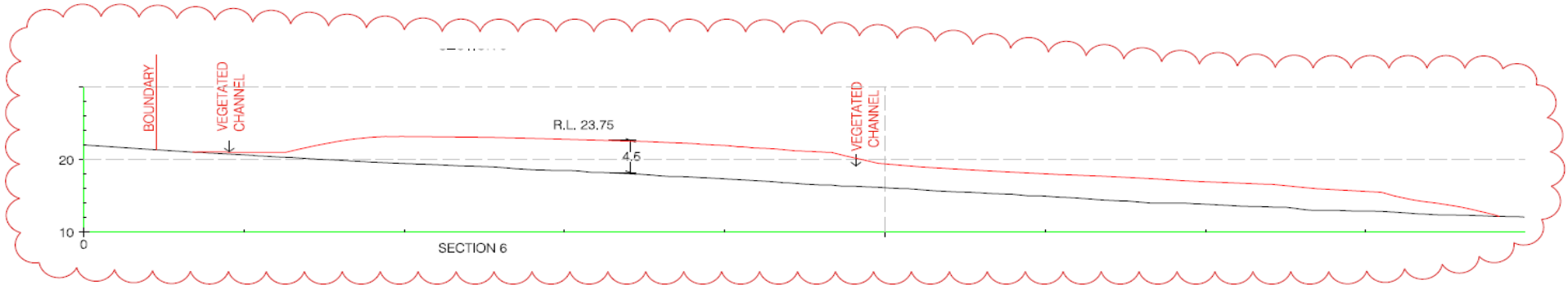
PROJECT DOCUMENT NUMBER: S2W-DRG-20-2000-LD1122 REVISION: B
HIGHWAY_NO 10 | S2W | CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
DETAILS
RTA PLAN REGISTRATION No OF PLANS: 0010.110RC4207
ISSUE STATUS: FOR CONSTRUCTION
SHEET No: SHEET 12
ISSUE

DELETED

SECTION 4

DELETED

SECTION 5



SECTION 6

CHECK PRINT
FOR CONSTRUCTION

REV	DATE	DESCRIPTION	APPD	Lot No.
A	19/04/13	SHEET ADDED & RESHAPING	ME	140A
B	20/03/14	RESHAPING	ME	140A

SCALE Units - m
0 10 20 30

CONTRACTOR: LEIGHTON Fulton Hogan
DESIGNER: AECOM SMEC

Tract

PROJECT DOCUMENT NUMBER: S2W-DRG-20-2000-LD1123 REVISION: B
HIGHWAY_NO 10 S2W CITY OF COFFS HARBOUR
ZONE 2000
LANDSCAPE DESIGN
DETAILS
RTA PLAN REGISTRATION No OF PLANS: 0010.110RC4207
ISSUE STATUS: FOR CONSTRUCTION SHEET No: SHEET 13 ISSUE

Appendix B
Agency Comments

Reference	Review Comment	JV Response
EPA comments received 22 October 2013	The EPA understands that there will be no additional clear required to finalise the 5 proposed permanent stockpile locations identified in Table 2.1 on page 8;	Correct, no additional clearing required.
	The EPA understands that suitable erosion and sediment (ERSED) controls will be maintained or established prior to final placement and/or shaping works being undertaken at each of the locations;	Correct, site specific ERSED plans will be developing in conjunction with Soil Conservation Service and implemented in advance of shaping works.
	The EPA understands that erosion and sediment control plans will be developed for all 5 locations, and these locations will be stabilised and that permanent groundcover will be established before ERSED controls are removed;	Correct, site specific ERSED plans will be developing in conjunction with Soil Conservation Service and implemented in advance of shaping works. Controls will be maintained until 70% surface stabilisation with vegetative cover is achieved.
	The EPA highlights the requirement to ensure that waste including construction wastes such as geo-fabric, concrete, barrier fencing, sediment fence, poly pipe, fencing materials are not included in the permanently stockpiled material which is understood to be Excavated Natural Material (ENM), and will be tested in accordance with the Australian Standard 1141 (or equivalent) to comply with the with the EPA Excavated Natural Material Exemption 2008;	Noted, all construction waste will be excluded from the proposed beneficial re-use areas – except for verified ENM material. Toolbox talks and surveillance will be implemented to ensure compliance.

EPA comments received 22 October 2013	The EPA also seeks confirmation that the sampling demonstrates that the material meet the ENM exemption;	LFHJV will provide EPA with records demonstrating the material meets the ENM exemption.
	The EPA notes that comments provided in submissions by residents consulted during the development of the Environmental Review raised a number of concerns about potential dust nuisance and the generation of noise and vibration during the conduct of works at each of the identified locations. The EPA notes that the Leighton Fulton Hogan Joint Venture have committed to manage the works in accordance with the Environment Protection Licence (No. 13278) and the approved Construction Environment Management Plan.	As per the commitments in Sections 5, 6 and 7 above the works will be undertaken in accordance with: • the CEMP and associated sub plans including the *Construction Air Quality Management Plan* and *Construction Noise and Vibration Management Plan*; and • EPL 13278 for the Sapphire to Woolgoolga Pacific Highway Upgrade
Department of Planning 18 January 2014	Ensure effect on private properties has been managed and increased flows considered for drainage lines.	Sections 2.1.1 to 2.1.5 include information relating to drainage and flows for each mound.
Department of Planning 3 December 2013	Table 2.1 should include a column which describes the pre-existing condition of each site.	Table 2.1 includes states the pre-existing & current condition of each site.
	Table 2.1 fails to demonstrate how the re-use of this material would be beneficial. A more detailed table should be provided (or a new table provided in section 5) which summaries the environmental constraints and	Table 2.1 includes the beneficial reuse of each site.

<table>
<tr><td></td><td>opportunities before determining whether the use will be 'beneficial'.</td><td></td></tr>
<tr><td></td><td>Section 2.1.5 states that the existing dwelling house was demolished as part of the S2W project. Does a dwelling entitlement still exist on this site?</td><td>The property will maintain a dwelling 'entitlement'. However, a dwelling being constructed is subject to Council's approval (current LEP, Development approval conditions etc).</td></tr>
<tr><td></td><td>Section 5 provides only a very brief overall assessment of the environmental impacts. This section should assess and consider any potential impacts for each site individually.</td><td>Tables 2.1.1 to 2.1.5 detail the potential environmental impacts for each site.</td></tr>
<tr><td></td><td>Section 5 states that only additional impacts are assessed in this section. A new subheading should be provided which describes those impacts that are not considered 'additional'.</td><td>The proposal is a modification, whereby Section 5 states 'An assessment of the proposed works has been undertaken to determine the environmental impacts compared to those of the Approved Project.
The proposed works have been assessed using the topics/issues discussed in the Project EA'.</td></tr>
<tr><td></td><td>Section 5 should include a discussion on flooding. If these sites are not flood affected this should be stated.</td><td>Sections 2.1.1 to 2.1.5 provide additional details on flooding and drainage of each mound.</td></tr>
<tr><td></td><td>Section 5.6 should be expanded.
(i) Which sites are in which zones?.</td><td>
<table>
<tr><th>Site identification</th><th>Residue area (approx)</th><th>Zoning (CHCC LEP 2013)</th><th>Minimum lot size (CHCC LEP 2013)</th><th>Dwelling Entitlement*</th></tr>
<tr><td>Reuse Location 1
RMS-owned land: 817 – 817a Pacific Highway, Korora (Lot 50 DP 847756)</td><td>2.44Ha</td><td>R5 Large Lot Residential</td><td>1Ha</td><td>Yes</td></tr>
</table>
</td></tr>
</table>

		Reuse Location 2 RMS-owned land: 18c The Mountain Way, Sapphire Beach (Lot 4 DP 249773)	2.5Ha	RU2 Rural Landscape	40Ha	Yes
		Reuse Location 3 RMS-owned land: 10 Gaudrons Road, Sapphire Beach (Lot 122 DP 1211466	2.07Ha	RU2 Rural Landscape	40Ha	Yes
		Reuse Location 4 RMS-owned land: 16 Sugarmill Road, Sapphire Beach (Lot 11 DP 243972)	1.83Ha	RU2 Rural Landscape	40Ha	Yes
		Reuse Location 5 RMS-owned land: 1225 Pacific Highway, Moonee Beach (Lot 4 DP 599177)	3.67Ha	RU2 Rural Landscape	40Ha	Yes
		* Subject to development consent from CHCC				
	(ii) What are the lot sizes of each parcel to be eventually sold?	A final boundary for the properties has not yet been determined; therefore actual residual areas are not available. Approximate areas are shown in the table above.				
	(iii) Are dwelling houses permissible in these zones (given the lot sizes)?	The zoning classifications for each of the properties within this strategy are shown in the above table. Each property will maintain a dwelling 'entitlement'. However, a dwelling being constructed is subject to Council's approval (current LEP, Development approval conditions etc).				
	(iv) A printout from the Coffs Harbor LEP 2000 maps showing each site should be provided	Appendix D illustrates the locality of each overlayed onto Council's LEP maps				

	For the residents concerned about view loss, a view loss analysis should be provided (including photographs). This should include a comparison of views from the residences before and after the proposed contouring together with a discussion on the type and nature of the views currently enjoyed.	Section 4 includes a view loss analysis in Table 3, including photographs.
	The plans/sections in Appendix A should be clearly labelled with their respective site numbers.	Appendix A identifies each stockpile.
	A plan showing the before and after contours for each site should be provided.	Appendix A illustrates the before (gray) and after (red) contours for each stockpile site.
	A copy of the notification letter/package to residents should be provided, together with a map indicating the residents consulted. How long were residents given to respond to the notification letter?	Appendix E includes a consultation map. Appendix C also includes the notification letters issued to residents. Residents were given one month to respond to the notification letter, which is detailed in Appendix C.
	Photographs and/or photomontages of each site should be provided.	Sections 2.1.1 to 2.1.5 and Section 4 includes photographs of each site.

Appendix C
Response to Submissions

Response to submissions

1. Purpose of this report

This report identifies the issues raised in community submissions received in response to consultation regarding the proposed permanent placement of excess material on residual land owned by Roads and Maritime Services (Roads and Maritime) and provides responses to those issues (sections 3.2-3.6).

2. Consultation process

In consultation with Roads and Maritime, it was determined that residents who had line of sight to the proposed permanent placement sites needed to be consulted in regards to the permanent placement of excess material on Roads and Maritime residual land that already had been used for temporary stockpiling.

These residents were identified from aerial photographs. They also were identified by a ground-truthing exercise undertaken at the proposed sites to determine those residences that could be seen.

The ground-truthing exercise identified a number of new additional residences that were not identified from the aerial photography due to the date the photography occurred.

As a result of the above, it was determined that consultation needed to occur with 21 residents.

Draft letters and a feedback form (refer below) regarding the permanent placement of excess material were sent to Roads and Maritime for approval along with aerial photographs marked up to show the stockpile locations and affected stakeholders, a spreadsheet setting out the timeframes for the consultation process and information regarding the proposed permanent stockpiles which included cross sections from various perspectives, contour intervals marked up on aerials and the proposed landscaping plans.

The letter set out the:

- Location of the proposed stockpiles.
- The size of the proposed stockpile in cubic metres.
- The proposed future use by Roads and Maritime of the residual land on which the stockpiles will be located.
- The environmental benefits of permanently placing the excess material on Roads and Maritime residual land.

Following approval of the information by Roads and Maritime, the stakeholders were contacted and meetings arranged at their residences. At the meetings, the existing temporary stockpiles were visually identified for the residents. The proposal to permanently place the excess material was explained in detail including the various perspectives shown on the cross sections, the aerials with the contour intervals marked up and the proposed landscaping plans. Roads and Maritime' intentions for the future use of the residual land also was explained.

Two copies of the letter and feedback form were taken to these meetings. It was explained that the feedback form on the back of the letters should be filled in identically by the resident so that one could be returned to the Leighton Fulton Hogan Joint Venture and the other retained for their records. The residents also were

provided with a Reply Paid envelope in which to send their completed feedback form back. They also were provided with the project's free call phone number and the project's email address if they needed further information. Residents were given a total of one (1) month to respond to the notification letter.

The process for approval of the permanent placement of excess material also was explained and the residents were advised that they would be notified of the outcome.

In some cases, residents having difficulty understanding the contour levels asked for the placement of a visual indicator (survey pegs) to show the final level of the proposed excess material (Reuse Location 2: 18c The Mountain Way, Sapphire Beach) and at one temporary stockpile location (Reuse Location 1: 817 – 817a Pacific Highway, Korora), minor works were undertaken to reshape the material to provide a better visual indication of the proposed final formation.

In these instances, subsequent meetings were held with some of the residents after the initial meeting following this work.

3. Consideration of submissions

3.1 Response to submissions

A total of 21 residents with line of sight were consulted about the proposed permanent placement of excess material. One resident was overseas. Several subsequent attempts to contact this resident have been unsuccessful.

The relevant proposed permanent placement sites are set out in sections 3.2-3.7 and chainages provided. The submissions received and responses to the issues are also set out in sections 3.2-3.7

3.2 Reuse Location 1: 817 – 817a Pacific Highway, Korora.

This proposed permanent placement site required consultation with 10 residents with line of sight. Initially, eight of the 10 residents supported the permanent placement of material at this site with two residents providing feedback that they did not agree with the proposal. However, it is noted since the original proposal the proposed reuse northern proposal has been removed and the southern option does not interrupt current views. With the removal of the northern proposal, the two residents not agreeing with the proposal were re-consulted and now all 10 residents are supporting the proposal.

Issue:
Current height of the excess material to be reduced/flattened.

Response:
All residents were provided with the various perspectives shown on the cross sections and the aerials with the contour intervals marked up and these were discussed with them. Some flattening of the material also was undertaken at Reuse Location 1: 817 – 817a Pacific Highway, Korora following the initial meetings to provide a better visual indication of the proposed final formation. Subsequent meetings were held with some of the residents after the initial meeting following this work.

Issue:
Can the excess material be used to fill a gully on the southern side?

Response:
No. This would impact on the natural water flows through the gully and result in sedimentation flowing into watercourses.

Issue:
Have concerns about noise deflection from the proposed sound wall on the eastern side of the new road and would hope regeneration on the western side will include plantings of suitable density and height to counteract the problem of sound bouncing back up the hill.

It would be beneficial to use this as a bund along the western edge of the new highway as the start of a noise barrier.

Response:
All residents were provided with the proposed landscaping plans which showed hydroseeded grass. The plantings are not intended to act as a sound barrier but rather to suit the proposed future use of the land including potential future development. In regards to noise, following the project's opening, Roads and Maritime undertakes post-operational noise monitoring generally six to 12 months afterwards. If further noise mitigation measures are required, these are undertaken where reasonable and feasible.

Issue:
We would prefer no housing development – just tidy up and plant grass and native shrubs.

Response:
The letter and discussion with all residents advised that the material will be reshaped to suit future land use including potential development.

Issue:
Do not want any impact on our current view. The land could potentially be built on and therefore can affect my views.

Response:
Noted. However, the potential to have a dwelling built on the land is pre-existing and, at the natural ground level of the Roads and Maritime residual land, the views of these residents would still be impacted by a dwelling.

Issue:
The stockpile looks to be contaminated with concrete, steel, tree stumps and asbestos along with soil that is not arable for agricultural use.

Response:
The letter and discussion with all residents advised that the material will be reshaped to suit future land use including potential development. It is noted that there is no longer a proposal to utilise this land as a future development.

In regards to the nature of the excess material, the material is excavated natural material (ENM) sourced from the Sapphire to Woolgoolga alignment with some vegetation from the clearing phase of the project and minor construction waste, mostly associated with redundant erosion and sedimentation controls. If the proposal to permanently place excess material on the site is approved, laboratory tests will be carried out to confirm the material is ENM and the results passed on to Roads and Maritime.

3.3 Reuse Location 2: 18c The Mountain Way, Sapphire Beach

This proposed permanent placement site required consultation with four residents with line of sight. One of the four residents supported the permanent placement of material at this site. Another resident provided feedback that they were not necessarily opposed. Two residents provided feedback that they did not agree with the proposal. However after further consultation by RMS one of the two residents not agreeing with the proposal now agrees with the proposal.

Issue:
There is the potential for the site not being kept maintained and trees overtaking the site.

Response:
This issue is in relation to interrupting coastal views which was raised by four respondents. The landscape treatment for the proposed re-shaped material will involve be hydroseeded grass. Survey assessment shows that the excess material will not interrupt the valued coastal views of the nearest property with line of sight to the proposed reshaped material. From this nearest property, the reshaped material will be located between 19.3 metres to 33 metres below their northerly views to the coastline. The reshaped material to the southerly views from this property will be between 14.5 metres to 18 metres below their views to the coastline. The greater risk to uninterrupted coastal views are trees that could naturally revegetate at the top roadside elevation of the Roads and Maritime owned residual land rather than the re-shaped material metres below.

Issue:
Have you considered offering to put fill into the valley on the adjacent property and so have a much shallower slope all the way.

Response:
To place material on the adjacent property would require a DA and a Section 143 sign-off. Placing permanent material into the valley would interrupt a natural watercourse and so would not be considered by the project.

Issue:
When a section of our land for upgrade purposes was acquired by Roads and Maritime, we signed off on that acquisition with no knowledge of the intention to construct a mound of any sort let alone one of the proportion that exists now.

Response:
When the acquisition occurred, the intention to temporarily place excess material on Roads and Maritime residual land was not proposed. Consultation with adjacent residents took place in late 2010.

Issue:
We have been advised that this stockpile contains approximately 95,000 cubic metres and more is currently being added on a daily basis.

Response:
It is unknown where this advice has come from. The residents were advised by letter and during the one-on-one consultations with them that it was proposed to permanently place about 44,000 cubic metres of excess material at the above location. They were advised that the current excess material will be reduced by a minimum of at least 6.5 metres in height and the material reshaped for beneficial re-use to create terraced landform for agricultural purposes.

No further excess material has been placed on the Roads and Maritime residual land since late June 2013 because access to the site has not been available due to the construction activities happening in the vicinity including paving. Nonetheless, there is no intention to increase the amount of proposed excess material to be placed other than what the residents have been consulted about.

Issue:
Ourselves and other affected residents have never been consulted on the intentions and proportions this mound would achieve.

Response:
In correspondence and on-site meetings with residents regarding the material, they were advised that until the project worked out its 'cut to fill' requirements, it was unclear how much of the material would be removed. They were also advised that should it become necessary to leave some of the excess material at this location, there would be a formal approval process which included the current consultation with the property owners who may potentially be affected.

3.4 Reuse Location 3: 10 Gaudrons Road, Sapphire Beach

This proposed permanent placement site required consultation with one resident on the western side of the upgraded highway with line of sight.

The one resident agreed to the permanent placement of excess material on the site.

Issue:
There were no issues raised by the one resident.

Response:
As there was no issues raised and they agreed with the permanent placement of excess material there was no further correspondence undertaken by RMS and LFHJV.

3.5 Reuse Location 4: 16 Sugarmill Road, Sapphire Beach

This proposed permanent placement site required consultation with one resident on the western side of the upgraded highway with line of sight. An approved noise barrier on the eastern side of the upgraded highway precluded consultation with residents in this vicinity.

The one resident agreed to the permanent placement of excess material on the site.

Issue:
The resident stated a preference for Roads and Maritime not to build on the land for privacy reasons. The resident also stated they had a drainage problem with the Roads and Maritime residual land and also wanted weeds on the fence line cleared to have a boundary fence erected.

Response:
Both the letter to the resident and one-on-one discussion made it clear that Roads and Maritime's intended future use of the land was potential development. There is already an existing residence nearby on the other property adjacent to the stakeholder. The one-on-one discussion with the resident also made it clear that the proposal for potential development will likely solve the existing issues of drainage, weeds and a boundary fence being installed which was acknowledged in the discussion.

3.6 Reuse Location 5: 1225 Pacific Highway, Moonee Beach

This proposed permanent placement site required consultation with three residents with line of sight. The three residents supported the permanent placement of material at this site.

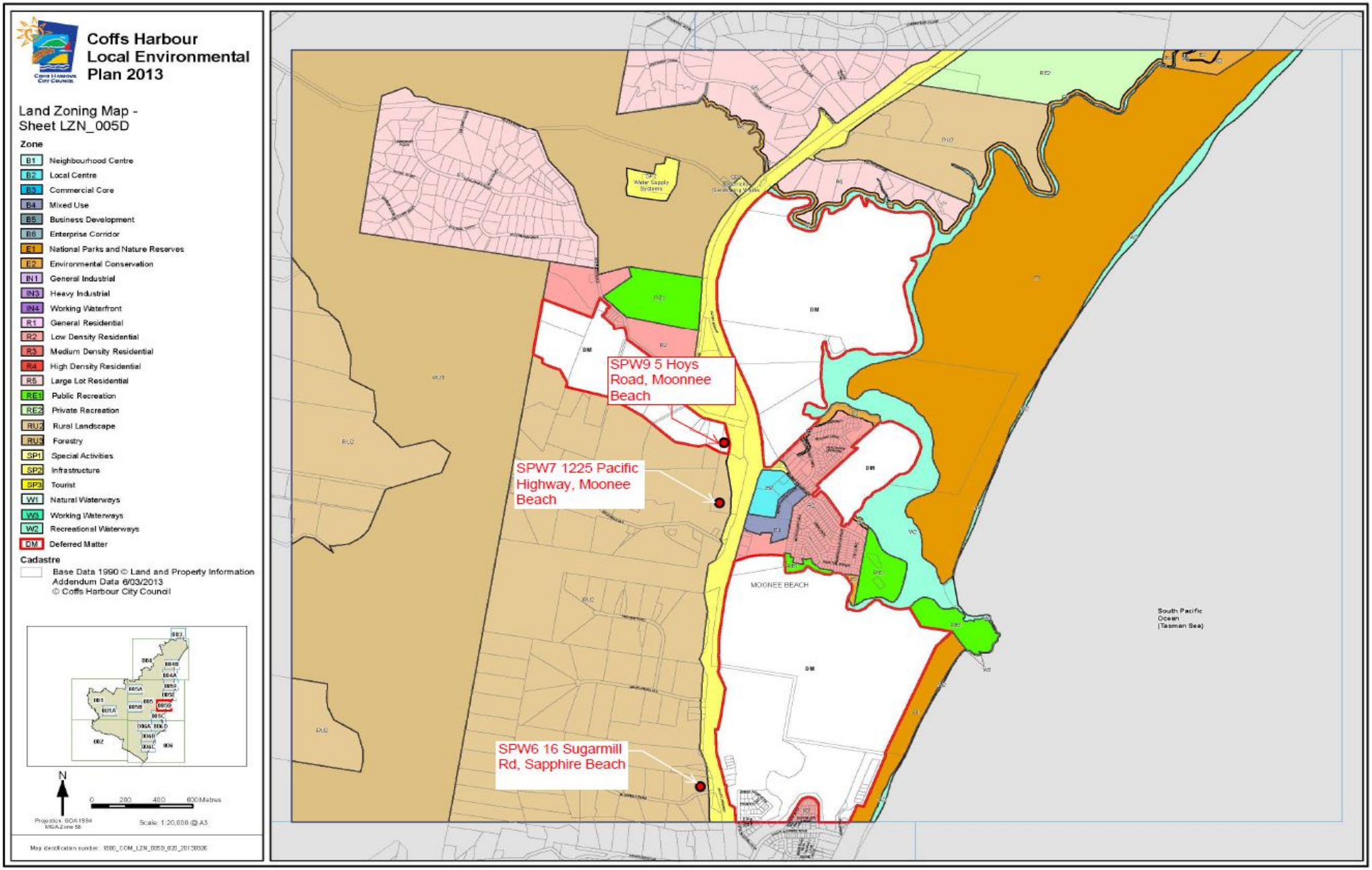
Issue:
Two residents raised the need for landscaping, with one resident raising the need for some re-shaping to achieve a gentler gradient and also to have the first option to purchase the land as a housing block.

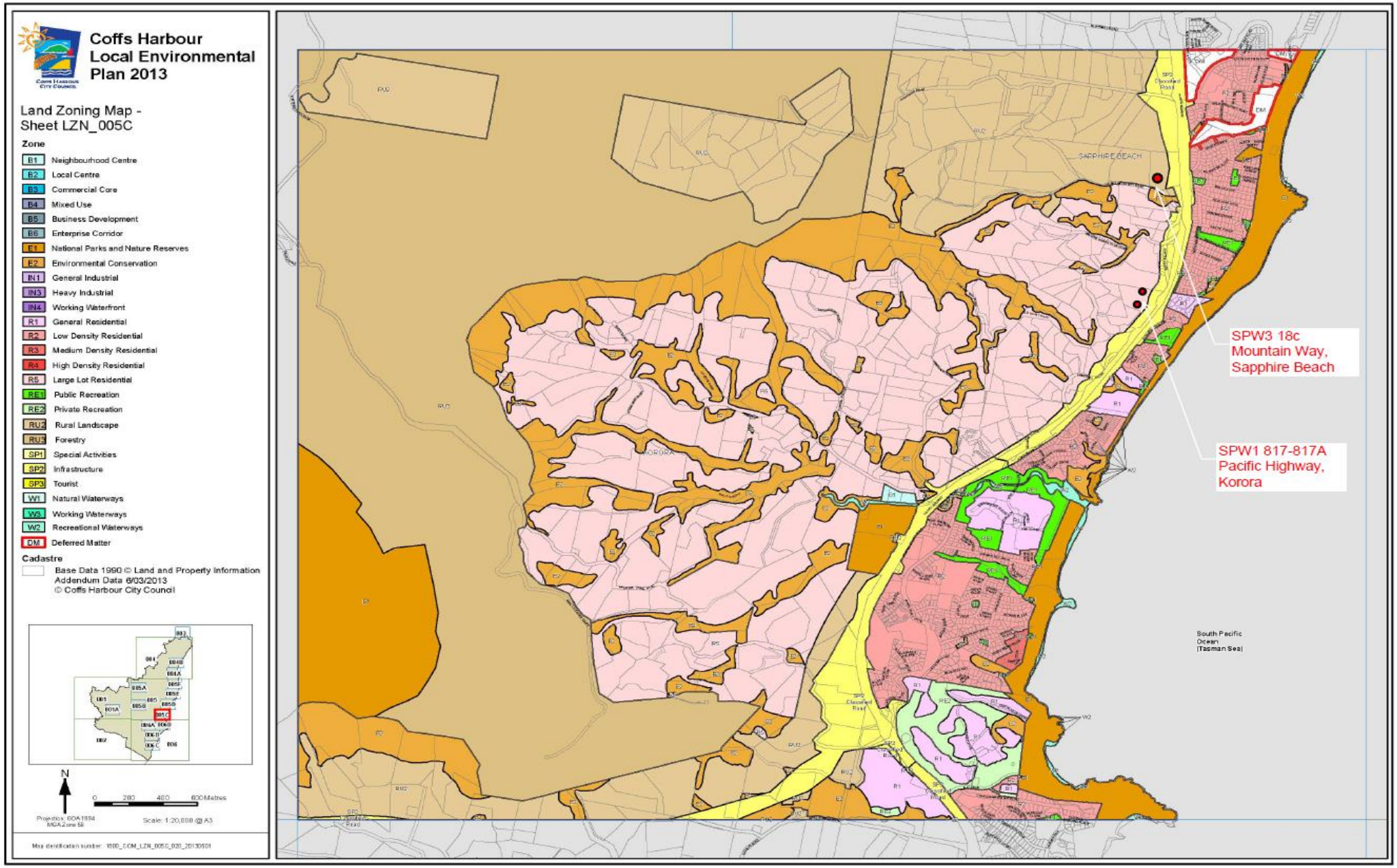
Response:
The proposed landscaping plans were detailed in discussions with the residents and the plans left with the residents. The landscaping treatment for the site is hydroseeded grass.

The residents were also provided with the various perspectives shown on the cross sections and the aerials with the contour intervals marked up and these were discussed with them.

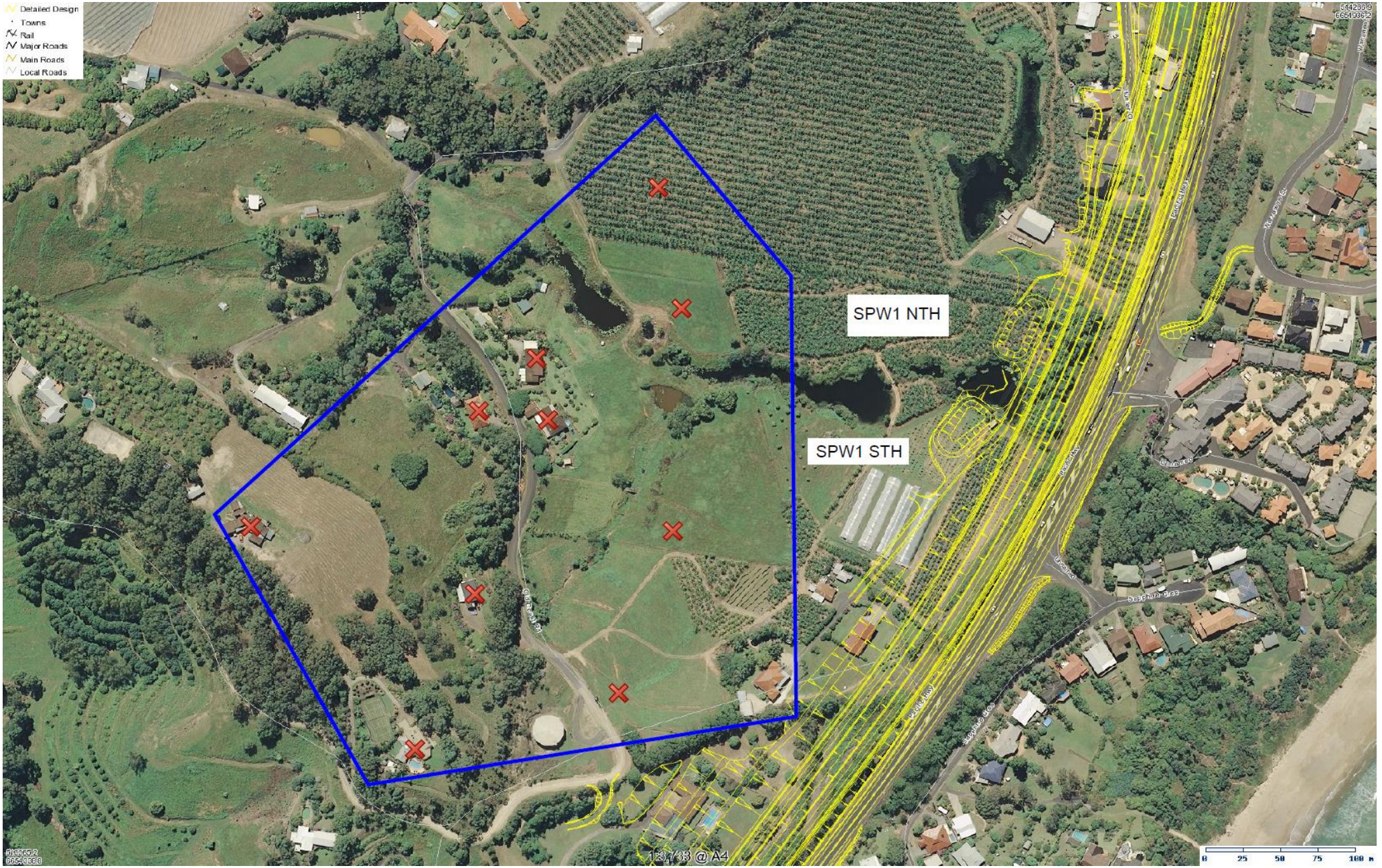
In regards to a first option to purchase, Roads and Maritime cannot enter into such an agreement. If Roads and Maritime proceeds with the proposed future use as a housing block, it is required to market the property on the open housing market.

Appendix D
Coffs Harbour LEP 2013

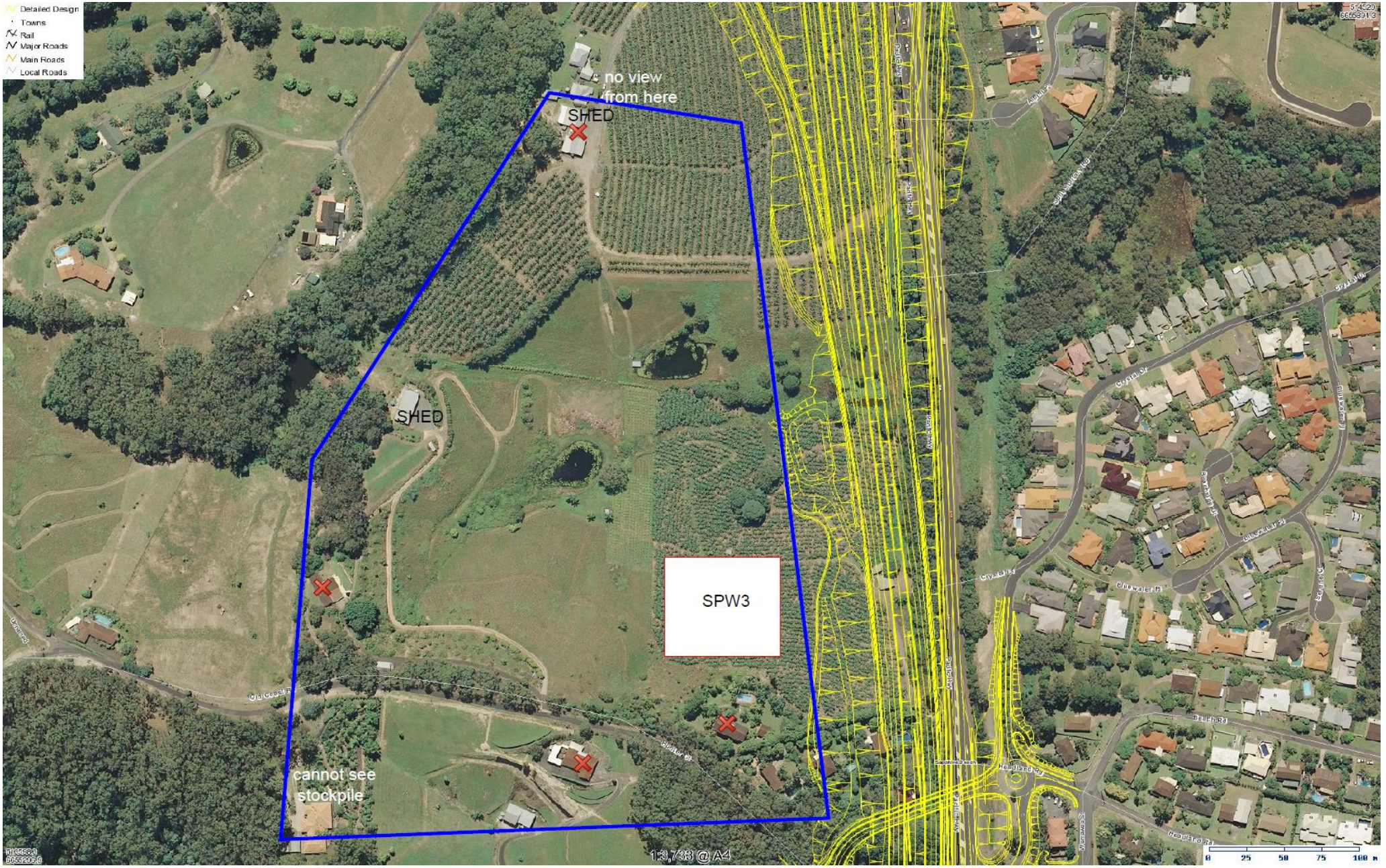

Coffs Harbour Local Environmental Plan 2013
Land Zoning Map - Sheet LZN_005D
Zone
B1 Neighbourhood Centre
B2 Local Centre
B3 Commercial Core
B4 Mixed Use
B5 Business Development
B6 Enterprise Corridor
E1 National Parks and Nature Reserves
E2 Environmental Conservation
IN1 General Industrial
IN3 Heavy Industrial
IN4 Working Waterfront
R1 General Residential
R2 Low Density Residential
R3 Medium Density Residential
R4 High Density Residential
R5 Large Lot Residential
RE1 Public Recreation
RE2 Private Recreation
RU2 Rural Landscape
RU3 Forestry
SP1 Special Activities
SP2 Infrastructure
SP3 Tourist
W1 Natural Waterways
W3 Working Waterways
W2 Recreational Waterways
DM Deferred Matter
Cadastre
Base Data 1990 © Land and Property Information
Addendum Data 6/03/2013
© Coffs Harbour City Council
N
0 200 400 600 Metres
SPW9 5 Hoys Road, Moonee Beach
SPW7 1225 Pacific Highway, Moonee Beach
SPW6 16 Sugarmill Rd, Sapphire Beach
MOONEE BEACH
South Pacific Ocean (Tasman Sea)


Coffs Harbour
Local Environmental
Plan 2013
Land Zoning Map -
Sheet LZN_005C
Zone
B1 Neighbourhood Centre
B2 Local Centre
B3 Commercial Core
B4 Mixed Use
B5 Business Development
B6 Enterprise Corridor
E1 National Parks and Nature Reserves
E2 Environmental Conservation
IN1 General Industrial
IN3 Heavy Industrial
IN4 Working Waterfront
R1 General Residential
R2 Low Density Residential
R3 Medium Density Residential
R4 High Density Residential
R5 Large Lot Residential
RE1 Public Recreation
RE2 Private Recreation
RU2 Rural Landscape
RU3 Forestry
SP1 Special Activities
SP2 Infrastructure
SP3 Tourist
W1 Natural Waterways
W3 Working Waterways
W2 Recreational Waterways
DM Deferred Matter
Cadastre
Base Data 1990 © Land and Property Information
Addendum Data 6/03/2013
© Coffs Harbour City Council
N
0 200 400 600 Metres
Projection: GDA 1994 MGA Zone 56
Scale: 1:20,000 @ A3
SAPPHIRE BEACH
KORORA
South Pacific Ocean (Tasman Sea)
SPW3 18c Mountain Way, Sapphire Beach
SPW1 817-817A Pacific Highway, Korora

Appendix E
Resident consultation map



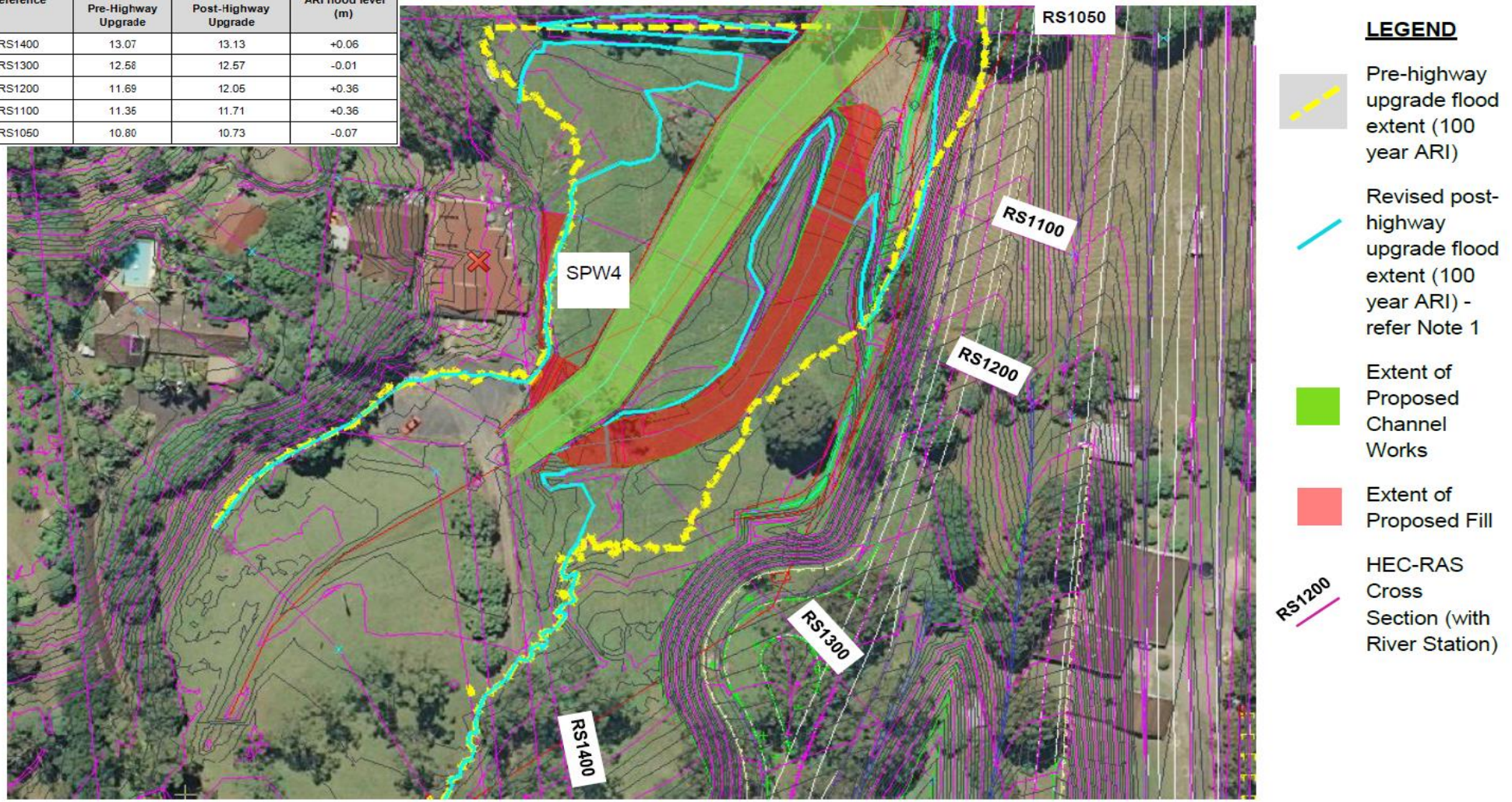
Location of Residents Consulted for Reuse Location 1



Location of Residents consulted for Reuse Location 2

HEC-RAS River Station (RS) Reference	Peak 100 year ARI flood level (m AHD)		Difference in peak 100 year ARI flood level (m)
	Pre-Highway Upgrade	Post-Highway Upgrade	
RS1400	13.07	13.13	+0.06
RS1300	12.58	12.57	-0.01
RS1200	11.69	12.05	+0.36
RS1100	11.35	11.71	+0.36
RS1050	10.80	10.73	-0.07

RFI 2927- Figure 2- Overview of Proposed Works and Impact on Flood Extents DJV.pdf



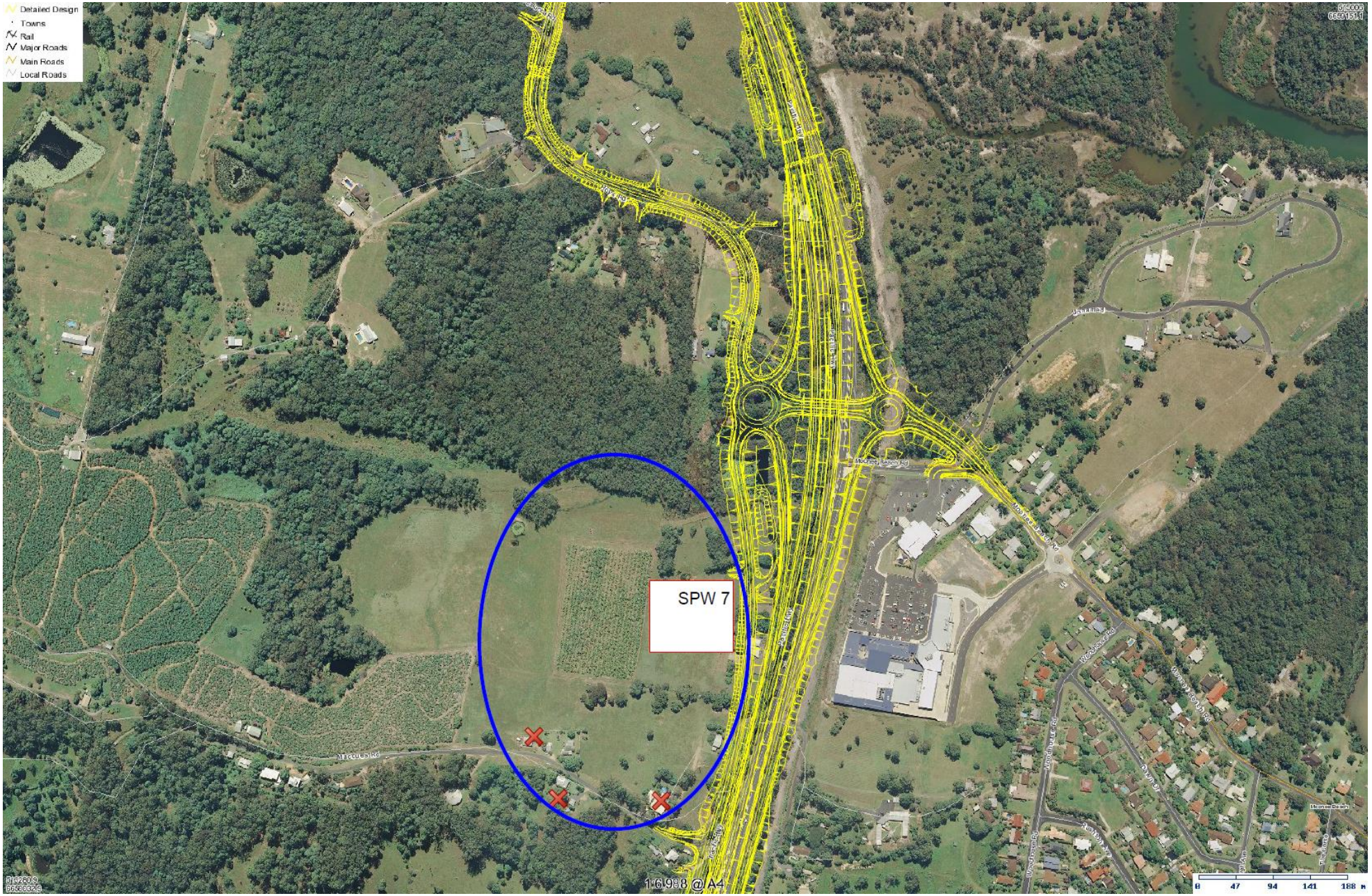
Notes

1. Revised post-highway upgrade scenario based on current site stockpile arrangement (at 29 May 2014) with proposed channel works and filling as shown above.

Figure 1
Overview of Proposed Works and Impact on Flood Extents

Location of Resident consulted west of Reuse Location 3

Location of Resident consulted north of Reuse Location 4



Location of Residents consulted for Reuse Location 5

Appendix F
ENM Analytical Data Opinion and Compliance Validation Report and Test Results

Level 19, Tower B, 799 Pacific Highway
Chatswood
NSW 2067 Australia

t: +61 2 9406 1195
f: +61 2 9406 1004

coffey.com

9 December 2014

Our ref: ENAURHOD01060AA-L01e

Leighton Fulton Hogan Joint Venture (Sapphire to Woolgoolga)
Level 1, 9 Market Street
Woolgoolga, NSW 2456

Attention: Ian Chaffey

Dear Ian

Review (ENM & HIL-F) Unsuitable Material Sapphire to Woolgoolga Upgrade - Analytical Data Opinion and Compliance Validation

1. Executive Summary

As described below Coffey have undertaken a review of analytical results provided by the Leighton Fulton Hogan Joint Venture (Sapphire to Woolgoolga) on 10 sites where unsuitable materials were placed on RMS owned land. Coffey were requested to assess the analytical results against Table 2 of the Excavated Natural Material (ENM) Exemption 2012 for eight (8) sites as described below and against the National Environmental Protection Measure Assessment of Site Contamination (1999) HIL-F for two (2) other sites.

Based on the analytical data reviewed, Coffey consider:

- The analytical results reviewed for Cut 28 and Cut 35 comply with the NEPM ASC (1999) HIL-F criteria.
- The analytical results reviewed for the other eight (8) unsuitable materials sites (Banana Shed South, Mountain Way, Gaudrons / Rob Rae, Sugamill, McCues, Hearnes Lake, Cut 21 and Cut 29) generally complies with the relevant concentrations for ENM Exemption 2012, although there are eleven (11) exceedances of the absolute maximum concentrations noted in this review.

  As discussed in this review five (5) of those are related to arsenic in samples from the base of unsuitable material at the Mountain Way site. Based on results of subsequent additional investigations elevated arsenic concentrations were only identified in the mixing and interface layers at the base of the fill and are likely to be sourced from arsenic contamination at the surface of the residual soils, consistent with the behaviour of arsenic residues on former banana lands.

Coffey note that the ENM Exemption was established to enable soils with a low risk of soil contamination to be beneficially reused as a resource at sites other than the source site. As such, soils meeting the ENM chemical criteria are generally regarded as having a low likelihood of contamination.

Coffey's review of data exceedances of the absolute maximum concentrations in the ENM Exemption 2012 indicates the total concentrations measured are predominantly significantly below the current amended NEPM ASC (1999 as amended 2013) health criteria for the most sensitive residential land use (HIL-A). Overall, the analytical results show little evidence of significant contamination and the relatively low concentrations of contaminants indicate the results are likely to be consistent with natural background levels in the area of the S2W project.

2. Introduction

Leighton Fulton Hogan Joint Venture (Sapphire to Woolgoolga) (LFHJV) were contracted by Roads and Maritime Services (RMS) to construct the Sapphire to Woolgoolga Upgrade (S2W), part of the overall Pacific Highway Upgrade.

The construction is complete and the S2W road is operational. We understand that prior to being released from the project by RMS, LFHJV are required finalise a number of matters. These include confirming that surplus unsuitable material that has been placed on RMS owned land by LFHJV is not contaminated.

Coffey Environments (Coffey) were engaged by LFHJV to undertake a review of information provided by LFHJV in relation to the quality of unsuitable material at 10 RMS owned sites within the S2W project corridor.

3. Background

We understand the S2W upgrade consisted of:

- A new southern section, 15 km dual carriageway, between Sapphire and South Woolgoolga largely within the existing highway corridor.
- A new 'greenfield' northern section, 10 km bypass from South Woolgoolga to the west of Woolgoolga which rejoins the existing highway alignment in the vicinity of Arrawarra Beach Road.

A significant S2W project activity was the excavation, storage and management of excavated materials which were proposed to be beneficially re-used as much as possible. Material that was suitable for beneficial reuse for engineering purposes was termed suitable material; while material that did not meet engineering specifications was termed to be unsuitable material and was not to be used beneficially for engineering purposes. Unsuitable material was to be placed in permanent locations within the road corridor or off site.

Due to a number of significant constraints including the size of the project, hilly terrain, land availability, tight road corridor, high rainfall, geotechnical conditions and the sensitive environment the management of unsuitable material has presented a significant challenge to the project. The requirement for placement locations for surplus unsuitable material far exceeded estimations prior to project commencement, primarily due to saturation of excavated material as a result of a period of a period of extremely wet weather. The high moisture content meant a significant quantity of the excavated material was classified as unsuitable material and could not be used for engineering purposes within the project.

We understand that the total volume of unsuitable material requiring management on the S2W project is 861,160m^3 of 473,420m^3 has been beneficially re-used. The remaining volume of 387,740m^3 has been placed at 10 RMS sites as referred to as follows:

1. Banana Shed South
2. Mountain Way
3. Gaudrons / Rob Rae
4. Sugamill
5. McCues
6. Hearnes Lake
7. Cut 21
8. Cut 28
9. Cut 29
10. Cut 35

The approximate location of each of the sites is shown on Figure 1 attached at the rear of the text.

The material was to be beneficially reused to ensure that the local landform suits its proposed use or to improve the amenity alongside the project, and provide beneficial future re-use opportunities at each of the sites.

We understand that RMS owns each of these sites but following completion of construction they may wish to sell some or all of the properties. RMS requires the LFHJV to demonstrate that the unsuitable material placed at each site is not contaminated.

We understand that for Cuts 28 and 35 (where unsuitable material as placed early in the project) that RMS agreed with LFHJV that the unsuitable material should meet ASC NEPM HIL F quality[1]; it is noted that the ASC NEPM (1999) was amended in 2013 and that in the amended ASC NEPM the commercial / industrial health investigation level is referred to as HIL-D. For the purposes of this report we assume HIL-F refers to the ASC NEPM (1999).

We understand that for all other sites of unsuitable material RMS has specified the material must be of a quality that meets the Excavated Natural Material (ENM) Exemption 2012[2] (dated 19 October 2012). LFHJV advised us that this was to be used in the review rather than the RMS obtained project specific ENM exemption titled "RMS Sapphire to Woolgoolga excavated natural material exemption 2011" (dated 1 December 2011). A copy of the ENM Exemption 2012 is included in Appendix A.

4. Scope of Work

It is agreed with LFHJV the scope of work for Coffey comprises the following:

- Review of the analytical results provided by the LFHJV and assessment of these against the list of analytical parameters and concentration requirements included in Table 2 of the ENM Exemption for eight (8) of the sites (Banana Shed South, Mountain Way, Gaudrons / Rob Rae, Sugamill, McCues, Hearnes Lake, Cut 21 and Cut 29); and assessment of results for the two remaining sites (Cut 28 and Cut 35) against the ASC NEPM (1999) HIL-F.

As part of the scope of work a site visit was also undertaken by a Coffey Senior Principal to briefly observe the 10 sites and to be briefed by the LFHJV.

---

[1] The National Environment Protection Assessment of Site Contamination Measure (1999) included health investigation levels (HILs) for a range of different land uses. Health investigation levels include:

A. 'Standard' residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry): this category includes children's day-care centres, kindergartens, preschools and primary schools.
B. Residential with substantial vegetable garden (contributing 10% or more of vegetable and fruit intake) and/or poultry providing any egg or poultry meat dietary intake.
C. Residential with substantial vegetable garden (contributing 10% or more of vegetable and fruit intake); poultry excluded.
D. Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard space such as high-rise apartments and flats.
E. Parks, recreational open space and playing fields: includes secondary schools.
F. Commercial/Industrial: includes premises such as shops and offices as well as factories and industrial sites.

[2] Under the Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A. We note that the Excavated Natural Material Exemption 2012 has recently been replaced by the Excavated Natural Material Order 2014 which commenced 24 November 2014.

5. The Review

5.1. Information Provided by LFHJV

The information provided by the LFHJV for each site typically included the following:

- Plans - survey plans, survey sections and commonly a plan showing sampling locations (not for all locations)
- Test results in the form of a laboratory (EAL[3]) compiled summary tables of results (laboratory certificates were not provided). As well as including individual analytical results these summary tables included the following:
    - Minimum concentration;
    - Maximum concentration; and
    - Average concentration (presumably based on arithmetic average)[4]
- Geotechnical information when provided included soil compaction results.

5.2. Overview

When undertaking the review Coffey have relied on advice and information provided by LFHJV including the following:

- All unsuitable material was sourced from within the S2W project corridor with no imported materials being included within the unsuitable material;
- The unsuitable materials were applied to land as engineering fill or used in earthworks in each of the reuse situations;
- The unsuitable material was classified as Excavated Natural Material as defined in the Section 6 of ENM Exemption 2012 and has been excavated from the ground, contains at least 98% natural material and does not meet the definition of Virgin Excavated Natural Material and did not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulphate Soils (ASS), Potential Acid Sulphate Soils (PASS) or sulfidic ores;
- LFHJV undertook sampling and analysis of the material for Acid Sulphate Soil (ASS) and Potential Acid Sulphate Soil (PASS), as required in Section 8 of the ENM Exemption 2012;
- LFHJV undertook sampling of the unsuitable material was undertaken in general accordance with Australian Standard 1141.3.1-1996 Methods for sampling and testing aggregates – Sampling – Aggregates (or equivalent);
- LFHJV sampling, sampling preparation and storage met the requirements of Tables 3, 4 and 5 of the ENM Exemption 2012;
- Laboratory test methods met the requirement of Test Methods of the ENM Exemption 2012; and
- The excavated natural material was appropriately stored until the characterisation test results were validated.

[3] EAL – Environmental analysis laboratory

[4] The summary table indicated that “For statistical purposes, half detection limit replaced with samples NOT DETECTED”

Coffey have relied on the advice of LFHJV in respect of these matters.

We understand that for each sample batch provided the laboratory EAL commonly provided a cover letter and accompanying tabulated laboratory summary tables of analytical results for testing undertaken, including columns recording: minimum; maximum; and average concentrations. The cover letter normally included commentary on compliance of the results with the concentration for characterisation columns (Columns 2 and 3) in the ENM Exemption 2012. We also note that EAL have confirmed to LFHJV that analytical testing methods for all chemicals and other attributes are in accordance with the requirements of the ENM Exemption 2012. Laboratory certificates weren't reviewed as part of this study; we relied on laboratory summary tables.

It is noted that EAL subcontracted out analysis for organics to Envirolab and that in analytical reports it is noted that EAL indicate that NATA accreditation was not yet received for RTA T276 (for contaminants).

The focus of this review by Coffey has been:

1. For Cuts 28 and 35 assessing the chemical results provided by LFHJV against the relevant NEPM ASC (1999) HIL-F criteria;
2. For all other locations of unsuitable materials (Banana Shed South, Mountain Way, Gaudrons / Rob Rae, Sugamill, McCues, Hearnes Lake, Cut 21 and Cut 29) assessing:
    a. The samples submitted to the analytical laboratory were analysed for the range of chemicals and other attributes listed in Column 1 of Table 2 of the ENM Exemption 2012;
    b. Assessing the chemical results provided by LFHJV provided results against the concentration requirements in Table 2 of the ENM Exemption 2012 as follows:
        i. The maximum average concentration (based on the arithmetic mean) complied with criteria listed in Column 2 of Table 2 of the ENM Exemption 2012 (see discussion below in relation to this point).
        ii. The absolute maximum concentration or value listed in Column 3 of Table 3 (of the ENM Exemption 2012);

In relation to HIL-F compliance Coffey have assumed the analytical parameters tested met the requirements of the agreement between LFHJV and RMS and have simply made a comparison of results with the respective HIL-F requirements. In the instance of Total Recoverable Hydrocarbons (TRH) where the NEPM ASC (1999) does not include criteria we have used the commonly used Total Petroleum Hydrocarbons (TPH) criteria from the NSW EPA (1994) Guidelines for Assessing Service Station Sites (the 2013 amended NEPM ASC includes TRH criteria for a commercial industrial land use).

Coffey did not review all the minimum and maximum concentrations or calculate the maximum average concentration for test results but rather relied on the summary and calculations included in the EAL laboratory summary tables and assumed these had been completed in accordance with the ENM Exemption 2012 requirements. Coffey did some spot checks of the average calculations which confirmed results as tabulated by EAL.

Where multiple sources of unsuitable material were used to fill an individual location (e.g. Cut 29), we assessed whether the maximum average concentration (see previous paragraph) of each source met the ENM Exemption 2012 requirements (and did not calculate or assess the overall maximum average concentration for the location).

5.3. Results of the Review

A summary of the results of the review of Cuts 28 and 35 for compliance with the NEPM ASC HIL-F criteria are presented in Table 1 below.

TABLE 1: CUTS 28 AND 35 COMPLIANCE WITH NEPM HIL-F

Unsuitable Material Site	Analytical Results Compliance with NEPM ASC (1999) HIL-F criteria	Comments
Cut 28	Yes	-
Cut 35	Yes	-

A summary of the results for other unsuitable material locations for compliance with Table 2 of the ENM Exemption 2012 is presented in Table 2.

TABLE 2: OTHER UNSUITABLE MATERIAL LOCATIONS COMPLIANCE WITH TABLE 2 OF ENM EXEMPTION 2012

Site	Analytical Testing Complies with Column 1 of Table 2 ENM Exemption 2012	Analytical Results Comply with Table 2 of ENM Exemption 2012[a]		Comments
		Maximum Average Concentration < Column 2	Absolute Maximum Concentration < Column 3	
Banana Shed South	Yes	Yes	Yes	-
Mountain Way	Yes	Yes	Yes except for arsenic in samples from base of TP22, BH5, BH7, BH33 and BH34	Additional sampling was undertaken at the base in the area of these locations with collection of samples from fill, fill/mixing layer, interface and natural. . All samples collected from fill were below the arsenic absolute maximum concentration. Elevated results above the arsenic absolute maximum concentration were measured in samples from: BH7B (fill / mixing layer and interface samples); BH7C (fill / mixing layer samples); BH33C (fill / mixing layer samples); BH34A (interface sample); BH34B (interface sample); and BH34C (interface sample).
Gaudrons / Rob Rae	Yes	Yes	Yes	-
Sugar Mill	Yes	Yes	Yes	-
McCues	Yes	Yes	Yes	-
Hearnes Lake	Yes	Yes	Yes	-
Cut 21	Yes	Yes	No	Mercury exceedance above absolute maximum (1mg/kg) at two samples 42A (1.46 mg/kg) and S75A for (1.13 mg/kg).

Site	Analytical Testing Complies with Column 1 of Table 2 ENM Exemption 2012	Analytical Results Comply with Table 2 of ENM Exemption 2012[a]		Comments
		Maximum Average Concentration < Column 2	Absolute Maximum Concentration < Column 3	
Cut 29	Yes	Yes except for: Untested at Cut 29 - Bitumen (0.082%) at Fill 29	Yes except for: Untested at Cut 29 - Bitumen (3.92%) at Fill 29_143 Benzo(a)pyrene (1.36 mg/kg) at Fill 29_152. Mountain Way - Lead (109 mg/kg) at MtW3 Ledonies Yard - Arsenic (51.9 mg/kg) at L14A	Exceedance of bitumen noted was revalidated by additional sampling. Additional samples tested were below the absolute maximum concentration & and maximum average concentrations were below criteria. It is noted there was four areas of VENM used as backfill for Cut 29 (totalling 15,000m3).

Footnotes: a) Coffey relied on the data presented in the EAL summary table of laboratory results - see section 4.2.

6. Discussion

Based on the review of the information provided by LFHJV as described above Coffey conclude:

- The laboratory analytical results (as presented in the EAL Summary Tables) reviewed in this study for Cut 28 and Cut 35 unsuitable material comply with the NEPM ASC (1999) HIL-F assessment criteria.
- The analytical parameters (as presented in the EAL Summary Tables) reviewed in this study for the other 8 unsuitable material sites comply with the list of analytical parameters listed in Column 1 of Table 2 of the ENM Exemption 2012.
- The laboratory analytical results (as presented in the EAL Summary Tables) reviewed in this study for the other 8 unsuitable material locations (Banana Shed South, Mountain Way, Gaudrons / Rob Rae, Sugamill, McCues, Hearnes Lake, Cut 21 and Cut 29) comply with the maximum average concentration for characterisation listed in Column 2 of Table 2 of the ENM Exemption 2012.
- The laboratory analytical results (as presented in the EAL Summary Tables) for the other 8 unsuitable material locations comply with the absolute maximum concentration for characterisation listed in Column 3 of Table 2 of the ENM Exemption 2012 with the exception of the following:
    - Arsenic in 5 initial samples (ranging from 43 mg/kg to 117mg/kg) from the base of the placed unsuitable material at Mountain Way.

      Subsequent sampling at Mountain Way in the vicinity of locations with elevated results focused on fill / interface layer and indicated samples assessed to be in fill showed no exceedances of the absolute maximum criteria. However, samples assessed to be in a fill / mixing layer (probably related to disturbance of natural ground surface during placement showed elevated arsenic concentrations (ranging from 53 to 150 mg/kg)

exceeding the absolute maximum concentration in three (3) samples and four (4) samples (ranging from 65 to 120 mg/kg) of the assessed interface exceeded the absolute maximum concentration. The data shows the elevated arsenic concentrations were only identified in the mixing and interface layers at the base of the fill and are likely to be sourced from arsenic contamination at the surface of the residual soils, consistent with the behaviour of arsenic residues on former banana lands.

- Lead (109 mg/kg) in one sample (MtW3) from Mountain Way which went into Cut 29.
- Mercury in two samples at S42A (1.46 mg/kg) and S75A (1.13mg/kg) from materials which went into Cut 21.
- Arsenic (51.9 mg/kg) in one sample L14A from Ledonies Yard which went into Cut 29.
- Bitumen (3.92%) in one sample (143) in fill which went into Cut 29. Subsequent additional sampling and analysis in the vicinity of this sample indicated no exceedances of the maximum average and absolute maximum concentrations, suggesting any bitumen present is very localised.
- Benzo(a)pyrene (1.36mg/kg) in one sample (153) in fill which went into Cut 29.

Coffey's review of data exceedances of the absolute maximum concentrations in the ENM Exemption 2012 indicates the total concentrations measured are predominantly significantly below the current amended NEPM ASC (1999 as amended 2013) health criteria for the most sensitive residential land use (HIL-A).

7. Conclusion

Overall Coffey consider:

- The analytical results reviewed for unsuitable materials in Cut 28 and Cut 35 comply with the NEPM ASC (1999) HIL-F criteria.
- The analytical results reviewed for the other eight (8) unsuitable materials sites (Banana Shed South, Mountain Way, Gaudrons / Rob Rae, Sugamill, McCues, Hearnes Lake, Cut 21 and Cut 29) generally complies with the relevant concentrations for ENM Exemption 2012, although there are eleven (11) exceedances of the absolute maximum concentrations noted in this review.

  As discussed in this review five (5) of those are related to arsenic in samples from the base of unsuitable material at the Mountain Way site. Based on results of subsequent additional investigations elevated arsenic concentrations were only identified in the mixing and interface layers at the base of the fill and are likely to be sourced from arsenic contamination at the surface of the residual soils, consistent with the behaviour of arsenic residues on former banana lands.

Coffey note that the ENM Exemption was established to enable soils with a low risk of soil contamination to be beneficially reused as a resource at sites other than the source site. As such, soils meeting the ENM chemical criteria are generally regarded as having a low likelihood of contamination.

Coffey's review of data exceedances of the absolute maximum concentrations in the ENM Exemption 2012 indicates the total concentrations measured are predominantly significantly below the current amended NEPM ASC (1999 as amended 2013) health criteria for the most sensitive residential land use (HIL-A). Overall, the analytical results show little evidence of significant contamination and the relatively low concentrations of contaminants indicate the results are likely to be consistent with natural background levels in the area of the S2W project.

8. Limitations

In preparing this report Coffey has relied upon data, surveys, analyses and plans provided by LFHJV and others. Coffey have not independently verified the accuracy or completeness of this information and data.

In accordance with the scope of services, Coffey has relied upon the provided data and has not conducted environmental field monitoring and/or testing in the preparation of the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition as indicated by the data, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time. Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

This report should be read in conjunction with the attached Important Information about your Coffey Environmental Report.

oooooooOOOOOOOOOOoooooOO

We trust that this meets your requirements. Please don't hesitate to contact the undersigned if you have any questions.

For and on behalf of Coffey

Tony Scott
Senior Principal

Attachments:

Important Information About Your Coffey Environmental Report

Figure 1 Site Location Plan

Appendix A Excavated Natural Material Exemption 2012

Important information about your Coffey Environmental Report

Introduction

This report has been prepared by Coffey for you, as Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice,

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Coffey should be kept appraised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statues and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can

reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

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Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Coffey prepared the report and has familiarity with the site, Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Coffey disowns any responsibility for such misinterpretation.

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The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

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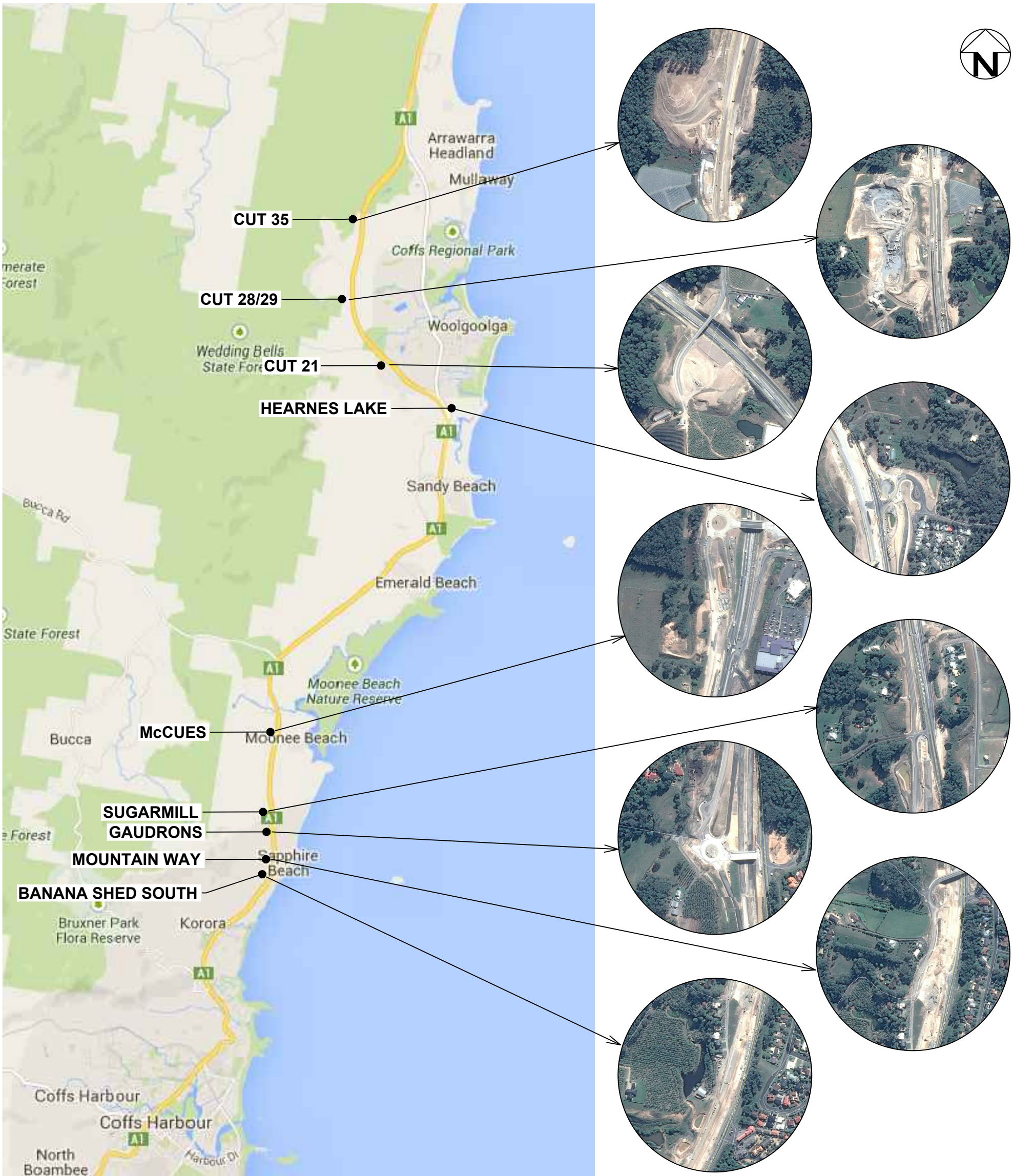
Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.

Figure 1

Site Location Plan



revision	no.	description	drawn	approved	date
	A	ORIGINAL ISSUE			

10 0 10 30 50

Scale (metres) 1:100,000

AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.2.2041
AERIAL IMAGE ©: IMAGE @ 2014 DIGITALGLOBE

NOTE:
ALL LOCATION ARE APPROXIMATE
DIMENSIONS IN METERES.

drawn	MV
approved	TS
date	27/11/14
scale	AS SHOWN
original size	A3

coffey

client: LEIGHTON FULTON HOGAN JOINT VENTURE (SAPHIRE TO WOOLGOOLGA)

project: SAPPHIRE TO WOOLGOOLGA
PACIFIC HIGHWAY,
ARRAWARRA TO SAPPHIRE BEACH, NSW

title: UNSUITABLE MATERIAL LOCATIONS

project no: ENAURHOD01060AA | figure no: FIGURE 1 | rev: A

PLOT DATE: 9/12/2014 12:53:26 PM DWG FILE: F:\ENV\PROJECTS\ENAURHOD\ENAURHOD01 AUDIT\ENAURHOD01000-01099\ENAURHOD01060\ENAURHOD01060 LFHJV S2W\DRAFTING\ENAURHOD01060AA.DWG

Appendix A - ENM Exemption 2012

Protection of the Environment Operations (Waste) Regulation 2005 – General Exemption Under Part 6, Clause 51 and 51A

The excavated natural material exemption 2012

Name

1. This exemption is to be known as 'The excavated natural material exemption 2012'.

Commencement

2. This exemption commences on 19 October 2012. 'The excavated natural material exemption 2008' which commenced 25 July 2008 is revoked from 19 October 2012.

Duration

3. This exemption is valid until revoked by the Environment Protection Authority (EPA) by notice published in the Government Gazette.

Legislation

4. Under the *Protection of the Environment Operations (Waste) Regulation 2005* (the Regulation):

4.1. Clause 51 (2) authorises the EPA to grant an exemption in relation to any matter or thing including an activity or class of activities, and

4.2. Clause 51A authorises the EPA to exempt a person from any of the following provisions in relation to an activity or class of activities relating to certain waste that is to be land applied or used as a fuel:

- the provisions of sections 47 to 49 and 88 of the *Protection of the Environment Operations Act 1997* (the Act),
- the provisions of Schedule 1 to the Act, either in total or as they apply to a particular activity, and
- the provisions of Part 3 and clauses 45 and 47 of the Regulation.

Exemption

5. In this Notice of Exemption:

5.1. The responsible person listed in Column 1 of Table 1 is exempt from the provision/s listed in Column 2 of that table but only:

- in relation to activities involving the relevant waste, and
- where the responsible person complies with the conditions referred to in Column 3 of the table, and
- in the case of a consumer, in relation to the premises where the waste is applied to land as permitted by clause 7.2.

However, this Notice of Exemption does not exempt the responsible person from the provisions specified in Column 2 where the relevant waste is received at premises that are, despite this exemption, required to be licensed for waste disposal (application to land) activities under the provisions of the Act.

5.2. Where a responsible person complies with the conditions of this Notice of Exemption, the activity referred to in Schedule 1 from which that person is exempt is taken to be a non-scheduled activity for the purposes of the Act.

Table 1

Column 1	Column 2	Column 3
Responsible person	**Provisions from which the responsible person is exempt**	**Conditions to be met by the responsible person**
Generator	section 48 of the Act in respect of clause 39 of Schedule 1 to the Act	all requirements specified in section 7 and 8
Consumer	section 48 of the Act in respect of clauses 39 and 42 of Schedule 1 to the Act section 88 of the Act clause 47 of the Regulation	all requirements specified in section 7 and 9

This Notice of Exemption is a general exemption for the purposes of clause 51(3) of the Regulation.

Definitions

6. In this Notice of Exemption:

Bgl means below ground level, referring to soil at depth beneath the ground surface.
Characterisation means sampling and testing that must be conducted on the material for the range of chemicals and other attributes listed in Column 1 of Table 2.
Composite sample means a sample that combines 5 sub-samples of equal size into a single sample for the purpose of analysis.
Consumer means a person who applies, causes, or permits the application to land of excavated natural material within the definitions of "application to land" in accordance with the Act. The consumer may be the landholder responsible for the land to which excavated natural material is applied.
Discrete sample means a sample collected and analysed individually that will not be composited.
Excavated natural material is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

a) been excavated from the ground, and
b) contains at least 98% (by weight) natural material, and
c) does not meet the definition of Virgin Excavated Natural Material in the Act.

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores.
Generator means a person who generates excavated natural material for supply to a consumer.
Hotspot means a cylindrical volume which extends through the soil profile from the ground surface to the proposed depth of excavation, where the level of any contaminant listed in Column 1 of Table 2 is greater than the absolute maximum concentration in Column 3 of Table 2.
***In situ* material** means material that exists on or below the ground level. It does not include stockpiled material.
***In situ* sampling** means sampling undertaken on *in situ* material.
Relevant waste means excavated natural material that meets the requirements of Section 7.
Stockpiled material means material that has been excavated from the ground and temporarily stored on the ground prior to use.

Systematic sampling means sampling at points that are selected at even intervals and are statistically unbiased.
Validation means ensuring that test results comply with the conditions of this exemption prior to material being supplied to a consumer.

General conditions

7. This Notice of Exemption is subject to the following conditions:

7.1. The chemical concentration or other attribute of the excavated natural material listed in Column 1 of Table 2 must not exceed any of the following:
  7.1.1. For characterisation tests, the maximum average (based on the arithmetic mean) concentration or value listed in Column 2 of Table 2, and
  7.1.2. The absolute maximum concentration or value listed in Column 3 of Table 2.
7.2. The excavated natural material can only be applied to land as engineering fill or used in earthworks.

Generator responsibilities

8. The following conditions must be met by the generator for this exemption to apply:

8.1. The generator must prepare a written sampling plan which includes information on sample preparation and storage. The plan must be kept for a period of three years;
8.2. The generator must undertake sampling and analysis of the material for Acid Sulfate Soil (ASS) and Potential Acid Sulfate Soil (PASS), in accordance with the *NSW Acid Sulfate Soil Manual*, Acid Sulfate Soils Management Advisory Council, 1998 and the updated *Laboratory Methods Guidelines version 2.1 – June 2004* where:
  8.2.1. the pH measured in the material is below 5, and/or
  8.2.2. the review of the applicable Acid Sulfate Soil Risk Maps (published by the former Department of Land and Water Conservation and available at http://www.environment.nsw.gov.au/acidsulfatesoil/riskmaps.htm) indicates the potential presence of Acid Sulfate Soils (ASS).
8.3. For stockpiled material, the generator must:
  8.3.1. undertake sampling in accordance with Australian Standard 1141.3.1-1996 *Methods for sampling and testing aggregates* – Sampling – Aggregates (or equivalent);
  8.3.2. undertake characterisation according to the requirements listed in Columns 1 and 2 of Table 3 for the range of chemicals and other attributes listed in Column 1 of Table 2; and
  8.3.3. store the excavated natural material appropriately until the characterisation test results are validated (i.e. obtained and assessed as compliant with this exemption).
8.4. For *in situ* material, the generator must:
  8.4.1. undertake characterisation for the range of chemicals and other attributes listed in Column 1 of Table 2 according to the requirements listed in Columns 1, 2, and 3 of Table 4. When the ground surface is not comprised of soil (e.g. concrete slab), samples must be taken at the depth at which the soil commences.
  8.4.2. undertake sampling at depth according to Column 1 of Table 5.
  8.4.3. collect additional soil samples (and analyse them for the range of chemicals and other attributes listed in Column 1 of Table 2), at any

depth exhibiting discolouration, staining, odour or other indicators of contamination inconsistent with soil samples collected at the depth intervals indicated in Table 5.

8.4.4. segregate and exclude hotspots identified in accordance with Table 4, from material excavated for reuse under this exemption.

8.5. For both stockpiled and *in situ* material the generator must:

8.5.1. keep a written record of all characterisation test results, volume of excavated material, and detected hotspot material for a period of three years; and

8.5.2. provide a written statement of compliance to the consumer with each transaction, certifying that the excavated natural material complies with the relevant conditions of this exemption.

Consumer responsibilities

9. The following conditions must be met by the consumer for this exemption to apply:

9.1. The consumer must ensure that the excavated natural material is fit for purpose and poses minimal risk of harm to human health or the environment.

9.2. The consumer must keep records of the quantity of the excavated natural material received as well as the suppliers' name and address, for a period of three years.

9.3. The consumer must land apply the relevant waste within a reasonable period of time.

Chemical and other material property requirements

10. This Notice of Exemption only applies to excavated natural material where the chemical and other attributes listed in Column 1 of Table 2 comply with the chemical concentrations and other values listed in Column 2 and Column 3 of Table 2, when analysed according to test methods specified in Column 4 of Table 2.

Table 2

Column 1	**Column 2**	**Column 3**	**Column 4**
Chemicals and other attributes	**Maximum average concentration for characterisation** (mg/kg 'dry weight' unless otherwise specified)	**Absolute maximum concentration** (mg/kg 'dry weight' unless otherwise specified)	**Test method specified within Section**
1. Mercury	0.5	1	12.1
2. Cadmium	0.5	1	12.2
3. Lead	50	100	12.2
4. Arsenic	20	40	12.2
5. Chromium (total)	75	150	12.2
6. Copper	100	200	12.2
7. Nickel	30	60	12.2
8. Zinc	150	300	12.2
9. Electrical Conductivity	1.5 dS/m	3 dS/m	12.3
10. pH *	5 to 9	4.5 to 10	12.3
11. Total Polycyclic Aromatic Hydrocarbons	20	40	12.4

Column 1	Column 2	Column 3	Column 4
Chemicals and other attributes	**Maximum average concentration for characterisation** (mg/kg 'dry weight' unless otherwise specified)	**Absolute maximum concentration** (mg/kg 'dry weight' unless otherwise specified)	**Test method specified within Section**
(PAHs)			
12. Benzo(a)pyrene	0.5	1	12.4
13. Benzene	NA	0.5	12.5
14. Toluene	NA	65	12.5
15. Ethyl-benzene	NA	25	12.5
16. Xylene	NA	15	12.5
17. Total Petroleum Hydrocarbons C_{10}-C_{36}	250	500	12.6
18. Rubber, plastic, bitumen, paper, cloth, paint and wood	0.05%	0.10%	12.7

* The ranges given for pH are for the minimum and maximum acceptable pH values in the excavated natural material.

Sampling requirements

11. This Notice of Exemption only applies to excavated natural material sampled according to the requirements in Tables 3, 4 and 5.

11.1. Stockpiled excavated natural material must be sampled as per the requirements in Table 3.

11.1.1. Composite sampling must be undertaken for analysis of attributes 1 to 10 and 18 in Column 1 of Table 2. Discrete sampling must be undertaken for analysis of attributes 11 to 17 in Column 1 of Table 2.

11.1.2. Sampling must be undertaken in a manner that ensures all parts of the stockpile are equally accessible for representative sampling.

11.1.3. For stockpiles greater than 4,000 tonnes the number of samples described in Table 3 must be repeated.

Table 3

Sampling of Stockpiled Material		
Column 1	**Column 2**	**Column 3**
Quantity (tonnes)	**Number of samples**	**Validation**
<500	3	Required
500 – 1,000	4	
1,000 – 2,000	5	
2,000 – 3,000	7	
3,000 – 4,000	10	

11.2. *In situ* material must be sampled by collecting discrete samples as per the requirements of Tables 4 and 5.

11.2.1. Sites larger than 50,000 m^2 should be subdivided into smaller areas and sampled as per Table 4.

Table 4

***In Situ* Sampling at surface**				
Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**
Size of *in situ* area (m^2)	**Number of systematic sampling points recommended**	**Distance between two sampling points** (m)	**Diameter of the hot spot that can be detected with 95% confidence** (m)	**Validation**
500	5	10.0	11.8	Required
1000	6	12.9	15.2	
2000	7	16.9	19.9	
3000	9	18.2	21.5	
4000	11	19.1	22.5	
5000	13	19.6	23.1	
6000	15	20.0	23.6	
7000	17	20.3	23.9	
8000	19	20.5	24.2	
9000	20	21.2	25.0	
10,000	21	21.8	25.7	
15,000	25	25.0	28.9	
20,000	30	25.8	30.5	
25,000	35	26.7	31.5	
30,000	40	27.5	32.4	
35,000	45	27.9	32.9	
40,000	50	28.3	33.4	
45,000	52	29.3	34.6	
50,000	55	30.2	35.6	

Table 4 has been taken from NSW EPA 1995, *Contaminated Sites Sampling Design Guidelines*, NSW Environment Protection Authority.

Table 5

***In Situ* Sampling at Depth**	
Column 1	**Column 2**
Sampling Requirements *	**Validation**
1 soil sample at 1.0 m bgl from each surface sampling point followed by 1 soil sample for every metre thereafter. From 1.0 m bgl, sample at the next metre interval until the proposed depth of excavation of the material is reached. If the proposed depth of excavation is between 0.5 to 0.9 m after the last metre interval, sample at the base of the proposed depth of excavation.	Required if the depth of excavation is equal to or greater than 1.0 m bgl

* Refer to Notes for examples

Test method

12. All testing must be undertaken by analytical laboratories accredited by the National Association of Testing Authorities (NATA), or equivalent. All chemicals and other attributes listed in Column 1 of Table 2 must be measured in accordance with the test methods specified below:

12.1. Test methods for measuring the mercury concentration.
- 12.1.1. Particle size reduction & sample splitting may be required.
- 12.1.2. Analysis using USEPA SW-846 Method 7471B Mercury in solid or semisolid waste (manual cold vapour technique), or an equivalent analytical method with a detection limit < 20% of the stated absolute maximum concentration in Column 3 of Table 2 (i.e. 0.20 mg/kg dry weight).
- 12.1.3. Report as mg/kg dry weight.

12.2. Test methods for measuring chemicals 2 to 8 in Column 1 of Table 2.
- 12.2.1. Particle size reduction & sample splitting may be required.
- 12.2.2. Sample preparation by digesting using USEPA SW-846 Method 3051A Microwave assisted acid digestion of sediments, sludges, soils, and oils (or an equivalent analytical method).
- 12.2.3. Analysis using USEPA SW-846 Method 6010C Inductively coupled plasma - atomic emission spectrometry, or an equivalent analytical method with a detection limit < 10% of the stated absolute maximum concentration in Column 3 of Table 2, (e.g. 10 mg/kg dry weight for lead).
- 12.2.4. Report as mg/kg dry weight.

12.3. Test methods for measuring electrical conductivity and pH.
- 12.3.1. Sample preparation by mixing 1 part excavated natural material with 5 parts distilled water.
- 12.3.2. Analysis using Method 103 (pH) and 104 (Electrical Conductivity). *In* Schedule B (3): Guideline on Laboratory Analysis of Potentially Contaminated Soils, National Environment Protection (Assessment of Site Contamination) Measure 1999 (or an equivalent analytical method).
- 12.3.3. Report electrical conductivity in deciSiemens per metre (dS/m).

12.4. Test method for measuring Polynuclear Aromatic Hydrocarbons (PAHs) and benzo(a)pyrene.
- 12.4.1. Analysis using USEPA SW-846 Method 8100 Polynuclear Aromatic Hydrocarbons (or an equivalent analytical method).
- 12.4.2. Calculate the sum of all 16 PAHs for total PAHs.
- 12.4.3. Report total PAHs as mg/kg dry weight.
- 12.4.4. Report benzo(a)pyrene as mg/kg.

12.5. Test method for measuring benzene, toluene, ethylbenzene and xylenes (BTEX).
- 12.5.1. Method 501 (Volatile Alkanes and Monocyclic Aromatic Hydrocarbons). In Schedule B (3): Guideline on Laboratory Analysis of Potentially Contaminated Soils, National Environment Protection (Assessment of Site Contamination) Measure 1999 (or an equivalent analytical method).
- 12.5.2. Report BTEX as mg/kg.

12.6. Test method for measuring Total Petroleum Hydrocarbons (TPH).

12.6.1. Method 506 (Petroleum Hydrocarbons). In Schedule B (3): Guideline on Laboratory Analysis of Potentially Contaminated Soils, National Environment Protection (Assessment of Site Contamination) Measure 1999 (or an equivalent analytical method).

12.6.2. Report as mg/kg dry weight.

12.7. Test method for measuring rubber, plastic, bitumen, paper, cloth, paint and wood.

12.7.1. NSW Roads & Traffic Authority Test Method T276 Foreign Materials Content of Recycled Crushed Concrete (or an equivalent method).

12.7.2. Report as percent.

Exemption Granted

Christopher McElwain
Manager Waste and Resource Strategy
Environment Protection Authority
by delegation

Notes

The EPA may amend or revoke this exemption at any time. It is the responsibility of the generator and the consumer to ensure that they comply with all relevant requirements of the most current exemption. The current version of an exemption will be available on the EPA website: www.epa.nsw.gov.au.

In gazetting this general exemption, the EPA is exempting the relevant waste from the specific requirements of the Act and Regulations as stated in this exemption. The EPA is not in any way endorsing the use of this substance or guaranteeing that the substance will confer benefit.

The use of exempted material remains subject to other relevant environmental regulations within the Act and Regulations. For example, a person who pollutes land (s142A) or water (s120), or does not meet the special requirements for asbestos waste (clause 42), regardless of having an exemption, is guilty of an offence and subject to prosecution.

For the purposes of arrangements between a generator and a consumer, a 'transaction' is taken to mean the contractual agreement between the two parties which specifies the exchange of waste material from one party to another. A 'statement of compliance' must be in writing and be provided with each transaction.

The conditions set out in this exemption are designed to minimise the risk of potential harm to the environment, human health or agriculture, however, neither this exemption nor these conditions guarantee that the environment, human health or agriculture will not be harmed.

The consumer should assess whether or not the exempted material is fit for the purpose for which the material is proposed to be used and whether this use will cause harm. The consumer may need to seek expert engineering or technical advice.

This exemption does not apply to any material received at premises that are required to be licensed for waste disposal (application to land) activities under the provisions of the Act. This exemption does not remove the need for a site at which processing occurs to be licensed, if required under Schedule 1 of the Act.

This exemption does not alter the requirements of any other relevant legislation that must be met in utilising this material, including for example, the need to prepare a Material Safety Data Sheet (MSDS).

Regardless of any exemption provided by the EPA, the person who causes or permits the application of the substance to land must ensure that the action is lawful and consistent with the development consent requirements of the land.
All records required to be kept under this exemption must be made available to authorised officers of the EPA upon request.

Failure to comply with the conditions of this Notice of Exemption may constitute an offence under clause 51 of the Regulation and the responsible person will be required to comply with the normal regulatory provisions.

Examples

In situ sampling at depth

Example 1.
If the proposed depth of ENM excavation is between 1 m bgl and 1.4 m bgl, then:

- 1 sample on surface (as per the requirements of Table 4).
- 1 sample at 1 m bgl.
- No further depth sampling after 1 m bgl, unless required under section 8.4.3.

Example 2.
If the proposed depth of ENM excavation is at 1.75 m bgl, then:

- 1 sample on surface (as per the requirements of Table 4).
- 1 sample at 1 m bgl.
- 1 sample at 1.75 m bgl.
- No further depth sampling after 1.75 m bgl, unless required under section 8.4.3.

Example 3.
If the proposed depth of ENM excavation is at 2.25 m bgl, then:

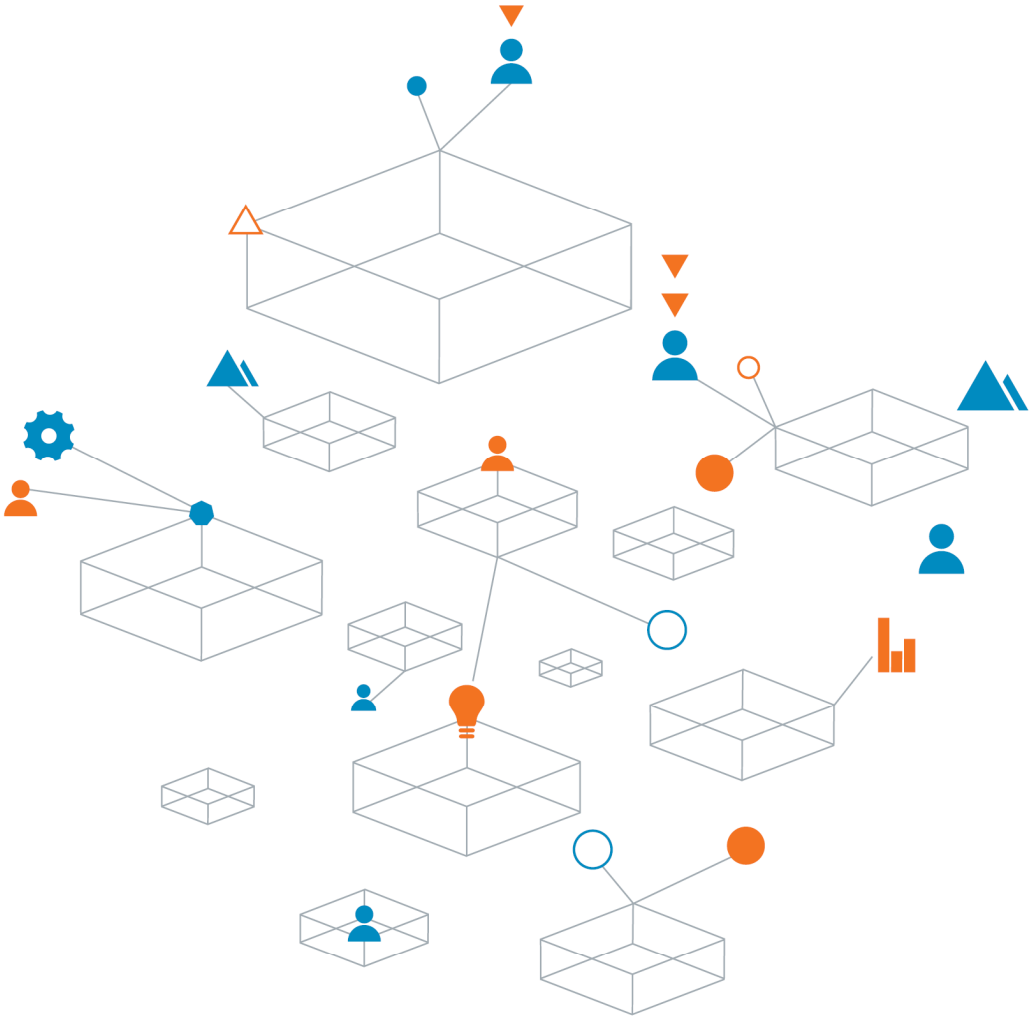
- 1 sample on surface (as per the requirements of Table 4).
- 1 sample at 1 m bgl.
- 1 sample at 2 m bgl.
- No further depth sampling after 2 m bgl, unless required under section 8.4.3.

Leighton Fulton Hogan Joint Venture

ENM & Site Contamination Assessment of Arsenic Contamination

Mountain Way Stockpile, Sapphire Beach NSW

15 December 2014



Trust is the cornerstone of all our projects

1/18 Hurley Drive
Coffs Harbour
NSW 2450 Australia

t: +61 2 6691 7311
f: +61 2 6651 5194

coffey.com

15 December 2014

Our ref: GEOTCOFH02820AG-AD

LFHJV
Level 1, 9 Market Street,
WOOLGOOLGA, NSW, 2456

Sent via email: Ian.Chaffey@leicon.com.au

Dear Ian

ENM & Site Contamination Assessment of Arsenic Contamination at Mountain Way Stockpile, Sapphire Beach NSW

1 Introduction

Coffey Geotechnics Pty Ltd (Coffey) was engaged by Leighton Fulton Hogan Joint Venture (LFHJV) to undertake a Site Contamination Assessment (SCA) of arsenic contamination in localised hotspots found within the Mount Way Stockpile on the Pacific Highway - Sapphire to Woolgoolga project, the site.

The stockpile consists of surplus material created during construction of the Pacific Highway – Sapphire to Woolgoolga Upgrade. We understand that the LFHJV placed approximately 63,500m^3 of surplus soil materials on this site.

2 Background

Coffey understands that the imported soil material was considered by LFHJV to be excavated natural material (ENM) using an exemption provided by the NSW Environmental Protection Agency (EPA) *The excavated natural material exemption 2012* (ENM Exemption). The ENM exemption allows for the excavated natural material to be applied to land as engineering fill or used in earthworks.

After placement of the material LFHJV undertook a sampling program to validate the imported soil met the requirements of the ENM Exemption. Copies of the LFHJV sampling plan and laboratory summary results tables are provided in Appendix A to this letter report. Laboratory certificates weren't sited in this study.

We understand the LFHJV noted the results of the testing identified samples from TP22, BH5, BH7, BH33 and BH34 had arsenic concentrations exceeding the absolute maximum concentration listed in Table 3 of the ENM Exemption. LFHJV reported the exceedances were in samples from the base of

the test pits and boreholes. We also understand the LFHJV considered that these samples may have included natural soils from beneath the placed material.

LFHJV then engaged Coffey to undertake additional testing at the base of the fill and its interface with the underlying natural soils, around each of the 5 hotspots, to collect additional data on arsenic levels in the base of the fill and the underlying soils.

3 Objectives and Scope of Works

The objective of this SCA was to assess levels of arsenic at the base of surplus fill material and at the interface with natural soil in each of the five hotspots.

The scope of work carried out for the SCA is summarised below:

- A site walkover was undertaken by a Coffey Environmental Scientist on 2 October 2014.
- Nominated test locations were surveyed and marked prior to field investigation by LFHJV. These locations were targeting the arsenic hotspots (Test Locations BH5, BH7, TP22, BH33 & BH34) previously identified within the site.
- Test pits and boreholes with a SPT sampler were used to collect soil samples.
- Samples were collected at varying depths within the soil profile targeting the fill/ mixing layer, interface with the fill and natural soils and the natural profile below the interface.
- A Coffey Environmental Scientist collected soil samples in accordance with relevant guidelines. Samples were placed into laboratory supplied glass jars and stored in a chilled insulated container during fieldwork and transport to the laboratory. Each sample was collected using a clean pair of nitrile gloves.
- Duplicate samples were collected at a rate of one per ten samples and triplicate samples at a rate of one per twenty samples.
- All soil samples collected were analysed by a National Association of Testing Authorities (NATA) certified laboratory.
- The results were compared with the acceptance criteria provided in Table 2 of the ENM Exemption for arsenic of 40 mg/kg (absolute maximum concentration). Any results which exceed the nominated investigation level have been highlighted in Section 6 & 7 of this letter report.

4 Stratigraphy

The subsurface conditions observed during field investigation at the site consisted of four distinct layers, these included:

Fill: consisted of the surplus material that had been previously placed during construction works by LFHJV. The depth of fill varies throughout the site.

Fill/ mixing layer: this was the layer above the interface with the pre-existing soil profile. This layer represents the area disturbed during stripping, spreading and rolling during initial filling works at the site.

Interface: this was the area between the overlain placed fill and pre-existing soil profile below (topsoil/ residual clays or weathered rock) the fill material. The interface layer varied across the site with the following profiles observed at the five arsenic hotspots.

- **Test Location 22** (TP22, 22A, 22B, 22C & 22D), there was no distinct topsoil layer observed during test pitting and the interface was determined as the area between the fill and the underlain residual natural clays.
- **Test Location 5** (BH5, 5A, 5B, 5D), there was no topsoil layer observed during drilling works and the interface was determined as the area between the fill and the underlain highly weathered rock.
- **Test Location 7** (BH7A, 7B, 7C & 7D), there was no distinct topsoil layer observed during drilling works and the interface was determined as the area between the fill and the underlain residual natural clays.
- **Test Location 33 & 34** (BH33, 33A, 33C, 34A, 34B, 34C), a topsoil layer was observed during drilling works for boreholes. This area between the overlying fill and the topsoil was identified as the interface for these locations.

Natural: this was the natural profile below the interface and predominately consisted of residual clays. The exception was the boreholes in the southwest of the site (BH5, BH5A, BH5B and BH5D) associated with test location 5 where highly weathered rock was encountered beneath the fill.

5 Field Investigation

Fieldwork was undertaken on the 2, 9, 10, 13 & 14 October 2014 by a Coffey Environmental Scientist. The sampling methodology followed is summarised in Table 1. The test locations were nominated and marked out prior to field investigation by the LFHJV surveyor.

Table 1: Sampling Methodology

Activity	Detail / Comments
Test pit Investigation	A test pit investigation was undertaken in the southeast portion of the site targeting the arsenic hotspot (test location 22). A test pit was excavated in the vicinity of test location 22 (TP22) and three (3) additional locations (TP22A, 22B & 22C) around the arsenic hotspot. Test pits were excavated to a maximum depth of 2.2m below ground surface (bgs). Soil samples (12 primary) were collected at varying depths within the test pits targeting the interface with the fill and natural soils, and fill and natural soils above and below the interface (~0.3m above and below the interface). There was no visible topsoil layer identified during the excavation of the four (4) test pits.
Borehole Investigation	A borehole investigation was also undertaken within the site targeting the previously identified arsenic hotspots (test location 5, 7, 33 & 34) in the deeper portions of the fill embankment within the site. **Test Location 5:** Five boreholes (BH5, 5A, 5B, 5C & 5D) were drilled within this area to a maximum depth of 8.3mbgs. Samples (8 primary) were collected from the fill/ mixing layer (0.3-0.5m above interface) and the interface (fill and natural) with the underlain weathered rock. Samples were collected from 4 of the 5 boreholes, with refusal encountered in fill material in BH5B at a depth of 6.4mbgs. No distinct topsoil layer was observed in these boreholes with highly weathered rock encountered directly beneath the fill material. **Test Location 7:** Five boreholes (BH7, 7A, 7B, 7C & 7D) were drilled within this area to a maximum depth of 8.9mbgs. Samples (12 primary) were collected from the fill/ mixing layer (0.3-0.5m above interface), interface (fill and natural) and the natural underlain residual soils (0.3m below interface). Samples were collected from 4 of the 5 boreholes, with no samples collected from BH7 as drilling works extended beyond the interface prior to sampling. **Test Locations 33 & 34:** Seven boreholes (BH33, 33A, 33C, BH34, 34A, 34B & 34C) were drilled within this area. These two arsenic hotspots (test locations 33 & 34) were located adjacent to each other on the fill embankment. The boreholes were drilled to a maximum depth of 13mbgs. Samples (17 primary) were collected from the fill/ mixing layer (0.3-0.5m above interface), interface (fill and natural/ topsoil) and the natural underlain residual soils (0.3m below interface). Samples were collected from 6 of the 7 boreholes, with no samples collected from BH34 which extended beyond the interface prior to sampling.

6 Quality Assurance/Quality Control

Samples were transported under chain of custody documentation and in chilled insulated containers to Eurofins mgt Environmental Laboratory which is National Association of Testing Authorities (NATA) certified for the analysis performed. A copy of the laboratory analytical report is attached to this letter report.

For QA/QC purposes 6 duplicate and 3 triplicate soil samples were analysed and the results of the sample testing for these soil samples are summarised in Table LR1.

Reported exceedances of the relative percentage difference (RPD) 50% control limits were found in soil duplicate sample TP22A / QC1 recording an RPD of 65% arsenic; and in triplicate sample BH7C: 7.2m / QC8 recording an RPD of 86% arsenic. The elevated RPDs recorded in these samples are considered by Coffey to be attributable to the heterogeneous nature of arsenic in soils.

The laboratory conducted internal quality control using laboratory duplicates, spikes and method blanks. The results are shown with laboratory analytical report, attached. Analytical methods used for the laboratory testing are also indicated on the laboratory report sheets. The results of laboratory quality control testing are considered to be within acceptable limits.

Based on the above assessment it is considered that the laboratory methods are appropriate and that the data obtained is usable and considered to reasonably represent the concentrations at the sampling points at the time of sampling.

7 Analysis Results and Discussion

The laboratory test results for the primary soil samples collected are summarised in Table LR2 and laboratory certificates of analysis are attached to this letter report. Comparison of soil concentrations to the adopted acceptance criteria provided in Table LR2 is as follows:

Test pitting

- Concentrations of arsenic were below the adopted arsenic acceptance criteria in all samples analysed. Marginally elevated concentrations of arsenic were reported TP22D: 1.1m (32 mg/kg) and 1.8m (37mg/kg), however below the adopted acceptance criteria.

Boreholes

- Concentrations of arsenic were above the adopted acceptance criteria of 40 mg/kg in seven (7) samples from six (6) borehole locations. These exceedances included BH7B: 7.5m (60 mg/kg) and 7.8m (72 mg/kg); BH7C: 7.2m (53 mg/kg); BH33C: 11m (150 mg/kg); BH34A: 12.3m (76 mg/kg); BH34B: 11.35m (120 mg/kg); and BH34C: 10.9m (65 mg/kg).
- The remaining soil sample concentrations ranged from 4.3 mg/kg (BH33: 10.2m) to 38 mg/kg (BH34C), however these samples were below the adopted acceptance criteria.

The laboratory analytical results indicate elevated levels of arsenic greater than the acceptance criteria were reported in seven samples from six boreholes around the three (3) arsenic hotspots (test locations 7, 33 & 34). Photographs for each of six (6) boreholes are attached to this letter report.

In summary the arsenic residues were found to be present in the Fill/ Mixing layer (3 samples) and Interfaces layer (4 samples). The underlying natural clay soils reported arsenic levels at low background levels.

We understand that this stockpile is sited in an area which was previously used for the cultivation of bananas. Coffey has undertaken many assessment of contamination in soils in the former banana lands in the Coffs Harbour area. The arsenic residues in surface soils in former banana plantations

originated from the use of arsenic based sprays. Arsenic residues may remain in soils for many years and even decades after the application of arsenic based pesticides.

Once inorganic arsenic or arsenic oxide based pesticides are applied to soil they revert to arsenates. The arsenate ion is readily absorbed by iron and aluminium components present in soils and it is this reaction which binds and restricts the leaching (downward movement) of arsenic in soil and the availability of arsenic to plants. Consequently these metals may still occur in elevated concentrations in surface soils in former banana lands many decades after the use of these arsenic based sprays has ceased.

8 Conclusions

In sampling undertaken by LFHJV arsenic was present in 5 initial samples at concentrations exceeding the absolute maximum concentration (ranging from 43 mg/kg to 117mg/kg) listed in Table 3 of the ENM Exemption. LFHJV reported the exceedances were in samples from the base of the test pits and boreholes and considered that these samples may have included natural soils from beneath the placed material. Consequently, LFHJV engaged Coffey to undertake additional sampling at the base of the fill / interface layer.

Subsequent sampling by Coffey at Mountain Way in the vicinity of the locations with elevated results focused on fill / interface layer and indicated samples assessed to be in fill showed no exceedances of the absolute maximum criteria. However, samples assessed to be in a fill / mixing layer showed elevated arsenic concentrations (ranging from 53 to 150 mg/kg) exceeding the absolute maximum concentration in three (3) samples and four (4) samples (ranging from 65 to 120 mg/kg) of the assessed interface exceeded the absolute maximum concentration.

Based on results of subsequent additional investigations by Coffey elevated arsenic concentrations were only identified in the mixing and interface layers at the base of the fill and are likely to be sourced from arsenic contamination at the surface of the residual soils, consistent with the behaviour of arsenic residues on former banana lands.

9 References

DUAP EPA. (1998). *Managing Land Contamination Planning Guidelines, SEPP 55 – Remediation of Land.* Department of Urban Affairs and Planning & Environmental Protection Authority NSW, Sydney

NEPC (2013). *2013 Amendment of the Assessment of Site Contamination NEPM 1999.* NEPC, Canberra

NEPC (1999). *National Environmental Protection (Assessment of Site Contamination) Measure*. NEPC, Canberra

NSW DEC (2006). *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition).* Department of Environment and Conservation NSW, Sydney

NSW EPA. (2011). *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*. Environmental Protection Authority NSW, Sydney

NSW EPA (2012) *Excavated Natural Soils Exemption*. Environmental Protection Authority NSW, Sydney

NSW EPA. (1995). *Sampling Design Guidelines.* Environmental Protection Authority NSW, Sydney

10 Limitations

In preparing this report Coffey has relied upon data, surveys, analyses and plans provided by LFHJV and others. Coffey have not independently verified the accuracy or completeness of this information and data.

The findings contained in this letter report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If material is observed during construction that does not conform to that described in this letter report, or is suspicious in nature, then an environmental consultant should be contacted and further assessments undertaken.

In preparing this letter report, current guidelines for assessment and management of contaminated land were followed. This work has been conducted in good faith in accordance with Coffey Geotechnics understanding of the client's brief and general accepted practice for environmental consulting.

This letter report was prepared for LFHJV with the objective to assess levels of arsenic present in surplus fill material and at the interface with natural soil in each of the five hotspots.

We draw your attention to the attached sheets entitled "Important Information about Your Coffey Environmental Site Assessment" which should be read in conjunction with this letter report.

I trust that this letter report meets your requirements. If you require further information please contact our Coffs Harbour office on (02) 6651 3213.

For and on behalf of Coffey

Andrew Ballard
Associate Environmental Scientist

Distribution: Original held by: Coffey Geotechnics Pty Ltd
1 electronic copy LFHJV

Attachments: Important Information about Your Coffey Environmental Site Assessment
Table LR1 Results of Quality Control Soil Samples
Table LR2 Laboratory Results for Soil Samples
Photographs
Field Logs
Eurofins mgt Laboratory Certificates of Analysis
Chain of Custody
Appendix A – LFHJV ENM Sampling Plan and Laboratory Summary Results Tables

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SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Environmental Site Assessment

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your environmental site assessment report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

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SPECIALISTS MANAGING THE EARTH

Important information about your **Coffey** Environmental Site Assessment

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to helo reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Table LR1: Results of Quality Control Soil Samples

	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)
Sample ID	TP22A	QC1		TP22C	QC3	
Material	Soil	Soil	%RPD between TP22A: 0.5 and QC1	Soil	Soil	%RPD between TP22C:0.4 and QC3
Date of Sampling						
Depth (m)	0.50			0.40		
Metals						
Arsenic	2.8	5.5	**65**	2.8	3	7

	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Triplicate Sample	RPD (%)
Sample ID	TP22D	QC5		BH7C	QC7		BH7C	QC8	
Material	Soil	Soil	%RPD between TP22D and QC5	Soil	Soil	%RPD between BH7C: 7.2 and QC7	Soil	Soil	%RPD between BH7C: 7.2 and QC8
Date of Sampling									
Depth (m)	1.80	1.80		7.20			7.20		
Metals									
Arsenic	37	37	0	53	46	14	53	21	**86**

	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Triplicate Sample	RPD (%)	Primary Sample	Duplicate Sample	RPD (%)	Primary Sample	Triplicate Sample	RPD (%)
Sample ID	BH7D	QC9		BH7D	QC10		BH33	QC13		Bh33	QC14	
Material	Soil	Soil	%RPD between BH7D: 6.9 and QC9	Soil	Soil	%RPD between BH7D: 6.9 and QC10	Soil	Soil	%RPD between B3:0.15-0.3 and QC4	Soil	Soil	%RPD between C3:0.15-0.3 and QC5
Date of Sampling												
Depth (m)	6.90	6.90		6.90	6.90							
Metals												
Arsenic	11	10	10	11	13	17	4.3	4	7	4.3	< 2	Inconsistent

Notes:

Value RPD exceeds control limit of 50%

NA Both samples have concentrations below laboratory's Limit of Reporting (LOR)

Table LR2: Laboratory Results for Soil Samples

Test pit No.		TP22A			TP22B			TP22C			TP22D		
Depth (m)	**Acceptance Criteria**	0.5	0.75	1	0.65	1.1	1.3	0.4	0.9	1.1	1.1	1.8	2
Material		Fill	Interface	Natural	Fill	Interface	Natural	Fill	Interface	Natural	Fill	Interface	Natural
Date of Sampling		2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14	2-Oct-14
Metals													
Arsenic	40 [1]	2.8	20	11	8.2	16	15	4.2	31	2.7	32	37	4

Borehole No.		BH5		BH5A		BH5B		BH5D	
Depth (m)	**Acceptance Criteria**	7.2	7.5	5.4	5.7	7.9	8.3	7	7.3
Material		Fill	Interface	Fill	Interface	Fill	Interface	Fill	Interface
Date of Sampling		9-Oct-14	9-Oct-14	9-Oct-14	9-Oct-14	9-Oct-14	9-Oct-14	9-Oct-14	9-Oct-14
Metals									
Arsenic	40 [1]	15	7.8	12	7.2	4.1	18	6	8.3

Borehole No.		BH7A			BH7B			BH7C			BH7D		
Depth (m)	**Acceptance Criteria**	6.4	6.7	7	7.5	7.8	8.1	7.2	7.5	7.8	6.9	7.25	7.6
Material		Fill / Mixing Layer	Interface	Natural	Fill / Mixing Layer	Interface	Natural	Fill / Mixing Layer	Interface	Natural	Fill / Mixing Layer	Interface	Natural
Date of Sampling		10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14	10-Oct-14
Metals													
Arsenic	40 [1]	18	30	15	**60**	**72**	13	**53**	24	10	11	25	12

Borehole No.		BH33		BH33A			BH33C		
Depth (m)	**Acceptance Criteria**	10.2	10.6	10.3	10.6	10.9	11	11.4	11.7
Material		Fill / Mixing Layer	Interface	Fill / Mixing Layer	Interface	Natural	Fill / Mixing Layer	Interface	Natural
Date of Sampling		14-Oct-14	14-Oct-14	14-Oct-14	14-Oct-14	14-Oct-14	13-Oct-14	13-Oct-14	13-Oct-14
Metals									
Arsenic	40 [1]	4.3	11	38	13	10	**150**	16	8.8

Borehole No.		BH34A			BH34B			BH34C		
Depth (m)	**Acceptance Criteria**	11.9	12.3	12.6	10.9	11.35	11.8	10.6	10.9	11.2
Material		Fill / Mixing Layer	Interface	Natural	Fill / Mixing Layer	Interface	Natural	Fill / Mixing Layer	Interface	Natural
Date of Sampling		13-Oct-14	13-Oct-14	13-Oct-14	14-Oct-14	14-Oct-14	14-Oct-14	13-Oct-14	13-Oct-14	13-Oct-14
Metals										
Arsenic	40 [1]	12	**76**	6	13	**120**	7.4	38	**65**	6.2

Notes:

Value Concentration exceeds the Acceptance Criteria

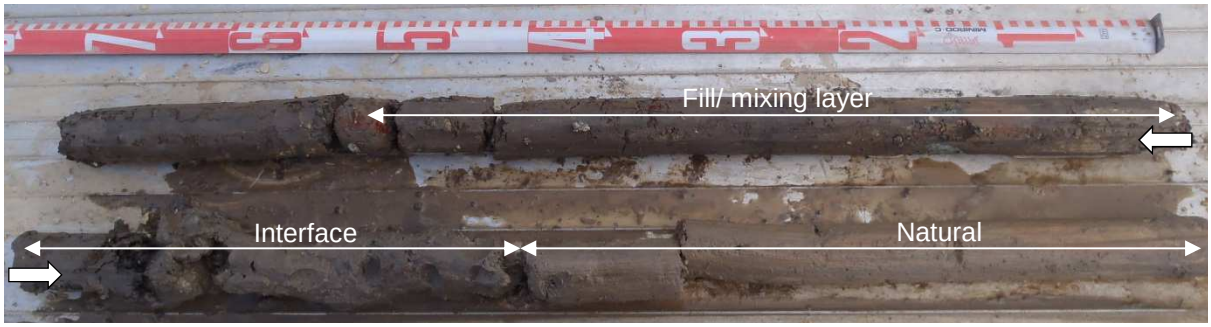
[1] NSW EPA Excavated Natural Materials Exemption (2012) - Table 2, Column 3 Absolute Maximum Concentration.

All results are reported in mg/kg

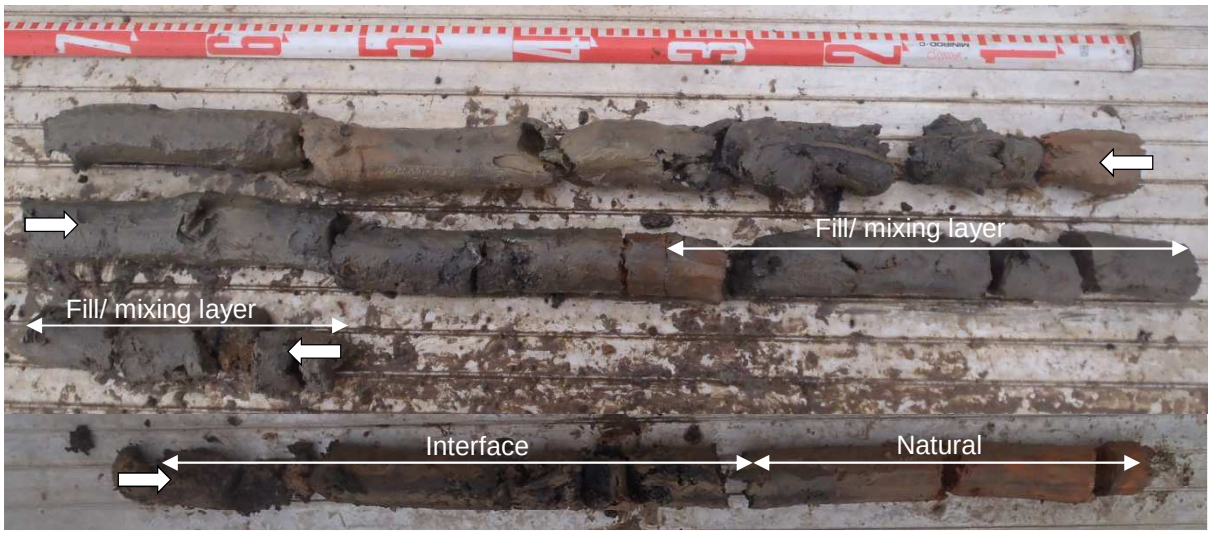
Photographs

The arrows in the below photographs indicates highest to deepest point of borehole. Note: Sample recovery from SPT varies and depths shown are approximate.

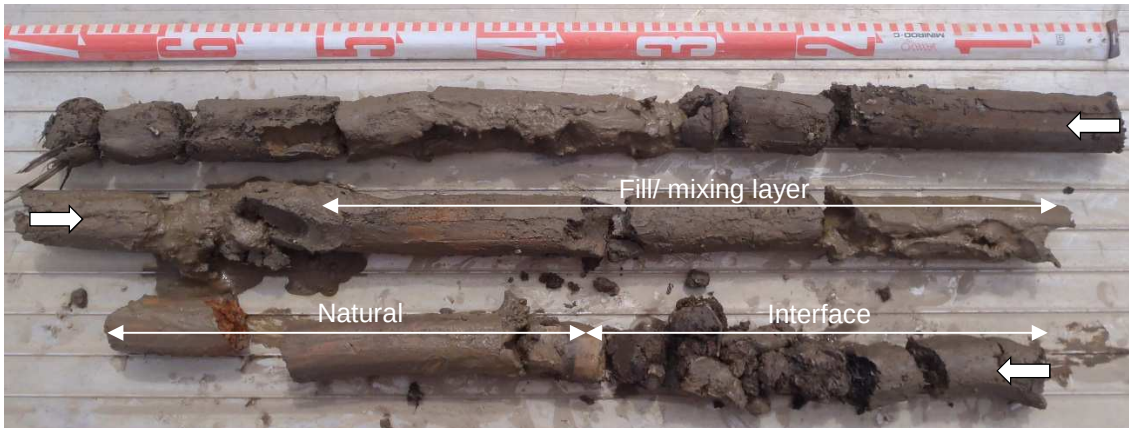
Photograph 1, shows undisturbed sample recovered from BH7B: 7.5m to 8.4m.



Photograph 2, shows undisturbed sample recovered from BH7C: 7.0m to 7.9m.

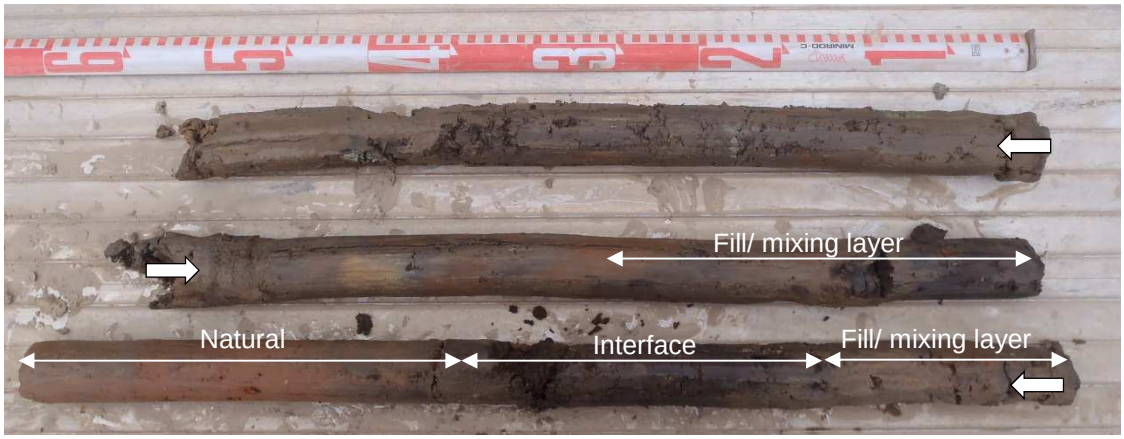


Photograph 3, shows undisturbed sample recovered from BH33C: 9.0m to 11.7m.



Photograph 4, shows undisturbed sample recovered from BH34A: 11.6m to 12.7m.

Photograph 5, shows undisturbed sample recovered from BH34B: 10m to 11.8m.



Photograph 6, shows undisturbed sample recovered from BH34C: 10m to 11.25m.

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Engineering Log - Borehole

Borehole ID.	**BH5**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	
date completed:	
logged by:	**JP**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description	moisture condition	consistency / relative density	hand penetrometer (kPa) (100 200 300 400)	structure and additional observations
AD/T			D (7.0–7.3)		1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
			D (7.3–7.5)					**ARGILLITE**: pale brown-white, fine to medium, some silty clay.				**HIGHLY WEATHERED ARGILITTE**
								Borehole BH5 terminated at 7.5 m Refusal				

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:48

method

AD	auger drilling*
AS	auger screwing*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*	bit shown by suffix
e.g.	AD/T

support

M	mud
C	casing
N	nil

penetration

1 2 3 — no resistance ranging to refusal

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
HP	hand penetrometer (kPa)
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
VS	vane shear; peak/remouded (kPa)
R	refusal
HB	hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH5A**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***09 Oct 2014***
date completed:	***09 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D D		1.0 2.0 3.0 4.0 5.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
								ARGILLITE: fine grained, some bands of clay.				**HIGHLY WEATHERED ARGILITTE**
					6.0 7.0			Borehole BH5A terminated at 5.9 m Refusal				

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:48

method
- AD auger drilling*
- AS auger screwing*
- RR roller/tricone
- W washbore
- CT cable tool
- HA hand auger
- DT diatube
- B blank bit
- V V bit
- T TC bit
- * bit shown by suffix
- e.g. AD/T

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Borehole

Borehole ID.	**BH5B**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***09 Oct 2014***
date completed:	***09 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D D		1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0			**FILL**: mixed layers of fill through profile varying in thickness. **ARGILLITE**: pale brown-white, fine to medium, some silty clay. Borehole BH5B terminated at 8.30 m Refusal				**FILL** **HIGHLY WEATHERED ARGILITTE**

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:48

method
- AD auger drilling*
- AS auger screwing*
- RR roller/tricone
- W washbore
- CT cable tool
- HA hand auger
- DT diatube
- B blank bit
- V V bit
- T TC bit
- * bit shown by suffix
- e.g. AD/T

support
- M mud
- C casing
- N nil

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- B bulk disturbed sample
- D disturbed sample
- E environmental sample
- SS split spoon sample
- U## undisturbed sample ##mm diameter
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear; peak/remouded (kPa)
- R refusal
- HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH5C**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***09 Oct 2014***
date completed:	***09 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T					0.0			**FILL**: mixed fill silty CLAY, some gravel fine to coarse and cobble, soil.				**FILL**
					1.0							
					2.0							
					3.0							
					4.0							
					5.0							
					6.0							
					6.4			Borehole BH5C terminated at 6.4 m Refusal				Refusal on potential large boulder. Mulch and organics at 6.3m, geofabric (SPT Refusal)
					7.0							

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:48

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH5D**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***09 Oct 2014***
date completed:	***09 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T					0.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					1.0							
					2.0							
					3.0							
		▶			4.0			Water inflows				
					5.0							
					6.0							
			D		7.0							
			D					**ARGILLITE** Borehole BH5D terminated at 7.35 m Refusal				**HIGHLY WEATHERED ARGILITTE**

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH7**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***10 Oct 2014***
date completed:	***10 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T					0.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					1.0							
					2.0							
					3.0							
					4.0							
					5.0							
					6.0							
					7.0							
					8.0		CL	**CLAY**: medium plasticity, pale brown mottled dark orange.				No samples collected as missed interface **RESIDUAL**
					9.0			Borehole BH7 terminated at 8.9 m Target depth				

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH7A**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***10 Oct 2014***
date completed:	***10 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D		1.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					2.0							
					3.0							
					4.0							
					5.0							
					6.0			large tree root SPT refusal				
			D				CL	**CLAY**: medium plasticity, pale brown/dark grey, mottled dark orange.				**RESIDUAL**
			D					colour change dark orange-pale brown				
			D		7.0			some rock structure				
								Borehole BH7A terminated at 7.10 m Target depth				

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method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH7B**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***10 Oct 2014***
date completed:	***10 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T					0.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					1.0							
					2.0							
					3.0							
					4.0							
					5.0							
					6.0							
		▶						Water inflow				
			D		7.0							
			D					Traces of roots, potential old topsoil				
			D		8.0		CL	**CLAY**: medium plasticity, pale brown-dark orange, mottled white-dark yellow, grading to white-dark yellow with increase in depth.				**RESIDUAL**
								Borehole BH7B terminated at 8.4 m Target depth				
					9.0							

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH7C**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***10 Oct 2014***
date completed:	***10 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D		1.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					2.0							
					3.0							
					4.0							
		▶						Water inflow				
					5.0							
					6.0							
			D		7.0			Traces of roots, potential old topsoil				
			D				CL	**CLAY**: medium plasticity, pale brown-dark orange.				**RESIDUAL**
			D		8.0			Borehole BH7C terminated at 7.9 m Target depth				
					9.0							

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH7D**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***10 Oct 2014***
date completed:	***10 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D D D		1.0 2.0 3.0 4.0 5.0 6.0 7.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
							CL	some roots, potential old topsoil **CLAY**: medium plasticity, dark orange-dark red/pale orange-pale brown, some quartz gravel fine to medium.				**RESIDUAL**
					8.0 9.0			Borehole BH7D terminated at 7.9 m Target depth				

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH33**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	**Leighton Fulton Hogan Joint Venture**
principal:	
project:	**SCA Arsenic Contamination Mountain Way Stockpile**
location:	**Mountain Way Stockpile**
date started:	**14 Oct 2014**
date completed:	**14 Oct 2014**
logged by:	**JP**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D		2.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					4.0							
					6.0							
					8.0							
			D		10.0		CL	**TOPSOIL: SILTY CLAY**: medium to high plasticity, dark grey-black, some fine roots and traces of charcoal.				**TOPSOIL**
								CLAY: medium plasticity, dark orange, some gravel fine to medium, subrounded.				**RESIDUAL**
					12.0			Borehole BH33 terminated at 10.80 m Target depth				Unable to sample 0.3m below interface as rock cave in above stopping sample recovery

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method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH33A**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	**14 Oct 2014**
date completed:	**14 Oct 2014**
logged by:	**JP**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D		2.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
			D		4.0							
			D		6.0							
					8.0							
					10.0		CL	**TOPSOIL: SILTY CLAY**: medium to high plasticity, dark grey-black, some fine roots.				**TOPSOIL**
								CLAY: medium plasticity, dark orange-brown, mottled white/dark yellow.				**RESIDUAL**
								Borehole BH33A terminated at 10.9 m Target depth				

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:48

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	***BH33C***
sheet:	1 of 1
project no.	***GEOTCOFH02820AG***

client: ***Leighton Fulton Hogan Joint Venture***

principal:

project: ***SCA Arsenic Contamination Mountain Way Stockpile***

location: ***Mountain Way Stockpile***

date started:

date completed:

logged by: ***JP***

checked by: ***AB***

position: Not Specified — surface elevation : Not Specified — angle from horizontal: 90°

drill model: — mounting: — hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D, D, D		2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0		CL	**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
								TOPSOIL: SILTY CLAY: medium to high plasticity, dark grey-black, some fine roots and organics.				**TOPSOIL**
								CLAY: medium plasticity, dark orange-pale brown.				**RESIDUAL**
								Borehole BH33C terminated at 11.70 m Target depth				

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method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH34**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***13 Oct 2014***
date completed:	***14 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T					2.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
					4.0							
					6.0							
					8.0							
					10.0							
					12.0							
							CL	**CLAY**: medium plasticity, dark orange, mottled white/pale brown.				**RESIDUAL**
					14.0			Borehole BH34 terminated at 13.0 m Target depth				Missed the interface - no samples collected

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method

AD	auger drilling*
AS	auger screwing*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*	bit shown by suffix
e.g.	AD/T

support

M	mud
C	casing
N	nil

penetration

1 2 3 — no resistance ranging to refusal

water

10-Oct-12 water level on date shown

water inflow

water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
HP	hand penetrometer (kPa)
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
VS	vane shear; peak/remouded (kPa)
R	refusal
HB	hammer bouncing

classification symbol & soil description

based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH34A**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	**13 Oct 2014**
date completed:	**13 Oct 2014**
logged by:	**JP**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD			D		2.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
AD			D		4.0							
AD			D		6.0							
AD					8.0							
AD					10.0							
AD					12.0		CL	**TOPSOIL: SILTY CLAY**: medium to high plasticity, dark grey-black, some fine toots and gravel, potential mixing layer.				**TOPSOIL**
								CLAY: medium plasticity, pale brown/dark orange.				**RESIDUAL**
					14.0			Borehole BH34A terminated at 12.70 m Target depth				

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method

AD	auger drilling*
AS	auger screwing*
RR	roller/tricone
W	washbore
CT	cable tool
HA	hand auger
DT	diatube
B	blank bit
V	V bit
T	TC bit
*	bit shown by suffix
e.g.	AD/T

support

M	mud
C	casing
N	nil

penetration

1 2 3 — no resistance ranging to refusal

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

B	bulk disturbed sample
D	disturbed sample
E	environmental sample
SS	split spoon sample
U##	undisturbed sample ##mm diameter
HP	hand penetrometer (kPa)
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
VS	vane shear; peak/remouded (kPa)
R	refusal
HB	hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH34B**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	***14 Oct 2014***
date completed:	***14 Oct 2014***
logged by:	***JP***
checked by:	***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D		2.0			**FILL**: mixed layers of fill through profile varying in thickness.				**FILL**
			D		4.0							
					6.0							
					8.0							
					10.0							
			D		12.0		CL	**TOPSOIL: SILTY CLAY**: medium to high plasticity, dark grey/black, some fine roots and charcoal.				**TOPSOIL**
								CLAY: medium plasticity, dark orange, mottled pale brown.				**RESIDUAL**
								Borehole BH34B terminated at 11.80 m Target depth				

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method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Borehole

Borehole ID.	**BH34C**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	***Leighton Fulton Hogan Joint Venture***
principal:	
project:	***SCA Arsenic Contamination Mountain Way Stockpile***
location:	***Mountain Way Stockpile***
date started:	
date completed:	
logged by:	**JP**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: | mounting: | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
AD/T			D D D		2.0 4.0 6.0 8.0 10.0 12.0		CL	**FILL**: mixed layers of fill through profile varying in thickness. **TOPSOIL: SILTY CLAY**: medium plasticity, dark grey-black, some fine roots and traces of gravel fine to medium, subangular. **CLAY**: medium plasticity, pale brown-dark orange/brown. Borehole BH34C terminated at 11.25 m Target depth				**FILL** **TOPSOIL** **RESIDUAL**

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Test pit

Borehole ID.	**TP22A**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	**Leighton Fulton Hogan Joint Venture**
date started:	**02 Oct 2014**
principal:	
date completed:	**02 Oct 2014**
project:	**SCA Arsenic Contamination Mountain Way Stockpile**
logged by:	**JP**
location:	**Mountain Way Stockpile**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: JCB-3CX | mounting: Backhoe | hole diameter :

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E, N		Not Observed	D		0.5			**FILL: GRAVELLY CLAY**: low to medium plasticity, white/brown/dark orange, gravel, fine to coarse, subangular, some fine roots.				**FILL**
			D					**FILL: SILTY CLAY**: medium plasticity, dark grey/grey.				
			D					**FILL: SILTY CLAY**: medium plasticity, dark grey, some roots, timber <20mm diameter.				
					1.0		CL	**CLAY**: medium plasticity, dark orange-brown, some gravel, fine to medium, subangular.	>Wp			**RESIDUAL**
					1.5			Test pit TP22A terminated at 1.2 m Target depth				
					2.0							
					2.5							

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method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Engineering Log - Test pit

Borehole ID.	***TP22B***
sheet:	1 of 1
project no.	***GEOTCOFH02820AG***
client: ***Leighton Fulton Hogan Joint Venture***	date started: ***02 Oct 2014***
principal:	date completed: ***02 Oct 2014***
project: ***SCA Arsenic Contamination Mountain Way Stockpile***	logged by: ***JP***
location: ***Mountain Way Stockpile***	checked by: ***AB***

position: Not Specified — surface elevation : Not Specified — angle from horizontal: 90°

drill model: JCB-3CX — mounting: Backhoe — hole diameter :

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
BH, N		Not Observed	D		0.5			**FILL: GRAVELLY CLAY**: low to medium plasticity, brown - pale brown/grey - dark grey, gravel, fine to coarse, subangular, traces of timber <50mm diameter.				**FILL**
								FILL: TIMBER MULCH: brown - dark brown, timber up to 20cm diameter, some clay, fine to medium.				
			D		1.0		CL	**CLAY**: medium plasticity, dark orange - dark yellow/pale yellow, some gravel, fine to coarse, subangular.	>Wp			**RESIDUAL**
			D									
					1.5			Test pit TP22B terminated at 1.4 m Target depth				
					2.0							
					2.5							

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Engineering Log - Test pit

Borehole ID.	**TP22C**
sheet:	1 of 1
project no.	**GEOTCOFH02820AG**
client:	**Leighton Fulton Hogan Joint Venture**
date started:	**02 Oct 2014**
principal:	
date completed:	**02 Oct 2014**
project:	**SCA Arsenic Contamination Mountain Way Stockpile**
logged by:	**JP**
location:	**Mountain Way Stockpile**
checked by:	**AB**

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: JCB-3CX | mounting: Backhoe | hole diameter :

drilling information | **material substance**

method & support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
BH, N		Not Observed	D		0.5			**FILL: SILTY CLAY**: low to medium plasticity, grey-dark grey, some gravel, fine to course, subangular and timber <10cm diameter.				**FILL**
			D									potential compressed old topsoil layer, however no fine roots or organics observed
			D		1.0		CL	**CLAY**: medium plasticity, dark orange-dark yellow, mottled white, some gravel fine to medium, subangular (quartz).	>Wp			**RESIDUAL**
								Test pit TP22C terminated at 1.1 m Target depth				
					1.5							
					2.0							
					2.5							

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

Engineering Log - Test pit

Borehole ID.	***TP22D***
sheet:	1 of 1
project no.	***GEOTCOFH02820AG***
client: ***Leighton Fulton Hogan Joint Venture***	date started: ***02 Oct 2014***
principal:	date completed: ***02 Oct 2014***
project: ***SCA Arsenic Contamination Mountain Way Stockpile***	logged by: ***JP***
location: ***Mountain Way Stockpile***	checked by: ***AB***

position: Not Specified | surface elevation : Not Specified | angle from horizontal: 90°

drill model: JCB-3CX | mounting: Backhoe | hole diameter :

drilling information | **material substance**

method & support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
BH N		Not Observed	D		0.5			**FILL: SILTY CLAY**: medium plasticity, dark grey-dark brown, some gravel, fine to coarse, subangular. A piece of wire and a brick were observed.				**FILL**
					1.0							
					1.5			**FILL: TIMBER MULCH**: brown - dark brown, timber up to 20cm diameter, some clay, fine to medium.				some dark grey clay at interface, potential remains of old topsoil
			D				CL	**CLAY**: medium plasticity, dark orange-dark yellow mottled white, some gravel, quartz, fine to coarse, subangular and rock structure.	>Wp			**RESIDUAL**
			D		2.0							
					2.5			Test pit TP22D terminated at 2.2 m Target depth				

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTCOFH02820AG.GPJ <<DrawingFile>> 28/10/2014 15:49

method
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

support
M mud
C casing
N nil

penetration
1 2 3 — no resistance ranging to refusal

water
10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

classification symbol & soil description
based on Unified Classification System

moisture
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

consistency / relative density

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbrev-iation	Point Load Index, $I_{s(50)}$ (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index $I_{s(50)}$. The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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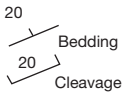
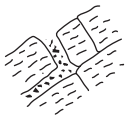
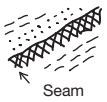
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

DEFECT SHAPE TERMS	
Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS	
Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS	
Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS	
Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greate than cross section

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

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Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μm to 2.36 mm
	medium	200 μm to 600 μm
	fine	75 μm to 200 μm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit w_L less than 35%. • Medium plasticity – w_L between 35% and 50%. • High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Certificate of Analysis

Coffey Geotechnics Pty Ltd
Unit 1 18 Hurley Dve
Coffs Harbour
NSW 2450

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Andrew Ballard**

Report **435499-S**
Project name GEOTCOFH02820AG
Received Date Oct 16, 2014

Client Sample ID			**BH5_7.2**	**BH5_7.5**	**BH5A_5.4**	**BH5A_5.7**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Oc11192**	**S14-Oc11193**	**S14-Oc11194**	**S14-Oc11195**
Date Sampled			**Oct 09, 2014**	**Oct 09, 2014**	**Oct 09, 2014**	**Oct 09, 2014**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	15	7.8	12	7.2
% Moisture	0.1	%	17	7.5	19	19

Client Sample ID			**BH5B_7.9**	**BH5B_8.3**	**BH5D_7**	**BH5D_7.3**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Oc11196**	**S14-Oc11197**	**S14-Oc11198**	**S14-Oc11199**
Date Sampled			**Oct 09, 2014**	**Oct 09, 2014**	**Oct 09, 2014**	**Oct 09, 2014**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	4.1	18	6.0	8.3
% Moisture	0.1	%	18	15	22	20

Client Sample ID			**BH7A_6.4**	**BH7A_6.7**	**BH7A_7**	**BH7B_7.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Oc11200**	**S14-Oc11201**	**S14-Oc11202**	**S14-Oc11203**
Date Sampled			**Oct 10, 2014**	**Oct 10, 2014**	**Oct 10, 2014**	**Oct 10, 2014**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	18	30	15	60
% Moisture	0.1	%	20	20	25	28

Client Sample ID			BH7B_7.8	BH7B_8.1	BH7C_7.2	BH7C_7.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Oc11204	S14-Oc11205	S14-Oc11206	S14-Oc11207
Date Sampled			Oct 10, 2014	Oct 10, 2014	Oct 10, 2014	Oct 10, 2014
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	72	13	53	24
% Moisture	0.1	%	24	22	22	22

Client Sample ID			BH7C_7.8	BH7D_6.9	BH7D_7.25	BH7D_7.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Oc11208	S14-Oc11209	S14-Oc11210	S14-Oc11211
Date Sampled			Oct 10, 2014	Oct 10, 2014	Oct 10, 2014	Oct 10, 2014
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	10	11	25	12
% Moisture	0.1	%	26	20	26	25

Client Sample ID			BH33_10.2	BH33_10.6	BH33A_10.3	BH33A_10.6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Oc11212	S14-Oc11213	S14-Oc11214	S14-Oc11215
Date Sampled			Oct 14, 2014	Oct 14, 2014	Oct 14, 2014	Oct 14, 2014
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	4.3	11	38	13
% Moisture	0.1	%	19	20	21	22

Client Sample ID			BH33A_10.9	BH33C_11	BH33C_11.4	BH33C_11.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Oc11216	S14-Oc11217	S14-Oc11218	S14-Oc11219
Date Sampled			Oct 14, 2014	Oct 13, 2014	Oct 13, 2014	Oct 13, 2014
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	10	150	16	8.8
% Moisture	0.1	%	24	26	22	25

Client Sample ID			BH34A_11.9	BH34A_12.3	BH34A_12.6	BH34B_10.9
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Oc11220**	**S14-Oc11221**	**S14-Oc11222**	**S14-Oc11223**
Date Sampled			**Oct 13, 2014**	**Oct 13, 2014**	**Oct 13, 2014**	**Oct 14, 2014**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	12	76	6.0	13
% Moisture	0.1	%	20	24	19	20

Client Sample ID			BH34B_11.35	BH34B_11.8	BH34C_10.6	BH34C_10.9
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Oc11224**	**S14-Oc11225**	**S14-Oc11226**	**S14-Oc11227**
Date Sampled			**Oct 14, 2014**	**Oct 14, 2014**	**Oct 13, 2014**	**Oct 13, 2014**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	120	7.4	38	65
% Moisture	0.1	%	22	22	22	25

Client Sample ID			BH34C_11.2	QC7	QC9	QC13
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Oc11228**	**S14-Oc11229**	**S14-Oc11230**	**S14-Oc11231**
Date Sampled			**Oct 13, 2014**	**Not Provided**	**Not Provided**	**Not Provided**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	6.2	46	10	4.0
% Moisture	0.1	%	21	21	19	19

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Sydney	Oct 16, 2014	180 Day
- Method: E022 Acid Extractable metals in Soils			
% Moisture	Sydney	Oct 16, 2014	28 Day
- Method: E005 Moisture Content			

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Coffey Geotechnics Pty Ltd COFFS	**Order No.:**	CH064625	**Received:**	Oct 16, 2014 9:00 AM
Address:	Unit 1 18 Hurley Dve Coffs Harbour NSW 2450	**Report #:**	435499	**Due:**	Oct 20, 2014
		Phone:	02 6651 3213	**Priority:**	2 Day
		Fax:	02 6651 5194	**Contact Name:**	Andrew Ballard
Project Name:	GEOTCOFH02820AG				

Eurofins | mgt Client Manager: Tammy Lakeland

Sample Detail					% Moisture	Arsenic
Laboratory where analysis is conducted						
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217					X	X
Brisbane Laboratory - NATA Site # 20794						
External Laboratory						
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
BH5_7.2	Oct 09, 2014		Soil	S14-Oc11192	X	X
BH5_7.5	Oct 09, 2014		Soil	S14-Oc11193	X	X
BH5A_5.4	Oct 09, 2014		Soil	S14-Oc11194	X	X
BH5A_5.7	Oct 09, 2014		Soil	S14-Oc11195	X	X
BH5B_7.9	Oct 09, 2014		Soil	S14-Oc11196	X	X
BH5B_8.3	Oct 09, 2014		Soil	S14-Oc11197	X	X
BH5D_7	Oct 09, 2014		Soil	S14-Oc11198	X	X
BH5D_7.3	Oct 09, 2014		Soil	S14-Oc11199	X	X
BH7A_6.4	Oct 10, 2014		Soil	S14-Oc11200	X	X
BH7A_6.7	Oct 10, 2014		Soil	S14-Oc11201	X	X

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
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Received: Oct 16, 2014 9:00 AM
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Priority: 2 Day
Contact Name: Andrew Ballard

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Sample Detail					% Moisture	Arsenic
Laboratory where analysis is conducted						
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217					X	X
Brisbane Laboratory - NATA Site # 20794						
External Laboratory						
BH7A_7	Oct 10, 2014		Soil	S14-Oc11202	X	X
BH7B_7.5	Oct 10, 2014		Soil	S14-Oc11203	X	X
BH7B_7.8	Oct 10, 2014		Soil	S14-Oc11204	X	X
BH7B_8.1	Oct 10, 2014		Soil	S14-Oc11205	X	X
BH7C_7.2	Oct 10, 2014		Soil	S14-Oc11206	X	X
BH7C_7.5	Oct 10, 2014		Soil	S14-Oc11207	X	X
BH7C_7.8	Oct 10, 2014		Soil	S14-Oc11208	X	X
BH7D_6.9	Oct 10, 2014		Soil	S14-Oc11209	X	X
BH7D_7.25	Oct 10, 2014		Soil	S14-Oc11210	X	X
BH7D_7.6	Oct 10, 2014		Soil	S14-Oc11211	X	X
BH33_10.2	Oct 14, 2014		Soil	S14-Oc11212	X	X

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

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Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name: Coffey Geotechnics Pty Ltd COFFS
Address: Unit 1 18 Hurley Dve
Coffs Harbour
NSW 2450

Project Name: GEOTCOFH02820AG

Order No.: CH064625
Report #: 435499
Phone: 02 6651 3213
Fax: 02 6651 5194

Received: Oct 16, 2014 9:00 AM
Due: Oct 20, 2014
Priority: 2 Day
Contact Name: Andrew Ballard

Eurofins | mgt Client Manager: Tammy Lakeland

Sample Detail					% Moisture	Arsenic
Laboratory where analysis is conducted						
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217					X	X
Brisbane Laboratory - NATA Site # 20794						
External Laboratory						
BH33_10.6	Oct 14, 2014		Soil	S14-Oc11213	X	X
BH33A_10.3	Oct 14, 2014		Soil	S14-Oc11214	X	X
BH33A_10.6	Oct 14, 2014		Soil	S14-Oc11215	X	X
BH33A_10.9	Oct 14, 2014		Soil	S14-Oc11216	X	X
BH33C_11	Oct 13, 2014		Soil	S14-Oc11217	X	X
BH33C_11.4	Oct 13, 2014		Soil	S14-Oc11218	X	X
BH33C_11.7	Oct 13, 2014		Soil	S14-Oc11219	X	X
BH34A_11.9	Oct 13, 2014		Soil	S14-Oc11220	X	X
BH34A_12.3	Oct 13, 2014		Soil	S14-Oc11221	X	X
BH34A_12.6	Oct 13, 2014		Soil	S14-Oc11222	X	X
BH34B_10.9	Oct 14, 2014		Soil	S14-Oc11223	X	X

eurofins | mgt

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Coffey Geotechnics Pty Ltd COFFS	**Order No.:**	CH064625	**Received:**	Oct 16, 2014 9:00 AM
Address:	Unit 1 18 Hurley Dve Coffs Harbour NSW 2450	**Report #:**	435499	**Due:**	Oct 20, 2014
		Phone:	02 6651 3213	**Priority:**	2 Day
		Fax:	02 6651 5194	**Contact Name:**	Andrew Ballard
Project Name:	GEOTCOFH02820AG				

Eurofins | mgt Client Manager: Tammy Lakeland

Sample Detail					% Moisture	Arsenic
Laboratory where analysis is conducted						
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217					X	X
Brisbane Laboratory - NATA Site # 20794						
External Laboratory						
BH34B_11.35	Oct 14, 2014		Soil	S14-Oc11224	X	X
BH34B_11.8	Oct 14, 2014		Soil	S14-Oc11225	X	X
BH34C_10.6	Oct 13, 2014		Soil	S14-Oc11226	X	X
BH34C_10.9	Oct 13, 2014		Soil	S14-Oc11227	X	X
BH34C_11.2	Oct 13, 2014		Soil	S14-Oc11228	X	X
QC7	Not Provided		Soil	S14-Oc11229	X	X
QC9	Not Provided		Soil	S14-Oc11230	X	X
QC13	Not Provided		Soil	S14-Oc11231	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	102			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S14-Oc11193	CP	%	99			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S14-Oc11223	CP	%	113			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S14-Oc11192	CP	mg/kg	15	12	20	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S14-Oc11202	CP	mg/kg	15	21	33	30%	Fail	Q15
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S14-Oc11212	CP	mg/kg	4.3	4.3	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S14-Oc11222	CP	mg/kg	6.0	4.7	24	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes Eurofins | mgt's Acceptance Criteria as stipulated in SOP 05. Refer to Glossary Page of this report for further details

Authorised By

Mary Makarios	Analytical Services Manager
Bob Symons	Senior Analyst-Inorganic (NSW)
Ivan Taylor	Senior Analyst-Metal (NSW)

Glenn Jackson
National Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Certificate of Analysis

Coffey Geotechnics Pty Ltd
Unit 1 18 Hurley Dve
Coffs Harbour
NSW 2450

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Joel Parkin**

Report **435646-S**
Project name GEOTCOFH02820AG
Received Date Oct 17, 2014

Client Sample ID			**QC8**	**QC10**	**QC14**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**M14-Oc12156**	**M14-Oc12157**	**M14-Oc12158**
Date Sampled			**Not Provided**	**Not Provided**	**Not Provided**
Test/Reference	LOR	Unit			
Heavy Metals					
Arsenic	2	mg/kg	18	13	< 2
% Moisture	0.1	%	21	19	20

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Heavy Metals	Melbourne	Oct 17, 2014	180 Day
- Method: USEPA 6010/6020 Heavy Metals			
% Moisture	Melbourne	Oct 17, 2014	14 Day
- Method: Method 102 - ANZECC - % Moisture			

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ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com.au web : www.eurofins.com.au

Melbourne
3-5 Kingston Town Close
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Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

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NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Coffey Geotechnics Pty Ltd COFFS	**Order No.:**		**Received:**	Oct 17, 2014 8:23 AM
Address:	Unit 1 18 Hurley Dve	**Report #:**	435646	**Due:**	Oct 21, 2014
	Coffs Harbour	**Phone:**	02 6651 3213	**Priority:**	2 Day
	NSW 2450	**Fax:**	02 6651 5194	**Contact Name:**	Joel Parkin
Project Name:	GEOTCOFH02820AG				

Eurofins | mgt Client Manager: Mary Makarios

Sample Detail					% Moisture	Arsenic
Laboratory where analysis is conducted						
Melbourne Laboratory - NATA Site # 1254 & 14271					X	X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
External Laboratory						
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
QC8	Not Provided		Soil	M14-Oc12156	X	X
QC10	Not Provided		Soil	M14-Oc12157	X	X
QC14	Not Provided		Soil	M14-Oc12158	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

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Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	84			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M14-Oc11586	NCP	mg/kg	< 2	< 2	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	No
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Mary Makarios	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Huong Le	Senior Analyst-Inorganic (VIC)

Glenn Jackson
National Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

eurofins | mgt

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1/21 Smallwood Place
Murarrie QLD 4172
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NATA # 1261 Site # 20794

Sample Receipt Advice

Company name:	**Coffey Geotechnics Pty Ltd COFFS**
Contact name:	Andrew Ballard
Project name:	GEOTCOFH02820AG
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Oct 16, 2014 9:00 AM
Eurofins | mgt reference:	**435499**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 7 degrees Celsius.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

QC8, QC10 and QC14 forwarded to Eurofin | mgt Melbourne

Contact notes

If you have any questions with respect to these samples please contact:

Tammy Lakeland on Phone : (+61) (3) 8564 5000 or by e.mail:
TammyLakeland@eurofins.com.au

Results will be delivered electronically via e.mail to Andrew Ballard - andrew.ballard@coffey.com.

1/18 Hurley Drive
COFFS HARBOUR NSW 2450
(02) 6651 3213

4
#438499

Chain of Custody

Laboratory Quotation/ Order No:

Project No.: GEOTCOFH02820AG | Sheet 1 of 3

Coffey Purchase Order No. CH064625

Dispatch to: Eurofins/ mgt	Sampled By: JP
Attention: Sample Receipt	Project Manager: (report results to) andrew.ballard@coffey.com; joel.parkin@coffey.com

Consigning Officer	TOLL
Date Dispatched	15-Oct-14
Courier Service:	TOLL
Consignment Note No.:	M11 00903RGGAI

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Coffey			Matt		
Coffs Harbour				16/10/14	9:00

Comments:	Sample Matrix	Container Type & Preservative	Sample No.	Sample Depth (m)	Date Sampled:	Analyses Required: Arsenic										Send to Melbourne	HOLD	Sample Condition on Receipt
	Soil	250ml Glass Jar	BH5	7.2	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5	7.5	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5A	5.4	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5A	5.7	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5B	7.9	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5B	8.3	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5D	7	9-Oct-14	x												
	Soil	250ml Glass Jar	BH5D	7.3	9-Oct-14	x												
	Soil	250ml Glass Jar	BH7A	6.4	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7A	6.7	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7A	7	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7B	7.5	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7B	7.8	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7B	8.1	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7C	7.2	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7C	7.5	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7C	7.8	10-Oct-14	x												

Special Laboratory Instructions:

Detection Limits: Normal

Turnaround Required: Standard (5day TAT)

coffey

1/18 Hurley Drive
COFFS HARBOUR NSW 2450
(02) 6651 3213

439469

Chain of Custody

Laboratory Quotation/ Order No:

Project No.: GEOTCOFH02820AG | Sheet 2 of 3

Dispatch to: Eurofins/ mgt	Sampled By: JP
Attention: Sample Receipt	Project Manager: (report results to) andrew.ballard@coffey.com; joel.parkin@coffey.com

Consigning Officer	TOLL
Date Dispatched	15-Oct-14
Courier Service:	TOLL
Consignment Note No.:	M11 00903RGGAI

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Coffey Coffs Harbour			Matt	16/10/14	1:00

Comments	Sample Matrix	Container Type & Preservative	Sample No.	Sample Depth (m)	Date Sampled:	Analyses Required: Arsenic										Send to Melbourne	HOLD	Sample Condition on Receipt
	Soil	250ml Glass Jar	BH7D	6.9	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7D	7.25	10-Oct-14	x												
	Soil	250ml Glass Jar	BH7D	7.6	10-Oct-14	x												
	Soil	250ml Glass Jar	BH33	10.2	14-Oct-14	x												
	Soil	250ml Glass Jar	BH33	10.6	14-Oct-14	x												
	Soil	250ml Glass Jar	BH33A	10.3	14-Oct-14	x												
	Soil	250ml Glass Jar	BH33A	10.6	14-Oct-14	x												
	Soil	250ml Glass Jar	BH33A	10.9	14-Oct-14	x												
	Soil	250ml Glass Jar	BH33C	11	13-Oct-14	x												
	Soil	250ml Glass Jar	BH33C	11.4	13-Oct-14	x												
	Soil	250ml Glass Jar	BH33C	11.7	13-Oct-14	x												
	Soil	250ml Glass Jar	BH34A	11.9	13-Oct-14	x												
	Soil	250ml Glass Jar	BH34A	12.3	13-Oct-14	x												
	Soil	250ml Glass Jar	BH34A	12.6	13-Oct-14	x												
	Soil	250ml Glass Jar	BH34B	10.9	14-Oct-14	x												
	Soil	250ml Glass Jar	BH34B	11 35	14-Oct-14	x												
	Soil	250ml Glass Jar	BH34B	11.8	14-Oct-14	x												

Special Laboratory Instructions:

Detection Limits: Normal

Turnaround Required: Standard (5day TAT)

1/18 Hurley Drive
COFFS HARBOUR NSW 2450
(02) 6651 3213

#435499

Chain of Custody

Laboratory Quotation/ Order No:

Project No.: GEOTCOFH02820AG | Sheet 3 of 3

Dispatch to: Eurofins/ mgt	Sampled By: JP
Attention: Sample Receipt	Project Manager: (report results to) andrew.ballard@coffey.com; joel.parkin@coffey.com

Consigning Officer	TOLL
Date Dispatched	15-Oct-14
Courier Service:	TOLL
Consignment Note No.:	M11 00903RGGAI

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Coffey Coffs Harbour			Matt	16/10/14	9:00

Comments:	Sample Matrix	Container Type & Preservative	Sample No.	Sample Depth (m)	Date Sampled:	Analyses Required: Arsenic										Send to Melbourne	HOLD	Sample Condition on Receipt
	Soil	250ml Glass Jar	BH34C	10.6	13-Oct-14	x												
	Soil	250ml Glass Jar	BH34C	10.9	13-Oct-14	x												
	Soil	250ml Glass Jar	BH34C	11.2	13-Oct-14	x												
	Soil	250ml Glass Jar	QC7			x												
	Soil	250ml Glass Jar	QC8			x										x		
	Soil	250ml Glass Jar	QC9			x												
	Soil	250ml Glass Jar	QC10			x										x		
	Soil	250ml Glass Jar	QC13			x												
	Soil	250ml Glass Jar	QC14			x										x		

Special Laboratory Instructions:

Detection Limits: Normal

Turnaround Required: Standard (5day TAT)

Appendix A
LFHJV ENM Sampling Plan and Laboratory Summary Results Tables

Craig Pullman Site Investigations Pty. Ltd. ABN 65 060 675 532 T/A

NORTH COAST DRILLING

PH/FAX 02 6687 2199
CRAIG MOBILE 0415 258 426
LOT 8 BYRON BAY ROAD BANGALOW NSW 2479

2964

CLIENT: Leighton - Fulton - Hogan

JOB No:

DRILLING UNIT: Rig 3 - P-160

LOCATION: Woodgate to Sarina

DRILLER: Brook - Kenny

DAY	DATE	BH No.	DRILLING: Start - Finish AM	DRILLING: Start - Finish PM	DRILLING: Start - Finish TOTAL HRS	TRAVEL hours	DRILLED Non-core m	DRILLED Core m	SPT	U50	WATER CART	GRAVEL DRILLING m	REAM CASING m	MOVE SET-UP HOURS	VANE SHEAR	STAND-BY HOURS	CORE BOXES	E.O.H DEPTH	RETURN SUPPORT VEHICLE
Wed	25.6		7am	10pm		Mob 1, 2 & 1 to WO													
Wed	25.6	BH7	11pm	4pm			32m		12		1			4		1hr			
Thur	26/6	5-11	6.30am	4.30pm			56m		21		1			7					
Fri	27/6	12-7	6.30am	3.30pm			48m		18		1			6					1
TOTAL																			

DAILY CHECK LIST	DRILL RIG	FIRE EXTINGUISH	FIRST AID KIT	SPILL KIT	TRUCK LIGHTS	TRUCK BRAKES	OIL LEAKS	TYRES	WINCHES	COMPULS. SIGNS	HYDRAULIC OIL (RIG)	ENGINE OIL (RIG)	GEAR BOX OIL (HEAD)	APPROP. PPE	EMERGENCY STOP	MAST PINS		
25.6.14 Wed		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
26/6 Thur		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
27/6 Fri		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

SITE SPECIFIC HAZARDS:	UNEVEN GROUND	BAD ACCESS	OVERHEAD POWER	SNAKE BITE	UNDERGRND SERVICES	SLIPPERY SURFACES	UNEVEN SURFACES	STEEP SURFACES	HOT CONDITIONS	COLD CONDITIONS	TRAFFIC ROAD	TRAFFIC SITE	DRILLER SIGNATURE	OFFSIDER SIGNATURE	SUPERVISOR SIGNATURE
25.6.14 Wed	N	N	N	Y	N	N	N	Y	Y	N	N	N			
26/6 Thu	N	Y	N	Y	N	N	Y	Y	N	Y	N	Y			
27/6 Fri	Y	Y	N	Y	N	N	Y	Y	N	Y	N	N			

REMARKS: eg. reasons for standby, etc. 1 hr standby checking hole locations.

CONSUMABLES: polymer, birs etc.

DATE: 27-6-2014 SUPERVISOR NAME: S Jenkins SUPERVISOR SIGNATURE:

...vestigations Pty. Ltd. ABN 65 060 675 532 T/A

NORTH COAST DRILLING

PH/FAX 02 **6687 2199**
CRAIG MOBILE 0415 258 426
LOT 8 BYRON BAY ROAD BANGALOW NSW 2479

2965

CLIENT: Leighton Fulton Hogan

JOB No:

DRILLING UNIT: Rig 3

LOCATION: W25

DRILLER:

DAY	DATE	BH No.	DRILLING: Start - Finish AM	DRILLING: Start - Finish PM	DRILLING: Start - Finish TOTAL HRS	TRAVEL hours	DRILLED Non-core m	DRILLED Core m	SPT	U50	WATER CART	GRAVEL DRILLING m	REAM CASING m	MOVE SET-UP HOURS	VANE SHEAR	STAND-BY HOURS	CORE BOXES	E.O.H DEPTH	RETURN SUPPORT VEHICLE
Mon	30/6	18-21	10am	4pm			32m		12		1			4				4.5m	
Tue	1/7	22-25	6:30am	4.30pm			56m		21		1			7				9.0m 4.5m	
Wed	2/7	26-34	6.30am	5.30pm			60m		21		1			6				9.0m 4.5m	
Thur	3/7	35-39	6.30am	5.30pm			60m		20		1			5				13.5m 4.5m	
TOTAL																			

DAILY CHECK LIST	DRILL RIG	FIRE EXTINGUISH	FIRST AID KIT	SPILL KIT	TRUCK LIGHTS	TRUCK BRAKES	OIL LEAKS	TYRES	WINCHES	COMPULS. SIGNS	HYDRAULIC OIL (RIG)	ENGINE OIL (RIG)	GEAR BOX OIL (HEAD)	APPROP. PPE	EMERGENCY STOP	MAST PINS		
Mon 30/6		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Tue 1/7		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Wed 2/7		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

SITE SPECIFIC HAZARDS:	UNEVEN GROUND	BAD ACCESS	OVERHEAD POWER	SNAKE BITE	UNDERGRND SERVICES	SLIPPERY SURFACES	UNEVEN SURFACES	STEEP SURFACES	HOT CONDITIONS	COLD CONDITIONS	TRAFFIC ROAD	TRAFFIC SITE	DRILLER SIGNATURE	OFFSIDER SIGNATURE	SUPERVISOR SIGNATURE
Mon 30/6	Y	Y	N	Y	N	N	Y	N	N	N	N	Y			
Tue 1/7	Y	Y	N	Y	N	N	Y	N	N	Y	N	Y			
Wed 2/7	Y	Y	N	Y	N	N	Y	N	N	Y	N	Y			
Thur 3/7	Y	Y	N	Y	N	N	Y	N	N	Y	N	Y			

REMARKS: eg. reasons for standby, etc.

CONSUMABLES: polymer, birs etc.

DATE: 7-7-2014 **SUPERVISOR NAME:** S JENKINS **SUPERVISOR SIGNATURE:**

Craig Pullman Site Investigations Pty. Ltd. ABN 65 060 675 532 T/A

NORTH COAST DRILLING

PH/FAX 02 **6687 2199**
CRAIG MOBILE 0415 258 426
LOT 8 BYRON BAY ROAD BANGALOW NSW 2479

CLIENT: Leighton Fulton Hogan

2966

JOB No:

DRILLING UNIT:

LOCATION:

DRILLER:

DAY	DATE	BH No.	DRILLING: Start - Finish AM	PM	TOTAL HRS	TRAVEL hours	DRILLED Non-core m	Core m	SPT	U50	WATER CART	GRAVEL DRILLING m	REAM CASING m	MOVE SET-UP HOURS	VANE SHEAR	STAND-BY HOURS	CORE BOXES	E.O.H DEPTH	RETURN SUPPORT VEHICLE
Fri	4/7	40-49	6am	5pm			66m		20		A			8				12.12.99	
Sat	5/7	49-52	7am				63m		16		P			2				77.77	
Sun	7/7				Derrick													77.77	
TOTAL																			

DAILY CHECK LIST	DRILL RIG	FIRE EXTINGUISH	FIRST AID KIT	SPILL KIT	TRUCK LIGHTS	TRUCK BRAKES	OIL LEAKS	TYRES	WINCHES	COMPULS. SIGNS	HYDRAULIC OIL (RIG)	ENGINE OIL (RIG)	GEAR BOX OIL (HEAD)	APPROP. PPE	EMERGENCY STOP	MAST PINS		
Fri 4/7		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Sat 5/7		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

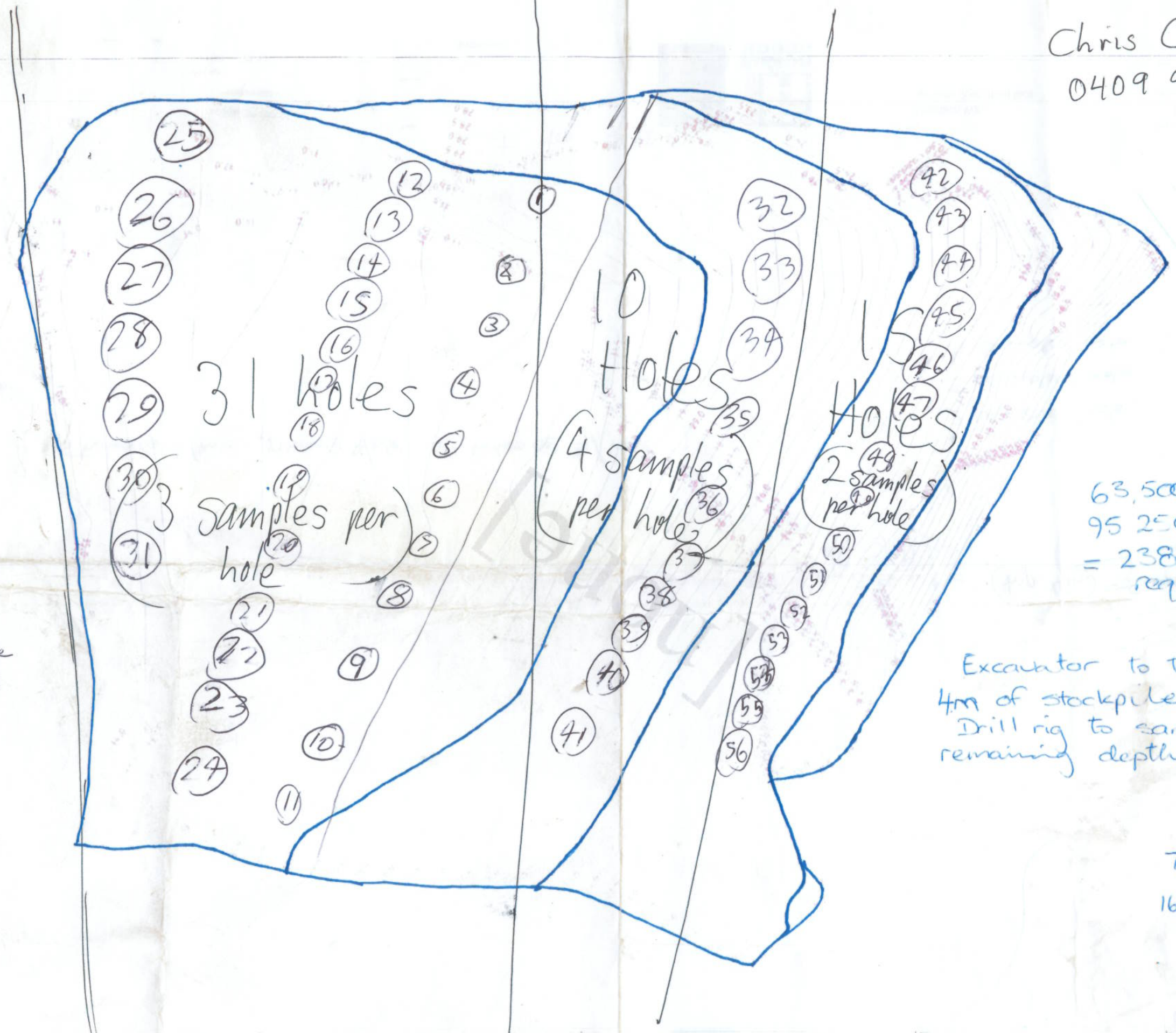
SITE SPECIFIC HAZARDS:	UNEVEN GROUND	BAD ACCESS	OVERHEAD POWER	SNAKE BITE	UNDERGRND SERVICES	SLIPPERY SURFACES	UNEVEN SURFACES	STEEP SURFACES	HOT CONDITIONS	COLD CONDITIONS	TRAFFIC ROAD	TRAFFIC SITE	DRILLER SIGNATURE	OFFSIDER SIGNATURE	SUPERVISOR SIGNATURE
Fri 4/7	Y	Y	N	Y	N	N	Y	N	N	N	N	Y			
Sat 5/7	Y	Y	N	Y	N	N	Y	N	N	N	N	Y			

REMARKS: eg. reasons for standby, etc.

CONSUMABLES: polymer, birs etc.

DATE: 27.7.2014 **SUPERVISOR NAME:** S Denham **SUPERVISOR SIGNATURE:**

Chris Carman
0409 912 758



63,500m³
95 250 t
= 238 samples required

Excavator to test top 4m of stockpile ≈ 20000m³ = 75 samples
Drill rig to sample the remaining depths ≈ 43,500m³
≈ 163 samples.

75 = 0, 2, 4 @ 25 TPits.
163 = @ 56 TPits

Scale
HORZ 1:500
VERT 1:500
Chainage
Ch to Ch

Drawn:
Designed:
Modelled:
Project:

LEIGHTON
Fulton Hogan

Title
Mountain Way
Stockpile Work As Execute

Dwg. No.
1
Job No.
Issue

Date plotted: Tue Jun 24 13:24:25 2014

Hole	Sample	Depth
1	1	6m
8m	2	7m
	3	8m
2	4	6m
	5	7m
	6	8m
3	7	6m
8m	8	7m
	9	8m
4	10	6m
8m	11	7m
	12	8m
5	13	6m
8m	14	7m
	15	8m
6	16	6m
8m	17	7m
	18	8m
7	19	6m
8m	20	7m
	21	8m
8	22	6m
8m	23	7m
	24	8m
9	25	6m
8m	26	7m
	27	8m

Hole	Sample	Depth
10	28	6m
8m	29	7m
	30	8m
11	31	6m
8m	32	7m
	33	8m
12	34	6m
8m	35	7m
	36	8m
13	37	6m
8m	38	7m
	39	8m
14	40	6m
8m	41	7m
	42	8m
15	43	6m
8m	44	7m
	45	8m
16	46	6m
8m	47	7m
	48	8m
17	49	6m
8m	50	7m
	51	8m
18	52	6m
8m	53	7m
	54	8m

Hole	Sample	Depth
(19) 4m	55	6m
	56	7m
	57	8m
(20) 4m	58	6m
	59	7m
	60	8m
(21) 8m	61	6m
	62	7m
	63	8m
(22) 4m	64	6m
	65	7m
	66	8m
(23) 8m	67	6m
	68	7m
	69	8m
(24) 6m	70	6m
	71	7m
	72	8m
(25) 8m	73	6m
	74	7m
	75	8m
(26) 6.1	76	6m
	77	7m
	78	8m
(27) 8m	79	6m
	80	7m
	81	8m

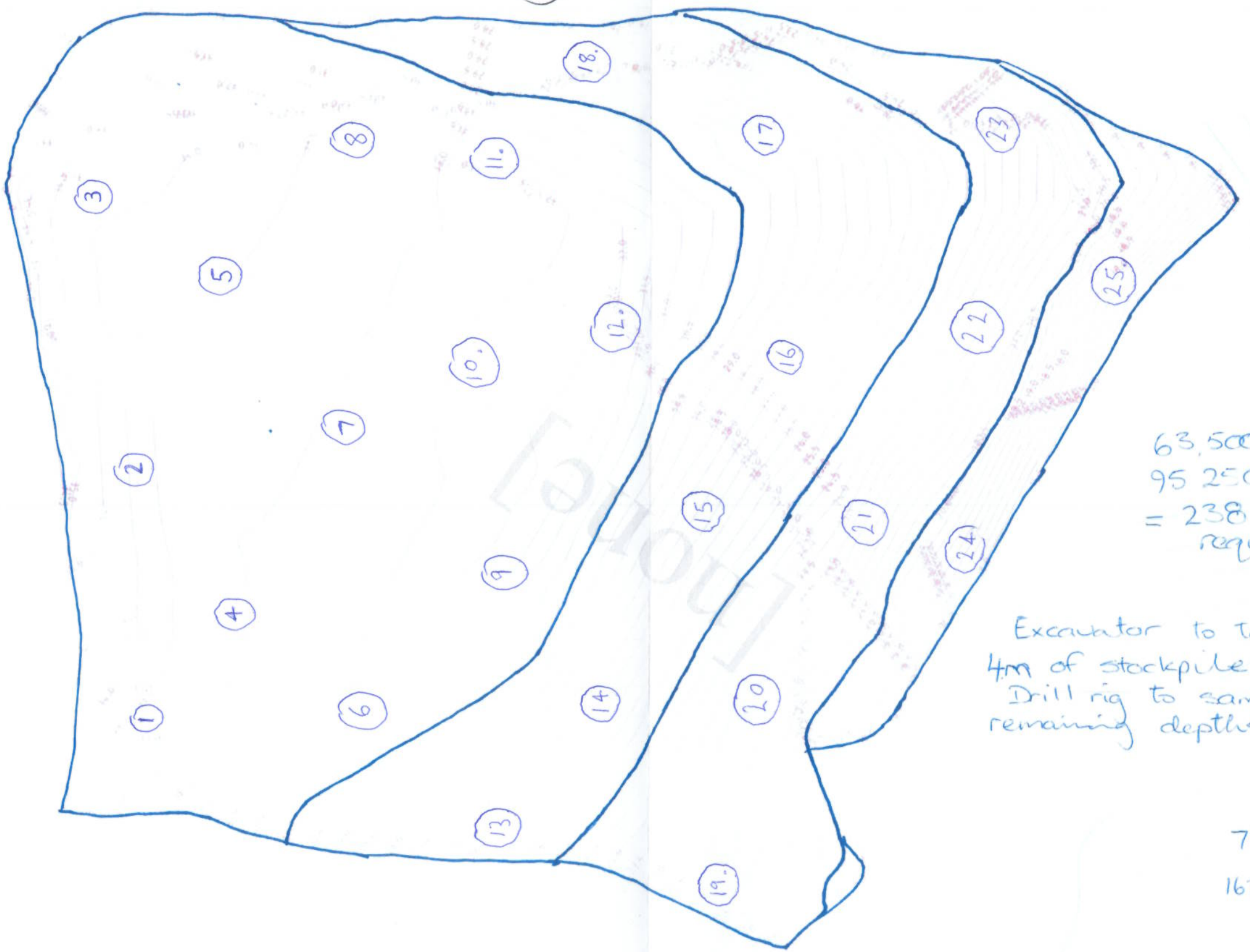
Hole	Sample	Depth
(28) 6m	82	6m
	83	7m
	84	8m
(29) 4m	85	6m
	86	7m
	87	8m
(30) 6m	88	6m
	89	7m
	90	8m
(31) 4m	91	6m
	92	7m
	93	8m
Section		2
(32) 12m	94	6m
	95	8m
	96	10m
	97	12m
(33) 12m	98	6m
	99	8m
	100	10m
	101	12m
(34) 12m	102	6m
	103	8m
	104	10m
	105	12m
(35) 12m	106	6m
	107	8m
	108	10m
	109	12m

Hole	Sample	Depth
36 12m	110	6m
	111	8m
	112	10m
	113	12m
37 12m	114	6m
	115	8m
	116	10m
	117	12m
38 12m	118	6m
	119	8m
	120	10m
	121	12m
39 12m	122	6m
	123	8m
	124	10m
	125	12m
40 12m	126	
	127	
	128	
	129	
41 12m	130	
	131	
	132	
	133	

Section 3

Hole	Sample	Depth
42 7m	134	
	135	
43 7m	136	
	137	
44 7m	138	5m
	139	7m
45 7m	140	5m
	141	7m
46 7m	142	5m
	143	7m
47 7m	144	5m
	145	7m
48 7m	146	5m
	147	7m
49 7m	148	5m
	149	7m
50 7m	150	5m
	151	7m
51 7m	152	5m
	153	7m
52 7m	154	5m
	155	7m
53 7m	156	5m
	157	7m
54 7m	158	5m
	159	7m
55 7m	160	5m
	161	7m
56 7m	162	5m
	163	7m

Excavator Samples (0 - 4m deep)



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95 250 t
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Scale
HORZ 1:500
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Chainage
Ch to Ch

Drawn
Designed
Modelled
Project

LEIGHTON
Fulton Hogan

Title
Mountain Way
Stockpile Work As Execute

Dwg. No.
1
Job No.
Issue

Date plotted: Tue Jun 24 13:24:25 2014

Hole	Sample (x2)	Depth (m)	Hole	Sample	Depth (m)
1.	75 | 164	0m	10.	48 | 191	0
	74 | 165	2m		47 | 192	2
	73 | 166	4m		46 | 193	4
2.	72 | 167	0	11.	45 | 194	0
	71 | 168	2		44 | 195	2
	70 | 169	4		43 | 196	4
3.	69 | 170	0	12.	42 | 197	0
	68 | 171	2		41 | 198	2
	67 | 172	4		40 | 199	4
4.	66 | 173	0	13.	39 | 200	0
	65 | 174	2		38 | 201	2
	64 | 175	4		37 | 202	4
5.	63 | 176	0	14.	36 | 203	0
	62 | 177	2		35 | 204	2
	61 | 178	4		34 | 205	4
6.	60 | 179	0	15.	33 | 206	0
	59 | 180	2		32 | 207	2
	58 | 181	4		31 | 208	4
7.	57 | 182	0	16.	30 | 209	0
	56 | 183	2		29 | 210	2
	55 | 184	4		28 | 211	4
8.	54 | 185	0	17.	27 | 212	0
	53 | 186	2		26 | 213	2
	52 | 187	4		25 | 214	4
9.	51 | 188	0	18.	24 | 215	0
	50 | 189	2		23 | 216	2
	49 | 190	4		22 | 217	4

Hole	Sample (x2)		Depth (m)	Hole	Sample (x2)		Depth (m)
19.	21	218	0m				
	20	219	2m				
	19	220	4m				
20.	221	218	0				
	222	217	2				
	223	216	4				
21.	224	215	0				
	225	214	2				
	226	213	4				
22.	227	212	0				
	228	211	2				
	229	210	4				
23.	230	209	0				
	231	208	2				
	232	207	4				
24.	233	206	0				
	234	205	2				
	235	204	4				
25.	236	203	0				
	237	202	2				
	238	201	4				

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 1 MtW 1	Sample 2 MtW 2	Sample 3 MtW 3	Sample 4 MtW 4	Sample 5 MtW 5	Sample 6 MtW 6	Sample 7 MtW 7	Sample 8 MtW 8	Sample 9 MtW 9	Sample 10 MtW 10	Sample 11 MtW 11	Sample 12 MtW 12	Sample 13 MtW 13	Sample 14 MtW 14	Sample 15 MtW 15	Sample 16 MtW 16	Sample 17 MtW 17
		Job No.	*D4495/1*	*D4495/2*	*D4495/3*	*D4495/4*	*D4495/5*	*D4495/6*	*D4495/7*	*D4495/8*	*D4495/9*	*D4495/10*	*D4495/11*	*D4495/12*	*D4495/13*	*D4495/14*	*D4495/15*	*D4495/16*	*D4495/17*
Moisture Content (% moisture)	..	Inhouse - 110˚C	24	22	20	20	20	21	14	21	21	19	19	18	17	20	17	22	21
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	12	9	12	10	9	8	10	9	11	6	9	10	14	7	14	10	11
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	19	17	17	22	20	20	22	21	20	20	21	20	22	21	21	18	21
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	12	12	13	13	13	12	14	13	14	10	12	14	14	32	18	19	14
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	10	7	9	16	15	13	19	16	14	10	17	12	13	13	13	11	11
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	4	3	4	5	6	6	7	7	6	5	6	6	7	8	6	6	6
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	26	26	27	36	43	38	49	42	36	33	41	34	46	38	40	37	34
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.16	0.12	0.21	0.25	0.19	0.19	0.08	0.16	0.16	0.07	0.11	0.13	0.08	0.08	0.14	0.10	0.10
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.88	5.86	5.89	5.70	5.83	5.76	6.32	5.98	5.68	6.35	6.23	5.86	6.38	6.16	5.47	6.39	6.32
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 18 MtW 18	Sample 19 MtW 19	Sample 20 MtW 20	Sample 21 MtW 21	Sample 22 MtW 22	Sample 23 MtW 23	Sample 24 MtW 24	Sample 25 MtW 25	Sample 26 MtW 26	Sample 27 MtW 27	Sample 28 MtW 28	Sample 29 MtW 29	Sample 30 MtW 30	Sample 31 MtW 31	Sample 32 MtW 32	Sample 33 MtW 33	Sample 34 MtW 34
		Job No.	*D4495/18*	*D4495/19*	*D4495/20*	*D4495/21*	*D4495/22*	*D4495/23*	*D4495/24*	*D4495/25*	*D4495/26*	*D4495/27*	*D4495/28*	*D4495/29*	*D4495/30*	*D4495/31*	*D4495/32*	*D4495/33*	*D4495/34*
Moisture Content (% moisture)	..	Inhouse - 110˚C	24	21	23	24	22	23	27	24	26	26	25	33	27	27	21	25	20
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	23	13	**43**	37	17	36	34	40	38	18	23	20	19	26	19	16	7
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	20	19	23	19	23	21	19	22	19	13	19	17	18	22	15	22	15
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	0.1	0.1	<0.1	0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	13	10	7	13	30	11	11	9	14	12	17	10	15	14	17	17
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	12	13	13	9	13	10	10	12	11	6	14	15	10	15	8	9	7
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	4	6	4	3	5	4	4	4	4	3	5	7	4	7	4	3	4
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	36	37	40	37	39	35	35	36	34	19	39	42	33	44	27	36	23
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.08	0.10	0.13	0.13	0.22	0.09	0.12	0.11	0.10	0.12	0.11	0.71	0.13	0.26	0.79	0.18	0.11
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.83	6.20	6.38	6.48	5.67	6.23	6.15	6.35	6.14	5.61	6.21	5.07	5.68	5.78	5.41	6.16	6.17
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 35 MtW 35	Sample 36 MtW 36	Sample 37 MtW 37	Sample 38 MtW 38	Sample 39 MtW 39	Sample 40 MtW 40	Sample 41 MtW 41	Sample 42 MtW 42	Sample 43 MtW 43	Sample 44 MtW 44	Sample 45 MtW 45	Sample 46 MtW 46	Sample 47 MtW 47	Sample 48 MtW 48	Sample 49 MtW 49	Sample 50 MtW 50	Sample 51 MtW 51
		Job No.	*D4495/35*	*D4495/36*	*D4495/37*	*D4495/38*	*D4495/39*	*D4495/40*	*D4495/41*	*D4495/42*	*D4495/43*	*D4495/44*	*D4495/45*	*D4495/46*	*D4495/47*	*D4495/48*	*D4495/49*	*D4495/50*	*D4495/51*
Moisture Content (% moisture)	..	Inhouse - 110˚C	22	20	22	28	25	20	28	32	23	23	22	21	20	22	22	20	18
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	11	7	8	10	12	9	12	11	10	22	12	12	10	11	9	13	9
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	20	18	14	21	16	18	18	20	19	22	21	17	19	22	18	18
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	16	13	14	13	16	14	17	15	15	15	15	19	16	18	18	22	18
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	7	14	8	6	23	9	9	9	8	9	8	8	7	10	7	8	9
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	4	6	4	3	5	4	4	4	5	4	4	4	4	6	5	5	6
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	27	32	30	23	29	29	26	33	29	31	29	28	26	34	29	30	31
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.09	0.15	0.09	0.12	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.13	0.11	0.10	0.09	0.15
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.69	5.47	5.96	6.17	5.81	6.09	6.01	6.05	6.21	6.02	5.98	6.16	5.97	5.61	6.06	5.65	5.71
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	**0.9**	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 52 MtW 164	Sample 53 MtW 165	Sample 54 MtW 166	Sample 55 MtW 167	Sample 56 MtW 168	Sample 57 MtW 169	Sample 58 MtW 170	Sample 59 MtW 171	Sample 60 MtW 172	Sample 61 MtW 173	Sample 62 MtW 174	Sample 63 MtW 175	Sample 64 MtW 176	Sample 65 MtW 177	Sample 66 MtW 178	Sample 67 MtW 179	Sample 68 MtW 180
		Job No.	*D4495/52*	*D4495/53*	*D4495/54*	*D4495/55*	*D4495/56*	*D4495/57*	*D4495/58*	*D4495/59*	*D4495/60*	*D4495/61*	*D4495/62*	*D4495/63*	*D4495/64*	*D4495/65*	*D4495/66*	*D4495/67*	*D4495/68*
Moisture Content (% moisture)	..	Inhouse - 110˚C	13	16	14	4	10	10	11	22	20	12	21	16	10	22	23	13	23
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	11	11	9	13	3	7	9	23	14	10	9	10	14	14	**80**	11	8
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	20	20	13	23	18	15	17	28	21	20	14	17	22	22	19	23	17
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	14	8	15	10	10	13	12	11	17	18	18	14	14	13	14	12
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	14	18	13	23	41	24	11	12	21	16	9	13	19	17	15	24	13
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	6	7	3	8	5	5	5	6	5	7	5	6	7	10	7	9	6
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	38	50	28	55	58	54	35	46	62	40	30	29	47	56	51	59	33
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.12	0.13	0.06	0.34	0.03	0.06	0.16	0.07	0.07	0.47	0.07	0.13	0.34	0.20	0.07	0.13	0.06
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.67	5.99	5.10	5.54	5.52	5.26	5.57	6.07	5.34	5.23	5.65	5.26	5.65	4.94	6.31	5.94	6.02
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 69 MtW 181	Sample 70 MtW 182	Sample 71 MtW 183	Sample 72 MtW 184	Sample 73 MtW 185	Sample 74 MtW 186	Sample 75 MtW 187	Sample 76 MtW 188	Sample 77 MtW 189	Sample 78 MtW 190	Sample 79 MtW 191	Sample 80 MtW 192	Sample 81 MtW 193	Sample 82 MtW 194	Sample 83 MtW 195	Sample 84 MtW 196	Sample 85 MtW 197
		Job No.	*D4495/69*	*D4495/70*	*D4495/71*	*D4495/72*	*D4495/73*	*D4495/74*	*D4495/75*	*D4495/76*	*D4495/77*	*D4495/78*	*D4495/79*	*D4495/80*	*D4495/81*	*D4495/82*	*D4495/83*	*D4495/84*	*D4495/85*
Moisture Content (% moisture)	..	Inhouse - 110˚C	16	14	16	17	10	20	23	16	22	22	11	20	18	9	23	12	6
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	13	19	23	17	17	20	15	10	16	30	10	10	11	11	8	11	11
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	20	20	20	17	28	24	23	21	24	21	22	19	23	27	35	23
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	0.1	0.1	<0.1	0.1	0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	12	12	14	14	13	17	13	13	17	22	14	15	17	14	9	10	14
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	26	14	15	18	11	11	11	18	15	14	13	10	9	17	13	16	24
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	7	5	6	6	4	6	4	7	5	7	6	5	5	7	4	5	9
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	59	44	44	50	31	43	35	51	45	46	39	38	31	50	48	43	59
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.11	0.17	0.15	0.16	0.18	0.07	0.07	0.27	0.10	0.10	0.20	0.11	0.06	0.20	0.07	0.10	0.21
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.16	5.67	5.99	5.54	5.76	6.00	5.92	5.81	6.01	6.07	5.89	6.64	5.65	5.97	6.43	6.28	5.95
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.2**	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	**0.7**	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 86 MtW 198	Sample 87 MtW 199	Sample 88 MtW 200	Sample 89 MtW 201	Sample 90 MtW 202	Sample 91 MtW 203	Sample 92 MtW 204	Sample 93 MtW 205	Sample 94 MtW 206	Sample 95 MtW 207	Sample 96 MtW 208	Sample 97 MtW 209	Sample 98 MtW 210	Sample 99 MtW 211	Sample 100 MtW 212	Sample 101 MtW 213	Sample 102 MtW 214
		Job No.	*D4495/86*	*D4495/87*	*D4495/88*	*D4495/89*	*D4495/90*	*D4495/91*	*D4495/92*	*D4495/93*	*D4495/94*	*D4495/95*	*D4495/96*	*D4495/97*	*D4495/98*	*D4495/99*	*D4495/100*	*D4495/101*	*D4495/102*
Moisture Content (% moisture)	..	Inhouse - 110˚C	22	23	10	21	17	3	19	19	5	18	17	3	22	21	6	15	23
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	13	10	14	10	13	14	7	10	18	11	13	11	10	13	9	10	7
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	25	24	18	18	21	21	17	15	19	22	23	23	12	15	20	23	12
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	14	13	13	12	14	19	10	11	13	13	16	14	13	16	15	17	26
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	20	20	13	12	17	15	4	4	11	21	23	12	8	5	16	19	11
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	10	10	5	5	6	7	3	3	5	7	8	5	4	3	7	7	6
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	52	48	38	41	44	43	19	19	35	49	56	39	33	18	42	47	25
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.06	0.06	0.31	0.22	0.18	0.21	0.09	0.10	0.29	0.15	0.15	0.21	0.07	0.13	0.30	0.27	0.08
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	6.37	6.26	5.54	5.88	6.13	5.47	5.91	5.96	5.77	6.11	6.02	5.88	6.24	6.60	5.73	6.62	6.27
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 103 MtW 215	Sample 104 MtW 216	Sample 105 MtW 217	Sample 106 MtW 218	Sample 107 MtW 219	Sample 108 MtW 220	Sample 109 MtW 221	Sample 110 MtW 222	Sample 111 MtW 223	Sample 112 MtW 224	Sample 113 MtW 225	Sample 114 MtW 226	Sample 115 MtW 227	Sample 116 MtW 228	Sample 117 MtW 229	Sample 118 MtW 230	Sample 119 MtW 231
		Job No.	*D4495/103*	*D4495/104*	*D4495/105*	*D4495/106*	*D4495/107*	*D4495/108*	*D4495/109*	*D4495/110*	*D4495/111*	*D4495/112*	*D4495/113*	*D4495/114*	*D4495/115*	*D4495/116*	*D4495/117*	*D4495/118*	*D4495/119*
Moisture Content (% moisture)	..	Inhouse - 110˚C	7	17	19	7	21	13	10	16	16	6	20	21	4	24	27	8	19
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	11	10	16	10	12	10	10	10	10	9	9	9	8	7	6	11	12
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	21	19	19	20	21	21	20	22	23	23	26	21	19	15	15	23	18
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	11	13	13	9	14	13	12	14	14	12	16	16	13	25	14	18
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	13	12	13	13	12	17	13	22	24	20	17	14	12	6	10	19	13
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	6	5	6	5	4	7	5	7	9	8	10	7	6	3	8	7	4
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	35	39	41	36	40	46	44	53	61	50	56	39	35	21	26	49	23
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.11	0.21	0.24	0.36	0.24	0.20	0.16	0.12	0.13	0.28	0.17	0.20	0.25	0.07	0.06	0.66	0.11
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.98	6.12	6.70	5.76	7.08	6.96	5.82	6.00	6.34	5.91	6.14	5.61	5.86	6.17	6.14	6.14	5.50
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	**0.1**	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	**0.2**	**0.2**	**0.8**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**1.0**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	**0.2**	**0.2**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	**0.3**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.6**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	**0.6**	**0.5**	**3.1**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	**5.0**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	**0.1**	**0.1**	**0.2**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.4**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

126 samples supplied by Leighton Fulton Hogan Joint Venture on the 1st July, 2014. Job Number: D4495
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 120 MtW 232	Sample 121 MtW 233	Sample 122 MtW 234	Sample 123 MtW 235	Sample 124 MtW 236	Sample 125 MtW 237	Sample 126 MtW 238	MIN	MAX	AVERAGE	ENM - Col 2 AVERAGE	ENM - Col 3 MAX
		Job No.	D4495/120	D4495/121	D4495/122	D4495/123	D4495/124	D4495/125	D4495/126				see note 2	see note 2
Moisture Content (% moisture)	..	Inhouse - 110˚C	21	11	20	14	7	16	20	3	33	18	..	..
METALS														
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	9	10	9	11	10	30	6	3	80	14	20	40
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	23	22	20	22	20	22	22	12	35	20	50	100
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	0.1	<0.1	0.5	1.0
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	14	13	12	10	15	13	12	7	32	14	75	150
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	24	13	14	13	18	16	14	4	41	14	100	200
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	9	5	5	6	7	5	7	3	10	6	30	60
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	70	37	34	40	46	37	38	18	70	39	150	300
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.2	0.08	0.5	1.0
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.18	0.19	0.07	0.07	0.41	0.08	0.05	0.03	0.79	0.16	1.5	3.0
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.92	5.75	6.19	6.59	5.96	6.09	6.27	4.94	7.08	5.95	5 - 9	4.5 - 10
Polycyclic Aromatic Hydrocarbons (PAH)														
Naphthalene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Acenaphthylene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Acenaphthene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Fluorene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Phenanthrene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	..	..	..
Anthracene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Fluoranthene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.0	..	..	..
Pyrene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	..	..	..
Benz(a)anthracene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	..	..	..
Chrysene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	..	..	..
Benzo(b)&(k)flouranthene (mg/Kg)	..	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.6	..	..	..
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	..	..	..
Dibenz(a,h)anthracene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Benzo(g,h,I)perylene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	..	..	..
Sum of reported PAHs (mg/Kg)	11	c	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	5.0	<1.0	20	40
Benzo(a)pyrene (mg/Kg)	12	c	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.4	<0.5	0.5	1.0
HYDROCARBON ANALYSIS RESULTS														
BTEX														
Benzene (mg/Kg)	13	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	..	..	0.5
Toluene (mg/Kg)	14	c	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	..	..	65
Ethylbenzene (mg/Kg)	15	c	<1	<1	<1	<1	<1	<1	<1	<1	<1	..	..	25
m+p-Xylene (mg/Kg)	16	c	<2	<2	<2	<2	<2	<2	<2	<2	<2	..	..	15
o-Xylene (mg/Kg))		c	<1	<1	<1	<1	<1	<1	<1	<1	<1	..	..	
Naphthalene (mg/Kg)	..	c	<1	<1	<1	<1	<1	<1	<1	<1	<1	..	..	..
Total Recoverable Hydrocarbons														
C10-C14 Fraction (mg/Kg)	..	c	<50	<50	<50	<50	<50	<50	<50	<50	<50	..	..	..
C15-C28 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
C29-C36 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
Sum of C10-C36 (mg/Kg)	17	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	<250	250	500
C10-C16 Fraction (mg/Kg)	..	c	<50	<50	<50	<50	<50	<50	<50	<50	<50	..	..	..
C10-C16 less Naphthalene Fraction (mg/Kg)	..	c	<50	<50	<50	<50	<50	<50	<50	<50	<50	..	..	..
C16-C34 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
C34-C40 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	** As per RTA T276	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112521

NOTES

1. DW = Dry Weight. na = no guidelines available
2. ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005
(The Excavation Natural Material Exemption 2012)
3. For statistical purposes, half detection limit replaced with samples NOT DETECTED
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 1 MtW 52	Sample 2 MtW 53	Sample 3 MtW 54	Sample 4 MtW 55	Sample 5 MtW 56	Sample 6 MtW 57	Sample 7 MtW 58	Sample 8 MtW 59	Sample 9 MtW 60	Sample 10 MtW 61	Sample 11 MtW 62	Sample 12 MtW 63	Sample 13 MtW 64	Sample 14 MtW 65	Sample 15 MtW 66	Sample 16 MtW 67	Sample 17 MtW 68
		Job No.	*D4685/1*	*D4685/2*	*D4685/3*	*D4685/4*	*D4685/5*	*D4685/6*	*D4685/7*	*D4685/8*	*D4685/9*	*D4685/10*	*D4685/11*	*D4685/12*	*D4685/13*	*D4685/14*	*D4685/15*	*D4685/16*	*D4685/17*
Moisture Content (% moisture)	..	Inhouse - 110˚C	21	20	21	21	18	21	21	25	26	23	21	22	19	20	21	22	22
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	<1	9	9	10	11	8	8	12	14	19	11	25	10	33	**51**	25	17
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	<1	19	19	21	20	17	14	22	28	31	21	28	33	33	26	20	22
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	<1	16	18	17	13	12	13	19	18	16	15	16	18	17	26	14	15
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	<1	10	11	12	6	5	7	16	15	12	12	13	11	13	13	12	15
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	<1	4	6	6	3	3	4	7	5	4	4	5	4	4	5	4	5
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	<1	29	29	37	28	20	26	43	43	43	36	52	52	46	172	35	41
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.09	0.11	0.10	0.16	0.12	0.10	0.12	1.04	0.29	0.18	0.16	0.13	0.10	0.08	0.10	0.06	0.06
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.85	5.78	5.30	5.08	6.13	6.03	6.25	4.61	5.46	6.08	5.83	5.99	6.61	6.09	5.62	5.77	5.84
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	**0.1**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112912

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. *DW = Dry Weight. na = no guidelines available*
2. *ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005*
(The Excavation Natural Material Exemption 2012)
3. *For statistical purposes, half detection limit replaced with samples NOT DETECTED*
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 18 MtW 69	Sample 19 MtW 70	Sample 20 MtW 71	Sample 21 MtW 72	Sample 22 MtW 73	Sample 23 MtW 74	Sample 24 MtW 75	Sample 25 MtW 76	Sample 26 MtW 77	Sample 27 MtW 78	Sample 28 MtW 79	Sample 29 MtW 80	Sample 30 MtW 81	Sample 31 MtW 82	Sample 32 MtW 83	Sample 33 MtW 84	Sample 34 MtW 85
		Job No.	*D4685/18*	*D4685/19*	*D4685/20*	*D4685/21*	*D4685/22*	*D4685/23*	*D4685/24*	*D4685/25*	*D4685/26*	*D4685/27*	*D4685/28*	*D4685/29*	*D4685/30*	*D4685/31*	*D4685/32*	*D4685/33*	*D4685/34*
Moisture Content (% moisture)	..	Inhouse - 110˚C	23	21	23	22	21	19	21	19	18	25	18	19	21	21	19	24	23
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	21	15	20	34	11	10	16	10	10	14	11	9	7	10	12	14	9
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	23	22	22	23	27	26	21	37	33	25	30	21	20	25	22	31
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	13	18	17	18	14	17	24	13	16	23	18	20	14	14	18	17	20
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	9	9	14	14	15	23	20	14	34	28	21	24	16	18	17	15	19
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	3	4	5	5	6	7	8	6	8	9	8	8	6	6	7	6	8
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	35	27	33	38	40	55	48	43	76	68	53	57	36	44	47	45	52
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	0.1	<0.1	0.1	0.1	<0.1	0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	<0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.08	0.08	0.06	0.06	0.42	0.13	0.07	0.10	0.07	0.13	0.09	0.07	0.06	0.09	0.07	0.08	0.08
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	6.06	5.37	5.95	5.92	5.81	5.57	5.11	5.94	5.56	5.56	5.58	5.35	5.69	5.35	5.59	5.56	5.28
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.2**	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**	**0.3**	<0.1	**0.1**
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**	**0.3**	<0.1	**0.1**
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.3**	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.1**	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.1**	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	**0.7**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	**2.1**	**0.1**	Not Detected	**0.4**
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.2**	**1.10**	<0.05	**0.1**
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112912

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. *DW = Dry Weight. na = no guidelines available*
2. *ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005 (The Excavation Natural Material Exemption 2012)*
3. *For statistical purposes, half detection limit replaced with samples NOT DETECTED*
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 35 MtW 86	Sample 36 MtW 87	Sample 37 MtW 88	Sample 38 MtW 89	Sample 39 MtW 90	Sample 40 MtW 91	Sample 41 MtW 92	Sample 42 MtW 93	Sample 43 MtW 94	Sample 44 MtW 95	Sample 45 MtW 96	Sample 46 MtW 97	Sample 47 MtW 98	Sample 48 MtW 99	Sample 49 MtW 100	Sample 50 MtW 101	Sample 51 MtW 102
		Job No.	*D4685/35*	*D4685/36*	*D4685/37*	*D4685/38*	*D4685/39*	*D4685/40*	*D4685/41*	*D4685/42*	*D4685/43*	*D4685/44*	*D4685/45*	*D4685/46*	*D4685/47*	*D4685/48*	*D4685/49*	*D4685/50*	*D4685/51*
Moisture Content (% moisture)	..	Inhouse - 110˚C	22	15	20	20	18	22	21	20	20	19	20	21	17	21	20	27	19
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	7	11	8	9	15	14	14	8	8	15	17	9	10	13	**67**	8
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	29	17	28	23	25	24	21	20	21	22	24	23	22	22	21	25	24
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	19	14	17	17	18	21	19	20	20	17	20	19	18	20	20	14	17
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	17	15	17	16	14	15	14	16	13	18	18	16	22	18	14	15	19
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	5	6	6	8	7	10	7	8	6	7	9	7	7	8	7	6	13
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	48	184	47	37	41	43	40	42	31	39	46	43	46	44	39	40	42
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	0.5	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.08	0.08	0.07	0.07	0.07	0.07	0.09	0.07	0.37	0.23	0.10	0.10	0.14	0.12	0.12	0.06	0.12
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.46	6.05	5.37	5.62	5.43	5.57	6.13	5.51	6.58	5.70	5.18	5.18	5.34	5.17	5.40	5.80	5.29
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112912

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. *DW = Dry Weight. na = no guidelines available*
2. *ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005*
(The Excavation Natural Material Exemption 2012)
3. *For statistical purposes, half detection limit replaced with samples NOT DETECTED*
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 52 MtW 103	Sample 53 MtW 104	Sample 54 MtW 105	Sample 55 MtW 106	Sample 56 MtW 107	Sample 57 MtW 108	Sample 58 MtW 109	Sample 59 MtW 110	Sample 60 MtW 111	Sample 61 MtW 112	Sample 62 MtW 113	Sample 63 MtW 114	Sample 64 MtW 115	Sample 65 MtW 116	Sample 66 MtW 117	Sample 67 MtW 118	Sample 68 MtW 119
		Job No.	*D4685/52*	*D4685/53*	*D4685/54*	*D4685/55*	*D4685/56*	*D4685/57*	*D4685/58*	*D4685/59*	*D4685/60*	*D4685/61*	*D4685/62*	*D4685/63*	*D4685/64*	*D4685/65*	*D4685/66*	*D4685/67*	*D4685/68*
Moisture Content (% moisture)	..	Inhouse - 110˚C	21	16	31	19	20	29	20	17	21	20	20	19	20	19	20	19	18
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	9	16	**117**	12	9	10	25	9	9	27	12	9	8	26	9	7	9
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	20	25	33	22	21	22	22	21	19	23	19	20	17	19	18	19	20
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	18	21	13	17	18	17	14	15	19	15	13	16	15	18	14	16	16
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	18	13	24	18	15	15	17	18	16	15	16	16	12	14	17	7	19
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	7	5	7	6	7	7	6	7	7	6	5	6	5	6	6	3	7
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	39	52	51	40	38	39	39	41	38	38	35	35	27	34	38	16	38
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	<0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.13	0.10	0.07	0.09	0.10	0.11	0.07	0.11	0.09	0.08	0.08	0.36	0.12	0.13	0.09	0.09	0.10
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.04	5.24	5.85	5.44	5.54	5.42	5.62	5.21	5.42	5.89	5.49	5.38	5.05	5.47	5.34	5.44	5.48
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	**0.1**	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	**0.1**	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	**0.2**	Not Detected	**0.3**	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112912

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. *DW = Dry Weight. na = no guidelines available*
2. *ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005*
(The Excavation Natural Material Exemption 2012)
3. *For statistical purposes, half detection limit replaced with samples NOT DETECTED*
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 69 MtW 120	Sample 70 MtW 121	Sample 71 MtW 122	Sample 72 MtW 123	Sample 73 MtW 124	Sample 74 MtW 125	Sample 75 MtW 126	Sample 76 MtW 127	Sample 77 MtW 128	Sample 78 MtW 129	Sample 79 MtW 130	Sample 80 MtW 131	Sample 81 MtW 132	Sample 82 MtW 133	Sample 83 MtW 134	Sample 84 MtW 135	Sample 85 MtW 136
		Job No.	*D4685/69*	*D4685/70*	*D4685/71*	*D4685/72*	*D4685/73*	*D4685/74*	*D4685/75*	*D4685/76*	*D4685/77*	*D4685/78*	*D4685/79*	*D4685/80*	*D4685/81*	*D4685/82*	*D4685/83*	*D4685/84*	*D4685/85*
Moisture Content (% moisture)	..	Inhouse - 110˚C	19	19	23	23	29	29	22	22	23	43	22	21	21	22	19	20	17
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	9	8	10	15	13	13	9	9	14	13	11	10	14	13	9	10	8
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	19	19	18	21	20	19	19	19	19	21	21	19	19	20	23	23	19
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	18	15	15	15	17	16	12	11	16	15	16	15	20	18	16	16	17
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	12	14	14	18	15	13	15	18	14	15	14	14	13	12	24	19	18
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	6	6	7	8	6	5	5	6	5	6	7	6	5	4	7	8	5
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	30	37	42	44	36	35	31	41	35	36	37	34	33	29	43	50	39
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.11	0.09	0.08	0.13	0.15	0.20	0.79	0.89	0.64	0.47	0.62	0.37	0.12	0.40	0.08	0.06	0.09
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.34	5.44	5.35	5.44	5.43	6.27	6.13	6.04	5.61	5.85	5.64	5.68	5.04	4.83	5.21	5.99	4.99
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	Not Detected	**0.1**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	**0.3**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112912

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. *DW = Dry Weight. na = no guidelines available*
2. *ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005*
(The Excavation Natural Material Exemption 2012)
3. *For statistical purposes, half detection limit replaced with samples NOT DETECTED*
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

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checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 86 MtW 137	Sample 87 MtW 138	Sample 88 MtW 139	Sample 89 MtW 140	Sample 90 MtW 141	Sample 91 MtW 142	Sample 92 MtW 143	Sample 93 MtW 144	Sample 94 MtW 145	Sample 95 MtW 146	Sample 96 MtW 147	Sample 97 MtW 148	Sample 98 MtW 149	Sample 99 MtW 150	Sample 100 MtW 151	Sample 101 MtW 152	Sample 102 MtW 153
		Job No.	*D4685/86*	*D4685/87*	*D4685/88*	*D4685/89*	*D4685/90*	*D4685/91*	*D4685/92*	*D4685/93*	*D4685/94*	*D4685/95*	*D4685/96*	*D4685/97*	*D4685/98*	*D4685/99*	*D4685/100*	*D4685/101*	*D4685/102*
Moisture Content (% moisture)	..	Inhouse - 110˚C	20	20	15	26	26	27	20	19	20	20	19	20	19	23	16	18	17
METALS																			
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	9	9	8	10	7	10	11	8	7	8	11	7	10	11	6	8	8
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	23	24	26	24	22	24	18	20	16	24	83	17	30	14	19	22	27
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	15	19	20	17	22	21	16	17	20	19	20	20	18	26	15	20	18
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	21	13	20	29	17	19	13	11	11	15	25	17	18	7	16	13	19
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	7	5	7	10	7	8	6	5	4	6	9	8	6	3	6	5	7
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	48	30	44	57	34	41	35	28	22	33	58	40	40	16	28	26	39
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.08	0.10	0.10	0.10	0.11	0.11	0.61	0.25	0.13	0.09	0.10	0.14	0.15	0.10	0.08	0.99	0.09
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.58	5.11	5.09	5.37	5.52	5.06	5.06	4.93	5.24	5.15	5.65	5.87	5.30	5.03	5.36	5.03	5.74
Polycyclic Aromatic Hydrocarbons (PAH)																			
Naphthalene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene (mg/Kg)	..	*c*	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	**0.7**	<0.1	**0.3**	<0.1	<0.1	<0.1	**0.5**
Anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene (mg/Kg)	..	*c*	<0.1	**0.2**	**0.1**	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	**0.4**	**1.3**	<0.1	**0.8**	<0.1	<0.1	**0.1**	**1.0**
Pyrene (mg/Kg)	..	*c*	<0.1	**0.2**	**0.1**	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	**0.4**	**1.4**	<0.1	**0.8**	<0.1	<0.1	**0.1**	**1.0**
Benz(a)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	**0.4**	<0.1	**0.2**	<0.1	<0.1	<0.1	**0.2**
Chrysene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	**0.4**	<0.1	**0.2**	<0.1	<0.1	<0.1	**0.3**
Benzo(b)&(k)flouranthene (mg/Kg)	..	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	**0.2**	**0.8**	<0.2	**0.4**	<0.2	<0.2	<0.2	**0.5**
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	**0.4**	<0.1	**0.2**	<0.1	<0.1	<0.1	**0.2**
Dibenz(a,h)anthracene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene (mg/Kg)	..	*c*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	**0.5**	<0.1	**0.3**	<0.1	<0.1	<0.1	**0.3**
Sum of reported PAHs (mg/Kg)	11	*c*	Not Detected	**0.5**	**0.3**	Not Detected	Not Detected	**0.5**	Not Detected	Not Detected	Not Detected	**1.8**	**6.6**	Not Detected	**3.5**	Not Detected	Not Detected	**0.3**	**4.3**
Benzo(a)pyrene (mg/Kg)	12	*c*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	**0.5**	<0.05	**0.3**	<0.05	<0.05	<0.05	**0.3**
HYDROCARBON ANALYSIS RESULTS																			
BTEX																			
Benzene (mg/Kg)	13	*c*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene (mg/Kg)	14	*c*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene (mg/Kg)	15	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-Xylene (mg/Kg)	16	*c*	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene (mg/Kg))		*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene (mg/Kg)	..	*c*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Recoverable Hydrocarbons																			
C10-C14 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15-C28 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C29-C36 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sum of C10-C36 (mg/Kg)	17	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C10-C16 Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C10-C16 less Naphthalene Fraction (mg/Kg)	..	*c*	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C16-C34 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
C34-C40 Fraction (mg/Kg)	..	*c*	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	*** As per RTA T276*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

METHODS REFERENCE

a. 1:3Nitric/HCl digest - APHA 3125 ICPMS
b. 1:3Nitric/HCl digest - APHA 3120 ICPOES
c. Analysis sub-contracted - Envirolab Report No. 112912

NATA
Accreditation No. 14960.
Accredited for compliance with ISO/IEC 17025.

NOTES

1. *DW = Dry Weight. na = no guidelines available*
2. *ENM Guidelines - Protection of the Environment Operations (Waste) Regulation 2005*
(The Excavation Natural Material Exemption 2012)
3. *For statistical purposes, half detection limit replaced with samples NOT DETECTED*
4. ** denotes these test procedures are as yet not NATA accredited but quality control data is available

Environmental Analysis Laboratory, Southern Cross University,
Tel. 02 6620 3678, website: scu.edu.au/eal

checked: .....
Graham Lancaster (Nata signatory)
Laboratory Manager

RESULTS OF SOIL ANALYSIS

113 samples supplied by Leighton Fulton Hogan Joint Venture on the 9th July, 2014. Job Number: D4685
Analysis requested by James Diamond. **Your Project: C280-241**
(Po Box 9090, MOONEE BEACH NSW 2450).

	S2W ENM Number	Method	Sample 103 MtW 154	Sample 104 MtW 155	Sample 105 MtW 156	Sample 106 MtW 157	Sample 107 MtW 158	Sample 108 MtW 159	Sample 109 MtW 160	Sample 110 MtW 161	Sample 111 MtW 162	Sample 112 MtW 163	Sample 113 MtW 164	MIN	MAX	AVERAGE	ENM - Col 2 AVERAGE	ENM - Col 3 MAX
		Job No.	D4685/103	D4685/104	D4685/105	D4685/106	D4685/107	D4685/108	D4685/109	D4685/110	D4685/111	D4685/112	D4685/113				see note 2	see note 2
Moisture Content (% moisture)	..	Inhouse - 110°C	17	21	21	21	19	18	21	20	20	20	18	15	43	21	..	..
METALS																		
Arsenic (mg/Kg)	4	1:3Nitric/HCl digest - APHA 3120 ICPMS	8	10	8	8	10	7	8	15	8	7	8	6	117	13	20	40
Lead (mg/Kg)	3	1:3Nitric/HCl digest - APHA 3120 ICPMS	21	29	20	27	40	23	19	26	26	20	18	14	83	23	50	100
Cadmium (mg/Kg)	2	1:3Nitric/HCl digest - APHA 3120 ICPMS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.2	0.1	0.5	1.0
Chromium (mg/Kg)	5	1:3Nitric/HCl digest - APHA 3120 ICPMS	18	18	18	17	16	15	17	14	16	13	13	11	26	17	75	150
Copper (mg/Kg)	6	1:3Nitric/HCl digest - APHA 3120 ICPMS	15	26	13	25	25	16	13	28	15	10	11	5	34	16	100	200
Nickel (mg/Kg)	7	1:3Nitric/HCl digest - APHA 3120 ICPMS	6	8	4	7	8	7	7	7	6	4	5	3	13	6	30	60
Zinc (mg/Kg)	8	1:3Nitric/HCl digest - APHA 3120 ICPMS	31	43	24	46	48	38	37	55	40	22	28	16	184	42	150	300
Mercury (mg/Kg)	1	1:3Nitric/HCl digest - APHA 3120 ICPMS	0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.54	0.10	0.5	1.0
Soil Conductivity (1:5 water dS/m)	9	Rayment and Higginson 4B1	0.07	0.07	0.17	0.07	0.12	0.10	0.09	0.05	0.08	0.07	0.09	0.05	1.04	0.16	1.5	3.0
Soil pH (1:5 water)	10	Rayment and Higginson 4A1	5.52	6.03	5.06	5.57	5.58	5.55	5.51	5.41	5.85	5.07	5.59	4.61	6.61	5.54	5 - 9	4.5 - 10
Polycyclic Aromatic Hydrocarbons (PAH)																		
Naphthalene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Acenaphthylene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Acenaphthene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Fluorene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Phenanthrene (mg/Kg)	..	c	<0.1	<0.1	**0.1**	<0.1	<0.1	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	..	..	..
Anthracene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	..	..	..
Fluoranthene (mg/Kg)	..	c	**0.2**	<0.1	**0.3**	<0.1	<0.1	**0.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	..	..	..
Pyrene (mg/Kg)	..	c	**0.2**	<0.1	**0.3**	<0.1	<0.1	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	..	..	..
Benz(a)anthracene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	..	..	..
Chrysene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	..	..	..
Benzo(b)&(k)flouranthene (mg/Kg)	..	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	..	..	..
Indeno(1,2,3-c,d)pyrene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	..	..	..
Dibenz(a,h)anthracene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	..	..	..
Benzo(g,h,i)perylene (mg/Kg)	..	c	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	..	..	..
Sum of reported PAHs (mg/Kg)	11	c	**0.4**	Not Detected	**0.7**	Not Detected	Not Detected	**1.1**	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	6.6	<1.0	20	40
Benzo(a)pyrene (mg/Kg)	12	c	**0.1**	<0.05	<0.05	<0.05	<0.05	**0.1**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.1	<0.5	0.5	1.0
HYDROCARBON ANALYSIS RESULTS																		
BTEX																		
Benzene (mg/Kg)	13	c	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	..	..	0.5
Toluene (mg/Kg)	14	c	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	..	..	65
Ethylbenzene (mg/Kg)	15	c	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	..	..	25
m+p-Xylene (mg/Kg)	16	c	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	..	..	15
o-Xylene (mg/Kg))		c	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	..	..	
Naphthalene (mg/Kg)	..	c	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	..	..	..
Total Recoverable Hydrocarbons																		
C10-C14 Fraction (mg/Kg)	..	c	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	..	..	..
C15-C28 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
C29-C36 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
Sum of C10-C36 (mg/Kg)	17	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<250	250	500
C10-C16 Fraction (mg/Kg)	..	c	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	..	..	..
C10-C16 less Naphthalene Fraction (mg/Kg)	..	c	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	..	..	..
C16-C34 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
C34-C40 Fraction (mg/Kg)	..	c	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	..	..	..
Contaminants (Physical - rubber, plastic, bitumen, paper, cloth, paint wood) (%)	18	** As per RTA T276	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1

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Graham Lancaster (Nata signatory)
Laboratory Manager