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ATTACHMENTS TO COUNCIL REPORT

6. DEWATERING MANAGEMENT PLAN

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Dewatering Management Plan

Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales

July 2019

Prepared for:
Mercato on Byron Pty Ltd
c/- Gaskin Construction Services Pty Ltd

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1 Introduction

ADG Consulting Pty Ltd (ADG) was engaged by Mercato on Byron Pty Ltd care of Gaskin Construction Services Pty Ltd to prepare a Dewatering Management Plan (DMP) for the proposed 'Essence of Byron Hotel' mixed-use residential development within Lot 6 on DP619224 and Part of Lot 9 on DP617509, situated at 106 Jonson Street, Byron Bay, New South Wales.

1.1 Proposed development

It is understood that the DMP is required to support a Development Application to Byron Shire Council to establish a three-storey mixed-use residential building over a single level basement carpark. The proposed development will provide accommodation for guests with up to 146 hotel rooms, restaurant dining and bar facilities, and will cater for conferences, weddings and other events.

Based on the preliminary plans provided, excavations to facilitate the basement construction will extend to a maximum of 3.13 m below ground level (mbgl) corresponding to a maximum elevation of approximately 0.3 m Australian Height Datum (AHD) throughout the basement footprint. Localised deeper excavations may be required for the construction of a lift overrun pit and/or other structural elements (i.e. pile caps or footings).

A site investigation, inclusive of groundwater monitoring well installation and acid sulfate soil and groundwater sampling and analysis has been carried out by ADG to inform a Byron Shire Council (BSC) request for information (dated 27 May 2019). ADG also has an understanding of surrounding soil and groundwater conditions expected to be encountered based on engagement for dewatering compliance monitoring for the neighbouring development site situated at 98 – 114 Jonson Street (Mercato on Byron). These results will be used to assist in providing advice and recommendations for the groundwater management during dewatering for the basement construction for the proposed mixed-use development at 106 Jonson Street.

Groundwater standing water levels on site (SWL) were recorded between 0.34 – 1.87 mbgl during a groundwater monitoring event (28 June 2019). Dewatering will therefore be necessary to allow any below ground construction on this site to be undertaken in dry conditions.

1.2 Relevant guidelines

The DMP was prepared with reference to the following documents:

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (ANZG, 2018), which supersedes the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ). 2000.

- *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination. Department of Environment and Conservation (DEC). 2007.*

- *Guidelines for Managing Risks in Recreational Water*. Australian Government, National Health and Medical Research Council (NHMRC). 2008.

- *National Environment Protection (Assessment of Site Contamination) Measure 1999, (May 2013). National Environment Protection Council (NEPC). 2013*.

1.3 Relevant legislation

The *Protection of the Environment Operations (POEO) Act 1997*, and associated schedules and regulations are relevant to dewatering at the site. The objectives of the Act include to protect, restore, and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development.

The Act includes the requirements not to pollute waters, to prevent or minimise air pollution, to maintain and operate plant in a proper and efficient condition/manner and to deal with materials in a proper and efficient manner to minimise noise impacts, and to minimise and manage wastes. The Act also requires notification to the EPA when a pollution incident occurs that causes or threatens material harm to the environment.

The *Environmental Planning and Assessment Act 1979*, and the *Water Management Act 2000* are also key environmental and planning legislation to manage groundwater resources in New South Wales.

1.4 DMP objectives

The objectives of the DMP are to:

1. Describe the dewatering methodology, groundwater treatment, monitoring and reporting procedures to be employed at the site during dewatering activities.

2. Provide effective management procedures to prevent environmental harm resulting from the discharge of extracted groundwater from the site.

1.5 Scope of work

To achieve the investigation objectives, the following scope of work was undertaken:

- A desktop study including:

    1. Review of the development proposal and proposed shoring/dewatering designs.
    2. Review of geology and soil maps for the area.
    3. Search of groundwater bores licensed by the Department of Primary Industries Office of Water (Water NSW) within a 500m radius of the site.
    4. Review of relevant existing reports and groundwater data from the local area.
    5. Review of current aerial photographs of the site and surrounds.

- The preparation of this Dewatering Management Plan for submission to Byron Shire Council (BSC) and the Department of Primary Industries Office of Water.

2 Site characteristics

2.1 Property description

The subject site is described as Lot 6 on DP619224 and Part of Lot 9 on DP617509 and is situated adjacent to the corner of Carlyle Street and Jonson Street at 106 Jonson Street in Byron Bay, New South Wales.

The site is rectangular in shape and is shown in Figure 1, Appendix A.

2.2 Surrounding environment

The surrounding environment and land use is described briefly in Table 1.

Table 1 Surrounding land use and environment

Direction	Environment
North	Byron Plaza carpark & shopping centre commercial retail development, then more commercial retail development.
East	Jonson Street, then commercial retail development and commercial residential (backpacker) development, then residential development.
South	Mercato on Byron commercial retail development, then commercial residential (backpacker) development, then more commercial development
West	Former rail corridor land and associated drainage channel that leads to the Cumbebin Swamp wetland to the southwest, then residential development.

2.3 Topography

The site is considered to be generally level based on existing/previous site use for a Woolworths shopping centre.

2.4 Geology & soils

The geology at the site is mapped at 1:250,000 as being Quaternary aged river gravels, alluvium, sand and clay (Tweed Heads, Geological Survey of NSW, 1972).

The Acid Sulfate Soil (ASS) Risk Map – Edition 2 1:25,000 Byron Bay Map categorises the site as 'HIGH PROBABILITY'. The map describes the area as high probability of occurrence of acid sulfate soil materials within the soil profile, within 1 metre of the ground surface (NSW Government, Department of Land and Water Conservation, 1997).

2.5 Hydrogeology

A search for licensed groundwater bores using the Australian Government Bureau of Meteorology, Australian Groundwater Explorer tool was carried out. A total of seven licenced groundwater bores were identified within a 500 m radius of the site. No groundwater level, quality or yield information has been provided. A summary of the bore information available is provided in Appendix B.

Based on the installation of a groundwater monitoring network at the site (ADG Consulting, 2019a), the sites' location, topography and geology, the inferred groundwater flow on the site is toward the east, south-east.

2.6 Groundwater dependent ecosystems

Cumbebin Swamp Wetland is located approximately 80 m to the south-west of the subject site and is incorporated within the Cumbebin Swamp Nature Reserve. The Cumbebin Swamp Wetland identifies as a coastal wetland within the Byron Shire Council region. Coastal wetlands within this region are managed under the State Environmental Planning Policy (Coastal Management) 2018, also recognized as the Coastal Management SEPP which commenced on 3 April 2018. This SEPP supersedes the previously relevant State

Environmental Planning Policy (SEPP) 14 (Coastal Wetlands) along with SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection).

It is expected that extracted groundwater will be discharged to the railway corridor adjacent to the site which then discharges to the Cumbebin Swamp Wetland in this location. This DMP outlines the management procedures for the extraction, treatment and discharge of extracted groundwater from the site. Section 4 outlines the proposed water quality objectives for treated groundwater and the receiving freshwater environment and Section 6 of this report outlines the water quality treatment measures and monitoring procedures that will be employed along with any contingencies if required.

It should be noted that while this area identifies as a coastal wetland, it also receives overland and stormwater run-off from numerous point sources within the Byron CBD and industrial area.

3 Previous investigations

To support a Development Application to Byron Shire Council, this DMP has been based on information obtained from the following reports provided to ADG by Hutchinson Builders for the development of an adjacent site (98 – 114 Jonson Street, directly south) and also recent investigations carried out by ADG (ADG Consulting, 2019a, ADG Consulting, 2019b). The following soil and groundwater reports described below are also considered to be relevant for the proposed development site:

- *Report on Geotechnical Investigation, Proposed Retail Development, Jonson Street, Byron Bay, Ref: 82675, Doc 1.* Douglas Partners Pty Ltd. March 2014.

- *Revised Acid Sulfate Soil Management Plan, Mercato on Byron, Lots 6-7 DP619224, Lots 8-9 SP617509, 98 – 114 Jonson Street, Byron Bay, Ref: 2015.036.2.* HMC Environmental Consulting Pty Ltd. July 2015.

A brief discussion of relevant soil and groundwater conditions is provided below.

3.1 Douglas Partners Pty Ltd 2014

A Geotechnical Investigation was undertaken by Douglas Partners Pty Ltd (DP) in March 2014 for the retail development situated at 98 – 114 Jonson Street in Byron Bay.

At the time of the investigation, the site was considered to be relatively level and paved and was occupied by small footprint retail stores and a carpark.

3.1.1 Soils

The soil conditions encountered within a total of seven (7) boreholes generally comprised mixed sandy, gravelly and clay fill material to between 0.0 m and 2.2 m in depth. Underlying natural material comprised medium dense to dense sand to between 0.8 m and 11.5 m in depth. A very dense indurated sand layer was encountered in three boreholes only (BH4, 5 & 7) to between 1.1 m and 5.0 m in depth. Firm to stiff clay and silt combination material was encountered across the site from between 3.8 m and 13.5 m, overlying extremely weathered meta-siltstone (very low strength) to between 8.1 m and 15.3 m in depth (termination depths).

No acid sulfate soil investigation/assessment was undertaken alongside the geotechnical investigation on this site in March 2014.

3.1.2 Groundwater

Groundwater was recorded in all boreholes at the time of drilling from between 0.8 m and 2.6 m below existing ground levels. No semi-permanent PVC standpipes were established therefore no steady/stabilised groundwater levels were provided in DPs reporting. No groundwater samples were recovered, therefore no field or laboratory analysis was undertaken.

3.2 HMC Environmental Pty Ltd 2015

No Acid Sulfate Soil (ASS) Investigation Report was provided to ADG in 2016, however HMC Environmental Pty Ltd (HMC) prepared an Acid Sulfate Soil Management Plan (ASSMP) to support a Development Application to BSC. Information within the report indicates that DP undertook an ASS Investigation on the site in March 2013. The following information has been summarised directly from HMS's report.

- *During drilling, soil samples were collected at 500mm intervals throughout the soil profile in all eight boreholes except BH2A where sampling in November 2013 extended from 5.0-9.0m depth as samples were collected in this location from 0.0 to 4.5m depth in May 2013.*

- *A total of 93 samples were collected and these samples were subjected to preliminary qualitative screening using the field pH (pHF), oxidised field pH (pHFOX), and reaction to both acid and hydrogen peroxide tests.*

- *Representative soil samples at depths throughout the soil profile were also subjected to quantitative Chromium Reducible Sulfur (SCR) and Total Actual Acidity (TAA) tests - a total of 49 samples.*

- *HMC summarises,*
  - *To confirm the qualitative results, additional quantitative testing was undertaken on selected samples. The additional testing results confirmed potential acidity exceeding action criteria below 2m depth. The maximum concentration of oxidisable sulphur recorded within the proposed excavation depth was 0.22% SCR recorded at 5.5m depth in BH5A.*

  - *Concentrations of actual acidity exceeding the action criteria were recorded at or below 2m depth in all boreholes. The maximum concentration was recorded in BH3 at 3m depth (TAA 187 mol H+/T). No Acid Neutralising Capacity (ANC) was recorded in any borehole.*

  - *There appears to be both potential acid sulfate soil (PASS) and actual acid sulfate soil (AASS) exceeding action criteria at or below 2m depth on the site. This acidity appears to be related to the interception of the dark brown sand and the indurated sand. No Acid Neutralising Capacity or other inherent buffering was recorded. Although the acidity within the indurated sand may be more related to iron oxidation and organic acids there is actual acidity and potential acidity exceeding action criteria within the soil profile in both this soil layer and the underlying pale grey silty clay.*

3.3 ADG Consulting Pty Ltd 2019

ADG soil sampling locations and the location of the installed groundwater network are provided in Appendix C.

3.3.1 Groundwater

ADG Consulting recently installed a groundwater monitoring network in response to a BSC RFI for the development of the site (ADG Consulting, 2019a). A summary of site specific groundwater results including ADG's understanding of groundwater quality in the area is provided below.

Groundwater quality data collected during a groundwater monitoring event (28 June 2019) reported the following:

- Groundwater is generally mildly acidic, with pH levels ranging from approximately 5.74 to 6.11 and electrical conductivity ranging from fresh to brackish between 0.04 mS/cm to 0.91 mS/cm.

  Groundwater pH has the potential to reduce (become more acidic) following oxidisation of PASS as dewatering progresses, particularly if re-wetting of the soils occurs.

- Dissolved oxygen levels in static groundwater ranged from approximately 14.8 – 24.5 % saturation.

- The groundwater associated with indurated sand strata is highly turbid as a result of staining and organic content (i.e. over-range NTU).

- Concentrations of dissolved metals were reported above the available freshwater water trigger values (MWTV's) provided in ANZG (2018) for the receiving environment (copper and zinc). Elevated levels of aluminium and particularly iron are also expected in the untreated extracted groundwater and have the potential to increase following oxidisation of PASS as dewatering progresses or as a result of existing acidic groundwater conditions.

  While there is no relevant criterion provided for iron under ANZG (2018), concentrations of dissolved and total iron reported ranged from between 120 µg/L to 940 µg/L and 7,970 µg/L to 18,600 µg/L, respectively. High dissolved and total iron concentrations have the potential to cause unsightly plumes in receiving environments and therefore require specialised treatment for removal.

Increased levels of actual acidity and subsequently higher levels of dissolved iron and aluminium in the groundwater from commencement of dewatering due to the previously established cone of depression and oxidised PASS in the surrounding soils from dewatering operations have been reported on adjacent sites (specifically 98 – 114 Jonson Street).

- Given the location, previous use and review of previous investigations on the site, groundwater impacts resulting from site contamination are not anticipated.

Groundwater investigations will be undertaken at the commencement of dewatering as described in Section 6 of this report. This assessment will be representative of the groundwater being extracted and treated from the entire site, as opposed to localised monitoring well data which is often misleading. Based on site specific information (ADG Consulting, 2019a) and previous experience with dewatering in the area, ADG expects the groundwater to require treatment to increase pH and dissolved oxygen levels, as well as reduce turbidity, suspended sediments and dissolved metal concentrations prior to being discharged to the receiving environment.

3.3.2 Soils

The soil conditions encountered within a total of six (6) boreholes generally comprised of sand, and silty sand to termination depths ranging from 3.0 to 6.0 mbgl.

An acid sulfate soil investigation/assessment was undertaken alongside the Stage 1 PSI on this site (ADG Consulting, 2019b). Titratable actual acidity for 8 soil samples was reported ranging from <0.02 – 91 mole H^+ / tonne with chromium reducible sulfur ranging from <10 – 97 mole H^+ / tonne. Calculated laboratory lime treatment values ranged from <1 – 14 kg $CaCO_3$ / tonne.

4 Water quality objectives

4.1 Receiving environment

It is proposed to discharge extracted groundwater to the Cumbebin Creek Swamp (west of the site) directly from the site. Byron Shire Council does not have any asset infrastructure mapping available for review therefore the exact location of the receiving waters/environment will need to be confirmed on commencement of dewatering.

The following section establishes water quality objectives (WQOs) to ensure that the environmental values of the receiving waters are protected and maintained.

4.2 Development of water quality objectives

WQOs have been developed to support and protect the designated environmental values (EVs) for the receiving environment. The WQOs have been developed with reference to the following guideline documents:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018). The selected trigger values apply to typical slightly to moderately disturbed systems to provide a 95% level of species protection for freshwaters.

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* by the Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ, 2000), has undergone review, with the publication of the 2018 version. The revised *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018* is a joint initiative between the Australian and New Zealand Governments and Australian state and territory governments (ANZG, 2018) and supersedes the ANZECC/ARMCANZ 2000 publication. Where ANZECC/ARMCANZ (2000) is referenced, the relevant sections are still relevant and consistent with the updated ANZG 2018 publication, as referenced in the ANZG 2018 publication.

4.3 Proposed water quality objectives

The proposed water quality objectives that have been developed for the discharge of extracted groundwater from the site are provided in the Tables below. All water discharged from the site must comply with the discharge criteria provided in Table 2. In addition, the receiving water quality within a 20m radius of the discharge point entry to the receiving water shall comply with the receiving water criteria provided in Table 3. Receiving waters data will be assessed against background monitoring data if non-compliant results are obtained at the receiving waters monitoring location.

Table 2 Discharge criteria

Parameter	Criteria
Physico-chemical	
pH (pH units)	6.5 – 8.5[1]
Dissolved oxygen (% saturation)	>80[1]
Suspended solids (mg/L)	<50[1]
Turbidity (NTU)	<50[1]
Litter	No visible litter released

Table notes:

1. Typical discharge criteria recognised throughout Queensland & NSW

Table 3 Receiving waters criteria

Parameter	Criteria
Physico-chemical	
pH (pH units)	6.5 – 8.5[1#]
Dissolved oxygen (% saturation)	85 – 110[1#]
Turbidity (NTU)	<50[1#]
Suspended solids (mg/L)	<50[1#]
Dissolved metals (µg/L)	
Aluminium	55[2]
Arsenic	13[2]
Cadmium	0.2[2]
Chromium	1[2]
Copper	1.4[2]
Iron	No relevant ANZG criterion
Lead	3.4[2]
Nickel	11[2]
Zinc	8[2]
Mercury	0.6[2]

Table notes:

1. ANZG (2018) - Supersedes ANZECC/ARMCANZ (2000). Default trigger values for physical and chemical stressors for freshwater ecosystem type.
2. ANZG (2018) - Supersedes ANZECC/ARMCANZ (2000). Freshwater trigger values for 95% species protection.

= Default trigger values for physical & chemical stressors for south-east Australia for slightly to moderately disturbed ecosystems (refer ANZECC/ARMCANZ (2000) Tables 3.3.2 and 3.3.3). Based on lowland freshwater receiving environment (i.e. Cumbebin Swamp Wetland).

5 Dewatering methodology

5.1 Excavation and shoring

The proposed basement excavation will extend to approximately 3.13 m below ground level (excluding basement slab). It is understood that the excavation/basement perimeter will be stabilised using a combination of anchored interlocking steel sheet piles and contiguous secant piles (consistent with the methodology employed during basement construction for the adjacent Mercato on Byron development). Localised deeper excavations may be required for construction of lift overrun pits. Perimeter stabilisation of soils using interlocking steel sheet piles may also be required in these sections to enable construction.

It is expected that the development will include a 'tanked' basement to prevent the requirement for a permanent dewatering facility at the site.

5.2 Groundwater extraction

It is expected that dewatering will be undertaken using a series of 40 mm diameter PVC spears installed at 1.5 m intervals around the internal and external perimeter of the excavation (consistent with the methodology employed during basement construction for the adjacent Mercato on Byron development). Additional 0.6 m diameter deep wells within the centre of the excavation may also be required to achieve the draw down required within the centre of the excavation. The excavation must be dewatered to a minimum of 1.0 m below the deepest point of excavation to allow construction to be undertaken in dry conditions. The water table (existing minimum approx. 0.34 mbgl or 3.09m AHD) is therefore expected to be lowered by a minimum of approximately 3.79 m throughout the excavation footprint to approximately -1.30 m AHD. Continual dewatering will therefore be required throughout the construction phase.

5.3 Extraction/discharge rates and volume

Based on the following subsection, it is estimated that 326.6 ML of groundwater will be extracted during the construction phase.

5.3.1 Dewatering extraction calculation based on subsurface soil profile

The dewatering extraction rate, area of influence and cone of depression has been estimated using the Western Australian Department of Water and Environmental Regulation *Cone of Depression Calculator*.

The calculation results are based on the following parameters and known site-specific conditions:

- Approximate length of excavation = 60.0 m
- Approximate width of excavation = 60.0 m
- Reduction in depth of groundwater across the excavation = 3.79 m (based on approx. min. groundwater depth of 0.34 mbgl or 3.09 m AHD).
- Approximate depth of saturated thickness of unconfined aquifer = 16.0 m (conservative value adopted based on lack of site based geotechnical information)

A soil profile of fine to medium sands, has a hydraulic conductivity of 8.2 m/day, or equivalent 0.0000949 L/sec (WA Calculator). The results of the calculation are shown in Table 4 below, and provided in Appendix D. A conservative hydraulic conductivity rate for fine to medium sands has been adopted.

Table 4 Dewatering extraction rate results

Output	Result
Dewatering radius of influence (m)	111
Discharge rate (L/sec)	27
Discharge rate (L/hr)	97,200
Establishment of cone of depression (hours)	131

Based on the above inputs, a groundwater flow rate of approximately 1,620 L/min or 97,200 L/hr has been predicted for the project.

5.4 Dewatering duration

Dewatering will be necessary throughout the basement excavation and construction phase, which is expected to require continual dewatering for approximately twenty weeks.

5.5 Groundwater drawdown

Groundwater drawdown caused by dewatering has the potential to create settlement in unconsolidated sediments and loose sands. Groundwater drawdown may also oxidise potential acid sulfate soils within the cone of depression, subsequently producing acidic groundwater conditions and mobilising heavy metals. Monitoring of the extracted untreated groundwater will be undertaken to detect any in-situ oxidation of soils.

5.6 Groundwater treatment

All extracted groundwater will be treated on-site using available technologies prior to discharge to the stormwater network. The following treatment measures will be adopted, and will be installed and operational prior to the commencement of dewatering:

1. A groundwater pH buffering treatment system (primary treatment)
2. A sedimentation tank to provide additional residence time and sedimentation (secondary treatment – precipitation of dissolved heavy metals and retention of suspended solids).
3. Installation of activated carbon filtration or other fine media filtration to retain suspended sediments and/or heavy metals (tertiary treatment)

Details of the treatment systems, methodologies and contingency measures are provided in Section 6 of this report.

5.7 Discharge of extracted groundwater

The exact location of the receiving environment is to be confirmed, however it is anticipated that treated extracted groundwater will be discharged to the drainage channel to the west of the rail corridor land immediately to the west of the site, which drains to the Cumbebin Swamp wetland. Refer to Figure 1, Appendix A.

Given that the total volume of extracted groundwater is predicted to be greater than 3 megalitres, a dewatering licence will need to be obtained from WaterNSW; and approval to commence off-site discharge to local stormwater infrastructure is also likely to be required to be obtained from Byron Shire Council following the submission of pre-discharge monitoring results.

ADG conducted a search of the list of NSW contaminated sites notified to the EPA as of 21 January 2019 under the *Contaminated Land management Act 1997*, and notes the site is not currently listed. Nonetheless, dewatering discharges will require appropriate management and monitoring as detailed in this DMP.

6 Water quality management

6.1 Responsibility

The Site Manager is ultimately responsible for implementing the water quality management procedures described in this DMP.

6.2 Operational policy

To prevent impacts on the receiving waters by effectively treating all extracted groundwater prior to discharge from the site.

6.3 Performance criteria

The performance criteria for the discharge of extracted groundwater are the water quality objectives provided in Table 2 and Table 3 Section 4 of this report. Both the discharge and receiving waters (within a 20 m radius of the discharge point) will be assessed against the WQOs to ensure that the environmental values of the waterway are maintained. Receiving waters data will also be assessed against background monitoring data if non-compliant results are obtained at the receiving waters monitoring location (where accessible).

6.4 Implementation strategy

All extracted groundwater will be treated on-site using available technologies prior to discharge to the stormwater network. The treatment system described in Section 6.4.1 (below) will be adopted, installed and operational prior to the commencement of dewatering.

6.4.1 Groundwater treatment systems

Primary treatment

Groundwater treatment system/s will be installed to provide primary treatment of the extracted groundwater. The system/s will provide the following capabilities:

1. A baffled pH treatment tank or automated inline pH treatment system
2. Automated in-line chemical dosing systems for the addition of buffering solutions and coagulants
3. A filtration system to reduce fine particulates, if required
4. Emergency response alarms for non-routine situations.

The size of the treatment unit will depend on available area onsite, estimated extraction rate and retention time required for pH correction prior to secondary treatment using a sedimentation tank.

Secondary treatment

A sufficiently sized sedimentation tank/s will be utilised to provide the necessary residence time for secondary treatment of the groundwater prior to offsite discharge. The following suitably sized treatment system could be utilised:

- 1 x Large volume sedimentation tank (approximately 23 kL each)

Based on the estimated groundwater extraction rate (refer to Section 5.3.1), ADG recommends that two sedimentation tanks be utilized.

Tertiary treatment

A fine filtration treatment system with specialised fine filtration media will be utilised to provide the required heavy metal removal (specifically for total and dissolved iron) where not precipitated and retained within the sedimentation tank/s (secondary treatment). This treatment system will provide tertiary treatment of the groundwater prior to offsite discharge.

6.4.2 Dewatering strategy

The Site Manager, Dewatering Contractor and Environmental Consultant must formulate a dewatering strategy to ensure that dewatering treatment system and sedimentation tank can be accommodated within the site prior to the commencement of works.

6.4.3 Initial pump-out

Prior to discharge of any extracted groundwater to the stormwater system, the following pre-dewatering procedure will be undertaken:

1. The excavation area will be excavated down to the standing groundwater level.
2. The initial dewatering discharge will be directed (via the treatment systems) into the excavation and allowed to infiltrate/recharge the aquifer. This process will provide initial clarification of the extracted groundwater as disturbed sediment loads are typically reduced following the initial pump-out (where onsite capacity is available).
3. Samples of the treated groundwater will be recovered and analysed for the parameters detailed in Table 2 and Table 3.
4. The extracted groundwater will be directed to the authorised discharge point following confirmation that the water quality complies with the discharge criteria and that approval to discharge has been obtained from Byron Shire Council.

6.5 Monitoring

6.5.1 Visual monitoring

Visual inspections of the site and dewatering equipment shall be undertaken daily by the Site Manager to identify the following:

- Quantity of chemical product within the dosing system
- Effective operation of all dewatering treatment equipment
- Short circuiting of water around baffles and any filter media in sediment tanks
- Visible hydrocarbon sheens and odours
- Green blue or extremely clear water indicating high levels of dissolved aluminium.

The Site Manager must keep a daily record of flow rates and extraction volumes for submission to Byron Shire Council following the completion of dewatering activities at the site, should it be required. Flow rates and extraction volumes will be measured using a calibrated flow meter installed on the dewatering treatment system prior to the commencement of dewatering.

6.5.2 Water quality monitoring

Water quality monitoring will be undertaken for the duration of dewatering activities at the site. The monitoring will include analysis of the extracted groundwater, treated discharge water and off-site monitoring in the receiving waters (in the mixing zone within a 20 m radius of the discharge point). The exact location of the receiving environment is to be confirmed, however it is anticipated that treated extracted groundwater will be discharged to the drainage channel to the west of the rail corridor land immediately to the west of the site, which drains to the Cumbebin Swamp wetland. Background water quality monitoring of field parameters will also be conducted during each sampling event, if applicable and safe to do so.

The proposed monitoring locations are shown in Figure 1, Appendix A are subject to confirmation following mobilisation of dewatering equipment to site.

Monitoring will be undertaken at the following frequencies:

- Daily monitoring of field parameters (pH, electrical conductivity, dissolved oxygen, temperature and turbidity) in the treated discharge water. Daily monitoring will be undertaken by a suitably trained site employee under the supervision of the Site Manager.

- Weekly monitoring of field parameters (pH, electrical conductivity, dissolved oxygen, temperature and turbidity) in the treated discharge water, receiving waters and background waters by Environmental Consultant.

- Weekly laboratory analysis of treated discharge water and receiving waters for suspended solids and dissolved 0.45µm filterable metals (aluminium, arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc and mercury) by Environmental Consultant.

- Pre-discharge/initial monitoring of field parameters (pH, electrical conductivity, dissolved oxygen and oxidation-reduction potential) in the extracted groundwater (prior to treatment) to assess changes in groundwater chemistry associated with PASS oxidation (sampled by Environmental Consultant).

- Pre-discharge/initial laboratory analysis of extracted groundwater (prior to treatment) for suspended solids, dissolved 0.45µm filterable metals (aluminium, arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc and mercury) and for soluble sulfate and chloride to assess changes in groundwater chemistry associated with PASS oxidation (sampled by Environmental Consultant).

As a contingency, if any hydrocarbon odours or sheens are observed onsite within the excavation pit or extracted groundwater, the following additional sampling and analysis will be undertaken:

- Weekly laboratory analysis of treated discharge water will be undertaken for total recoverable hydrocarbons (TRHs), benzene, toluene, ethylbenzene and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs) during the initial rounds of monitoring by Environmental Consultant. Approval from the relevant authority (EPA) should be obtained to discontinue or reduce (i.e. monthly) the analytical frequency of these parameters if no detectable concentrations are reported for three consecutive weeks.

All samples will be recovered by a suitably qualified Environmental Scientist and submitted to a National Association of Testing Authorities (NATA) accredited laboratory for analysis.

Following the receipt of pre-discharge sample results, the results will be reviewed and, if required, forwarded to Byron Shire Council (BSC) to obtain approval to commence offsite discharge to stormwater.

Pre-approval on a fast turn-around-time (TAT) will be requested (48 to 72 hours) from a NATA accredited laboratory, with sufficient notification from the Site Manager on an anticipated commencement date for the dewatering.

6.5.3 Discharge volumes

A daily record of discharge rates and total volumes must be recorded from dewatering flow meter/s which should be installed on the outlet of the dewatering treatment system. The monitoring will be undertaken by a suitably trained site employee under the supervision of the Site Manager.

6.5.4 Monitoring responsibilities

The persons responsible for undertaking the compliance monitoring described in Section 6.5.2 above are shown in Table 5.

Table 5 Monitoring responsibilities

Activity	Frequency	Responsibility	Person
Monitoring of field parameters in discharge water	Daily	Site Manager	Site Manager
Monitoring of field parameters in discharge water, receiving waters and background waters	Weekly	ADG Consulting	Environmental Consultant
Laboratory analysis of samples recovered from discharge water and receiving waters	Weekly	ADG Consulting	Environmental Consultant

6.6 Maintenance

The groundwater treatment systems must be regularly maintained. Maintenance must include:

- Regular cleaning and or replacement of any geo-fabric filters within the filtration unit, where required to be installed.
- Regular removal of sediment from the sedimentation tank. The sediment must be either returned to the excavation pit for dewatering and bulking out with excavated material, or removed from the site by a licensed liquid waste contractor.
- Regular/required back flushing of fine media filtration treatment system.
- Regular check of the dosing system and top-up of buffering solutions and flocculants.

6.7 Reporting

Dewatering management procedures and monitoring results will be reviewed by ADG Consulting weekly to ensure that the treatment procedures are effective, and that the receiving waters are not being impacted by the discharge.

The following reporting procedures will be adopted:

- A summary report will be prepared upon completion of the initial pre-discharge monitoring. The report will be submitted to the Site Manager, Dewatering Contractor and BSC (by the Site Manager, if required).
- Weekly interim reports will be prepared upon receipt of laboratory data for each round of ongoing compliance monitoring. The interim reports will display all data obtained during the previous monitoring event, and provide comments and recommendations based on the results.
- A dewatering compliance report will be prepared on completion of the project (upon request).

The above reports will be prepared by ADG Consulting and provided to the Site Manager, Dewatering Contractor and BSC (by the Site Manager, if required) as they become available. The reports will include all water quality results and comparison to the WQOs, corrective actions and recommendations made to the Site Manager and Dewatering Contractor during the monitoring period.

The Site Manager must keep records of complaints, volumes of chemicals used and treatment methods employed. These records must be available on-site at all times and submitted to BSC by the Site Manager upon request.

6.8 Contingencies

If water quality monitoring indicates ongoing exceedances of the performance criteria, and the water quality objectives for the receiving waters cannot be met, then corrective actions will be adopted as necessary. Possible contingencies may include one or more of the following:

- Installation of additional sedimentation tanks to provide increased residence time and assist with the retention of precipitated iron hydroxides.

- Installation of additional flocculant and/or coagulant dosing systems to assist in precipitation of suspended sediments and/or heavy metals.

- Installation of a sedi-sparge (air-sparger) and/or granular activated carbon treatment system to remove detectable concentrations of TRHs and volatile toxicants if cause to sample is warranted and concentrations are detected.
- Failing other contingency methods, ongoing non-compliance of the performance criteria may require extracted groundwater to be disposed of offsite by a liquid waste contractor to an appropriate waste treatment/processing facility.

7 Noise & odour management

7.1 Responsibility

The Site Manager is responsible for ensuring the appropriate management of noise and odour during dewatering operations.

7.2 Operational policy

To minimise noise and odour emissions generated from the site during dewatering.

7.3 Performance criteria

The appropriate criteria to measure the performance of dewatering management at the site are provided below.

1. No noise or odour related complaints received from neighbouring residents or the community.
2. No degradation of air quality due to fumes or odours emanating from the dewatering process.

7.4 Implementation strategy

Noise and odour emissions will be managed as described in the following sections.

7.4.1 Noise

All dewatering equipment must be operated appropriately and maintained in good working order. All dewatering systems and plant must be fitted with the appropriate noise reduction equipment to comply with the performance criteria. Non-complying dewatering plant will be replaced or repaired as necessary.

7.4.2 Odour

All dewatering plant must be fitted with the appropriate emission reduction devices. Where practicable, all dewatering plant will be sealed to prevent the release of odours to the atmosphere. Fine mist odour control sprays will be applied to reduce offensive odours if complaints are received from neighbouring residents.

7.5 Monitoring

An inspection of the site and dewatering equipment shall be undertaken daily by the Site Manager to identify the following:

- Excessive noise being generated by the dewatering systems and plant
- Strong or offensive odours being generated by the dewatering equipment and/or extracted groundwater.

7.6 Reporting

Reporting will be undertaken as described in Section 6.7 of this report.

7.7 Contingencies

If noise levels consistently exceed the performance criteria, temporary acoustic barriers will be constructed around the offending dewatering systems and plant. Odour control sprays will be applied as necessary to mask odour emissions if complaints are received from neighbouring residents. This may include the direct injection of deodorisers to the groundwater treatment system.

8 Limitations

ADG Consulting Pty Ltd (ADG) has prepared this report for Mercato on Byron Pty Ltd in accordance with the agreed scope of work. The services performed by ADG have been conducted in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No other warranty or guarantee, expressed or implied, is made as to the professional advice included in this report.

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9 References

ADG Consulting. 2019a. *Stage 1 Preliminary Site Investigation - Proposed 'Essence of Byron Hotel' Mixed Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales*.

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Water Management Act 2000. NSW Government. 2000.

Appendix A: Figures

Figure 1. Site and proposed monitoring locations

106 Jonson Street, Byron Bay, New South Wales
Site location and proposed monitoring locations
Legend
Proposed monitoring locations
Approximate site boundary
Discharge sampling location (to be confirmed)
Receiving water mixing zone sampling location (to be confirmed)
Background sampling location (independant of receiving waters) (to be confirmed)
Butler Ln
Jonson St
Kingsley St
Fletcher Ln
N
100 m
Google Earth
Imagery © Department Finance, Services and Innovation 2016

Appendix B: Licenced groundwater bore search results

Bore ID	State	Bore Depth (m)	Drilled Date	Purpose	Status	Geology	Water Level	Salinity	Construction Log	Lithology Log	Hydrostratigraphy Log	Latitude	Longitude
GW303643.1.1	NSW	4.0	1983-01-01 00:00:00.0	Household water supply	Unknown	Unknown	false	false	false	false	false	-28.644880	153.609570
GW303447.1.1	NSW			Drainage	Unknown	Unknown	false	false	false	true	false	-28.643524	153.614033
GW303689.1.1	NSW	3.1	1981-06-01 00:00:00.0	Household water supply	Unknown	Unknown	false	false	true	false	false	-28.643970	153.613269
GW303661.1.1	NSW		1913-01-01 00:00:00.0	Household water supply	Unknown	Unknown	false	false	false	false	false	-28.645106	153.609449
GW301091.1.1	NSW	7.0	1995-05-20 00:00:00.0	Household water supply	Unknown	Unknown	false	false	true	true	false	-28.647202	153.615129
GW306401.1.1	NSW	1.5	2007-12-20 00:00:00.0	Monitoring	Functional	Unknown	false	false	true	true	false	-28.646538	153.615499
GW300932.1.1	NSW	10.0	1997-10-15 00:00:00.0	Recreation and culture	Unknown	Unknown	false	false	true	true	false	-28.646064	153.615112

Appendix C: Site and Location Plan (ADG Consulting 2019)


BH2/MW2
BH5
BH1/MW1
BH3/MW3
BH4
BH6

Appendix D: Dewatering Calculation Output

Cone of depression

DER requires a preliminary assessment of the radial extent of the cone of depression and pumping rates and times for all dewatering operations in ASS areas.

Empirical methods to calculate the radial extent of the groundwater cone of depression and pumping rates and times for dewatering operations are outlined in Appendix E of Treatment and management of soils and water in acid sulfate soil landscapes 1.59 MB (Published July 2011, Revised June 2015)

Calculator

Input

Length of excavation (metres):	60	m
Width of excavation (metres):	60	m
Required groundwater drawdown (metres):	3.79	m
Saturated thickness of the unconfined aquifer(A) (metres):	16	m
Hydraulic conductivity of the aquifer (K) (metres per second):	0.0000949	m/sec

Calculate

Results

Effective radius of pumping well , R_e (metres):	34m
Radius of influence of dewatering, R_o (metres): (i.e. radius of the cone of depression)	111m
Total pumping rate (litres per second):	27l/sec
Time taken to establish the cone of depression (hours):	131hrs

Main Menu

Acid sulfate soils
Air quality
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Contaminated sites
Environmentally Sensitive Areas
Environmental offsets
Illegal dumping
Noise
Sustainability
Waste
Reporting pollution
Marine Debris Project
WA Plastic Bag Ban
Reduce single use plastic

2019NTH015

DA 10.2018.650.1 Mixed use development, Jonson Street, Byron Bay

ATTACHMENTS TO COUNCIL REPORT

7. ACID SULFATE SOIL INVESTIGATION REPORT

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Acid Sulfate Soil Investigation Report
Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales

July 2019

Prepared for:
Mercato on Byron Pty Ltd
c/- Gaskin Construction Services Pty Ltd

Report details

Project ref:	ADG965.19
Project Manager:	Michael Campbell
Report title:	Acid Sulfate Soil Investigation Report
	Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development:
	Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales
Version:	Rev0
Author:	Dr Samuel Gregory
Reviewer:	Michael Campbell
Client:	Mercato on Byron Pty Ltd
	c/- Gaskin Construction Services Pty Ltd
Client contact:	John Gaskin
Distribution date:	9 July 2019
Distributed to:	Gaskin Construction Services Pty Ltd
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Date: 9 July 2019

Table of Contents

1 Introduction

ADG Consulting Pty Ltd (ADG) was engaged by Mercato on Byron Pty Ltd care of Gaskin Construction Services Pty Ltd to undertake an acid sulfate soil investigation as part of addressing a Byron Shire Council (BSC) request for information (RFI) for Development Application 10.2018.650.1 for the proposed mixed-use development for tourist and visitor accommodation, 'The Essence of Byron Hotel' within Lot 6 on DP619224 and Part of Lot 9 on DP617509, situated at 106 Jonson Street, Byron Bay, New South Wales (the site). The proposed scope of work was detailed in ADG's fee proposal dated 6 June 2019, and acceptance of the engagement was confirmed by email 13 June 2019.

1.1 Background

The site comprises two adjoining allotments with a total area of 0.55 hectares and it is proposed to be developed for mixed use (residential and commercial use). In response to the development application (10.2018.650.1) an RFI was issued by BSC for the site on 27 May 2019 identifying that the following additional information (not exhaustive) was needed to enable appropriate assessment:

- An Acid Sulfate Soil (ASS) investigation
- A Stage 1 Preliminary Site Investigation (PSI) for contamination
- A groundwater investigation to determine 'groundwater quality and quantity'
- Revision of the current Dewatering Management Plan (DMP) (ADG Consulting, 2019).

The ASS Investigation (this report) is required to quantify levels of existing and potential acidity in the soil and to provide effective management procedures to prevent environmental harm resulting from the disturbance of ASS during redevelopment of the site. The additional requirements of the BSC RFI are addressed in separate reports. No information has been provided to ADG regarding site specific ASS conditions.

Where potential acid sulfate soils (PASS) or actual acid sulfate soils (AASS) are identified at levels exceeding applicable action criteria, an Acid Sulfate Soil Management Plan (ASSMP) will be developed to ensure that PASS/AASS that may be disturbed as a result of the proposed development are appropriately planned for and managed during construction to prevent environmental harm.

1.2 Relevant guidelines

The investigation was conducted with reference to the following documents:

- *Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1, June 2004*. Ahern et al. (2004). Department of Natural Resources, Mines and Energy.
- *Acid Sulfate Soil Manual, 1998*. Stone et al. 1998. Acid Sulfate Soil Management Advisory Committee. Including Acid Sulfate Soil Planning Guidelines.

1.3 Investigation objectives

The objectives of the investigation were to:

- Quantify levels of existing and potential acidity in the soil
- Provide effective management procedures to prevent environmental harm resulting from the disturbance of ASS during redevelopment of the site.
- The provision of an Acid Sulfate Soil Investigation Report (this report) detailing the findings of the investigation and comparison to applicable guidelines.

1.4 Scope of work

To achieve the investigation objectives, the following scope of work was undertaken:

- The construction of 4 boreholes (min 1 borehole on each lot in accordance with relevant guidelines) to a maximum depth of 6.0m below the ground surface within the proposed development footprint.
- Acid sulfate soil screening (pH_F and pH_{FOX}) at 0.5m depth intervals in each borehole. A total of 35 samples were subjected to pH screening.

- Laboratory analysis of 8 samples to determine the acid generating capacity of the soil. Analysis was undertaken using the Chromium Reducible Sulfur Suite and included analysis for oxidisable sulfur, titratable actual acidity, retained acidity and acid neutralising capacity.
- The preparation of this Acid Sulfate Soil Investigation Report.

2 Site characteristics

2.1 Site description

The subject site is described as Lot 6 on DP619224 and Part of Lot 9 on DP617509 and is situated adjacent to the corner of Carlyle Street and Jonson Street at 106 Jonson Street in Byron Bay, New South Wales.

The site was generally accessible during the site inspection (21 June 2019) except for the interior of the supermarket, limiting access for the drill rig. A series of photos were taken during the site inspection which show the terrain and general features of the area. The images are displayed below.

The site and soil sampling locations are shown in Figure 1, Appendix A.

Image 1. View west from Jonson Street, within carpark area of site.

Image 2. View looking south

Image 3. View looking west from south east corner

Image 4. Mineral sands at BH1

Image 5. Silty sand at BH2

2.2 Surrounding land use and environment

A brief description of the surrounding environment is described in Table 1 below.

Table 1. Surrounding land use and environment

Direction	Environment
North	Byron Plaza carpark & shopping centre commercial retail development, then more commercial retail development.
East	Jonson Street, then commercial retail development and commercial residential (backpacker) development, then residential development.
South	Mercato on Byron commercial retail development, then commercial residential (backpacker) development, then more commercial development
West	Former rail corridor land and associated drainage channel that leads to the Cumbebin Swamp wetland to the southwest, then residential development.

2.3 Topography

The site is considered to be generally level based on existing/previous site use for a Woolworths shopping centre.

2.4 Hydrology

The property is flanked to the west by the Cumbebin Swamp wetland although no other water bodies are noted in direct proximity to the site. Any subsurface flow on the property itself is directed to engineered drainage to the local stormwater network.

2.5 Geology

The geology at the site is mapped at 1:250,000 as being Quaternary aged river gravels, alluvium, sand and clay (Tweed Heads, Geological Survey of NSW, 1972).

The Acid Sulfate Soil (ASS) Risk Map – Edition 2 1:25,000 Byron Bay Map categorises the site as 'HIGH PROBABILITY'. The map describes the area as high probability of occurrence of acid sulfate soil materials within the soil profile, within 1 metre of the ground surface (NSW Government, Department of Land and Water Conservation, 1997).

3 Acid sulfate soil investigation

3.1 Methodology

An acid sulfate soil investigation was undertaken at the site on 21 June 2019. A total of four boreholes were constructed to a maximum depth of 6.0m below the ground surface within the proposed development footprint (3 x 6.0m and 1 x 3.0m).

All boreholes were constructed using a ute-mounted drill rig with a 100mm spiral flight auger, which was considered appropriate for the site and soil conditions encountered. A site plan showing the borehole locations is provided in Figure 1, Appendix A.

Soil samples were recovered from each borehole at 0.5 m increments directly from the auger. Samples were recovered using a gloved hand and sealed into polyethylene bags with excess air extruded. All samples were stored in an insulated, ice filled container to preserve sample integrity and minimise analyte degradation. The samples remained chilled until arrival at the laboratory within the specified holding times.

All samples collected (35) were submitted to ALS Laboratory in Brisbane for field pH and oxidised pH laboratory analysis. Following this initial analysis, eight (8) select samples (based on reaction rates and pH change) were analysed using the Chromium Reducible Sulfur suite. The chromium reduction method measures reduced inorganic sulfur compounds and is not subject to significant interferences from the sulfur in either organic matter or sulfate minerals (Ahern *et al*. 2004).

3.2 Sub-surface conditions

A total of four boreholes (BH1, BH2, BH3, BH5) were constructed across the site on 21 June 2019, the locations of which are provided in Figure 1, Appendix A. The natural sub-surface conditions identified during the site investigation were generally consistent with mapped geology and soil conditions, and the subsurface profile can generally be separated into two descriptions, as follows:

Fill: A filled sequence typically comprising pale grey-brown silty sand comprising fine grained sand / mineral sand throughout, to depths of 0.8-1.2m below the ground surface. Concentrated mineral sands were identified in BH1 and BH5 (although of varying layer thickness), with surface deposits recorded in BH1.

Natural soils: A sequence generally comprising silty sands and sands with fine grained sand and was encountered at depths ranging from 1.2m to termination depth.

The water table at the time of the investigation ranged from 0.340 to 1.865 metres below ground level across the site.

3.3 Assessment criteria

The relevant assessment criteria are the Texture-Based Acid Sulfate Soil Action Criteria provided in Stone *et al.* (1998). The action criteria triggers the need to prepare a management plan based on the sum of the existing plus potential acidity. The criteria are texture-based, as clay content can influence a soils natural buffering capacity, permeability, and the rate of oxidation when soil is disturbed. The action criteria are provided in Table 2.

Table 2. Action criteria

Type of material		*Action criteria* if 1 - 1,000 tonnes of material is disturbed		*Action criteria* if more than 1,000 tonnes of material is disturbed	
		Existing + Potential Acidity		Existing + Potential Acidity	
Texture range	Approx. clay content (%)	Equivalent sulfur (%S)*	Equivalent acidity (moles H^+/tonne)*	Equivalent sulfur (%S)*	Equivalent acidity (moles H^+/tonne)*
Coarse texture *Sands to loamy sands*	≤5	0.03	18	**0.03**	**18**
Medium texture *Sandy loams to light clays*	5 - 40	0.06	36	**0.03**	**18**
Fine texture *Medium to heavy clays and silty clays*	≥40	0.1	62	**0.03**	**18**

Source: Stone *et al.* (1998).
* Oven-dry basis

Based on the estimated volume of soil to be disturbed and soil description, that being sand/silty sands (coarse texture), the action criteria of 0.03%S or 18 moles H^+/tonne of net acidity is applicable for the site.

3.4 Laboratory analysis

3.4.1 Initial pH screening

Soil pH (F) were reported between 5.2 to 9.2 with oxidised pH (F_{ox}) reported between 1.5 to 7.2 across all analysed soil samples. Reaction rates during the oxidising process were reported generally as moderate (2).

3.4.2 Chromium Reducible Sulfur suite

The net acid generating capacity of the soil was calculated using the chromium suite acid base accounting (ABA) method (acidity units) described in Stone *et al.* (1998), and as follows:

Net acidity = Potential Sulfidic Acidity + Actual Acidity + Retained Acidity – Measured ANC/FF

The laboratory certificates are provided in Appendix B. A summary of the analytical results showing the reported concentration ranges is provided in Table 3.

Table 3. Summary of Chromium Reducible Sulfur analysis

Borehole	Depth (m)	%S	S_{CR} (moles H^+/t)	TAA (moles H^+/t)	S_{NAS} (moles H^+/t)	ANC (moles H^+/t)	Net acidity (moles H^+/t)
BH1	1.0	0.016	10	nd	-	-	10
BH1	4.0	0.025	15	**34**	nd	-	**49**
BH1	5.5	**0.133**	**83**	**59**	nd	-	**147**
BH1	6.0	**0.034**	**21**	**20**	-	-	**41**
BH2	4.0	0.015	nd	**18**	-	-	**28**
BH2	5.0	0.011	nd	12	-	-	**19**
BH3	6.0	**0.155**	**97**	**91**	nd	-	**190**
BH5	2.0	0.014	nd	nd	-	116	nd
Action criteria		**0.03**	**18**	**18**	Not applicable		**18**

Table notes:
S_{cr} = Chromium reducible sulfur
TAA = Titratable actual acidity
S_{NAS} = Net acid soluble sulfur
ANC = Acid neutralising capacity
nd = non detect

A brief interpretation of the analytical results is provided below:

– Potential acid sulfate soils (PASS) were identified. Three samples reported oxidisable sulfur concentrations above the action criteria of 0.03%S and the corresponding three samples reporting over the equivalent potential acidity trail of 18 moles H^+/tonne of soil.

– Actual acid sulfate soils (AASS) were also identified with five samples (including the three PASS samples noted above) reporting over the titratable actual acidity (TAA) action criteria of 18 moles H^+/tonne of soil.

– Net acidity concentrations reported above the action criteria of 18 moles H^+/tonne for six samples

4 Discussion and conclusion

The results of the investigation indicate that *in situ* soils contain potential acidity (PASS), and actual acidity (AASS). The *Byron Local Environmental Plan 2014* maps the site as Class 3 land with the proposed development resulting in excavations and the lowering of the water table beyond one metre below natural ground surface.

PASS were identified with acidity concentrations ranging from <10 to 97 moles H^+/tonne with three samples exceeding the action criteria of 18 moles H^+/tonne. AASS was also identified with acidity concentrations ranging from <2 to 91 moles H^+/tonne.

These results suggest that an ASS Management Plan (ASSMP) will be required (refer to Appendix C) and it is recommended (see section 5) that a nominal rate of >10 kg of ag-lime per tonne of soil is applied to soils existing at a depth of >5.5 mbgl and a nominal rate of >2 kg of aglime per tonne of soil is applied to soils existing at a depth of <5.5 mbgl.

From an acid sulfate soils perspective, ADG considers that the site is suitable for future development, and that the identified PASS/AASS soils can be appropriately managed to prevent impacts on the surrounding environment. The following section briefly details suitable management and treatment options for the property.

For further recommendations on groundwater management and contingency measures in relation to ASS for the site, refer to the site specific Dewatering Management Plan (DMP) (ADG Consulting, 2019).

5 Recommendations

ADG recommends that a treatment pad site is developed for neutralisation and validation before off site removal. This strategy is considered to be acceptable due to the proposed volume of material and the area available on-site. Further recommendations including AASS/PASS management are found in Appendix C.

6 Limitations

ADG Consulting Pty Ltd (ADG) has prepared this report for Mercato on Byron Pty Ltd in accordance with the agreed scope of work. The services performed by ADG have been conducted in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No other warranty or guarantee, expressed or implied, is made as to the professional advice included in this report.

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7 References

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Ahern, C.R., McElnea, A.E. and Sullivan, L.A. (2004). *Acid Sulfate Soils Laboratory Methods Guidelines*. Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland, Australia. ISBN 1 920920 66 8

Department of Mines (NSW), Geological Survey of New South Wales. 1972. *1:250,000 Tweed Heads.*

Department of Land and Water Conservation. 1997. *The Acid Sulfate Soil (ASS) Risk Map – Edition 2 1:25,000 Byron Bay.*

Stone et al. 1998. *Acid Sulfate Soil Manual, 1998*. Acid Sulfate Soil Management Advisory Committee. Including Acid Sulfate Soil Planning Guidelines.

Appendix A: Figures

Figure 1. Site and borehole locations

Client: Mercato on Byron Pty Ltd

Project: Lot 6 on DP619224 & Lot 9 DP 619224, 106 Jonson Street, Byron Bay, NSW

Project ref: ADG965.19

Drawn by: Samuel Gregory Date: 09.07.19 Base plan source: NSW Six Maps

Figure 1 Acid Sulphate Soils Sampling Locations

N

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ADG CONSULTING
SOIL AIR WATER ENVIRONMENT

Appendix B: Laboratory Reports

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095 Ph: 08 8162 5130 E: adelaide@alsglobal.com
☒BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 48 Callemondah Drive Gladstone QLD 4680 Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com
☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: sam...
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐...field NSW 2164

Environmental Division
Brisbane
Work Order Reference
EB1916240

Telephone : + 61-7-3243 7222

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT (List due date): 28.06.19
Non Standard or urgent TAT (List due date):
ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABO...
Custody Seal ... N/A
Free ice / frozen ... receipt? N/A
Random Sam...
Other comme...

RELINQUISHED BY: Samuel Gregory
DATE/TIME: 24.06.19

RECEIVED BY: M. Birch
DATE/TIME: 14.10 24/6/19

RELINQUISHED ...
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (*refer to codes below*)	TOTAL BOTTLES	EA037		EA033						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH1 0.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
2	BH1 1m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
3	BH1 1.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
4	BH1 2m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
5	BH1 2.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
6	BH1 3m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
7	BH1 3.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
8	BH1 4m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
9	BH1 4.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
10	BH1 5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
11	BH1 5.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
12	BH1 6m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
				TOTAL	12	12								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: **please tick →**

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☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 E: samples.sydney@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com
☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT (List due date): 28.06.19
Non Standard or urgent TAT (List due date):
ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Samuel Gregory	M. Birkett		
DATE/TIME: 24.06.19	DATE/TIME: 24/6/19 14.10	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037		EA033						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH2 0.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
14	BH2 1m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
15	BH2 1.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
16	BH2 2m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
17	BH2 2.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
18	BH2 3m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
19	BH2 4m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
20	BH2 5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
21	BH2 6m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
				TOTAL	9	9								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☑BRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 48 Callemondah Drive Gladstone QLD 4680
Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com

☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740
Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 / ☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com / samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com

☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting

OFFICE: PO Box 6405, Yatala DC, QLD

PROJECT: Byron Bay **PROJECT NO.:** ADG965.19

ORDER NUMBER: **PURCHASE ORDER NO.:**

PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372

SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859

COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**

Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au

Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

Standard TAT **(List due date): 28.06.19**

Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY: Samuel Gregory	**RECEIVED BY:** M. Birzer	**RELINQUISHED BY:**	**RECEIVED BY:**
DATE/TIME: 24.06.19	DATE/TIME: 24/6/19 14:10	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)								Additional Information
LAB ID	**SAMPLE ID**	**DATE / TIME**	**MATRIX**	**TYPE & PRESERVATIVE** *(refer to codes below)*	**TOTAL BOTTLES**	**EA037**		**EA033**						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
22	BH3 0.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
23	BH3 1m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
24	BH3 1.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
25	BH3 2m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
26	BH3 2.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
27	BH3 3m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
28	BH3 4m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
29	BH3 5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
30	BH3 6m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
				TOTAL	9	9								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

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☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com
☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 28.06.19**
Non Standard or urgent TAT **(List due date):**
ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: Samuel Gregory	RECEIVED BY: M. Birch	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 24.06.19	DATE/TIME: 14.10 24/6/19	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA037		EA033						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
31	BH5 0.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
32	BH5 1m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
33	BH5 1.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
34	BH5 2m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
35	BH5 2.5m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
SNR 36	BH5 3m	21-06-19	S	ASS	1	X								Sample frozen day of sampling
				TOTAL	6	6								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EB1916240**		
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: mail@adgconsulting.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: ADG935.19	Page	: 1 of 3
Order number	:	Quote number	: EB2018ADGCON0001 (BNBQ/004/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SAMUEL GREGORY		

Dates

Date Samples Received	: 24-Jun-2019 14:10	Issue Date	: 24-Jun-2019
Client Requested Due Date	: 28-Jun-2019	Scheduled Reporting Date	: **28-Jun-2019**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 0.9°C - Ice Bricks present
Receipt Detail	: MEDIUM ESKY RECEIVED	No. of samples received / analysed	: 35 / 35

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised that sample "BH5 3m" was not received at the laboratory (denoted SNR on the scanned COC).**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - EA037 ASS Field Screening Analysis
EB1916240-001	21-Jun-2019 00:00	BH1 0.5m	✓
EB1916240-002	21-Jun-2019 00:00	BH1 1m	✓
EB1916240-003	21-Jun-2019 00:00	BH1 1.5m	✓
EB1916240-004	21-Jun-2019 00:00	BH1 2m	✓
EB1916240-005	21-Jun-2019 00:00	BH1 2.5m	✓
EB1916240-006	21-Jun-2019 00:00	BH1 3m	✓
EB1916240-007	21-Jun-2019 00:00	BH1 3.5m	✓
EB1916240-008	21-Jun-2019 00:00	BH1 4m	✓
EB1916240-009	21-Jun-2019 00:00	BH1 4.5m	✓
EB1916240-010	21-Jun-2019 00:00	BH1 5m	✓
EB1916240-011	21-Jun-2019 00:00	BH1 5.5m	✓
EB1916240-012	21-Jun-2019 00:00	BH1 6m	✓
EB1916240-013	21-Jun-2019 00:00	BH2 0.5m	✓
EB1916240-014	21-Jun-2019 00:00	BH2 1m	✓
EB1916240-015	21-Jun-2019 00:00	BH2 1.5m	✓
EB1916240-016	21-Jun-2019 00:00	BH2 2m	✓
EB1916240-017	21-Jun-2019 00:00	BH2 2.5m	✓
EB1916240-018	21-Jun-2019 00:00	BH2 3m	✓
EB1916240-019	21-Jun-2019 00:00	BH2 4m	✓
EB1916240-020	21-Jun-2019 00:00	BH2 5m	✓
EB1916240-021	21-Jun-2019 00:00	BH2 6m	✓
EB1916240-022	21-Jun-2019 00:00	BH3 0.5m	✓
EB1916240-023	21-Jun-2019 00:00	BH3 1m	✓
EB1916240-024	21-Jun-2019 00:00	BH3 1.5m	✓
EB1916240-025	21-Jun-2019 00:00	BH3 2m	✓
EB1916240-026	21-Jun-2019 00:00	BH3 2.5m	✓
EB1916240-027	21-Jun-2019 00:00	BH3 3m	✓
EB1916240-028	21-Jun-2019 00:00	BH3 4 m	✓
EB1916240-029	21-Jun-2019 00:00	BH3 5m	✓
EB1916240-030	21-Jun-2019 00:00	BH3 6m	✓
EB1916240-031	21-Jun-2019 00:00	BH5 0.5m	✓
EB1916240-032	21-Jun-2019 00:00	BH5 1m	✓
EB1916240-033	21-Jun-2019 00:00	BH5 1.5m	✓
EB1916240-034	21-Jun-2019 00:00	BH5 2m	✓
EB1916240-035	21-Jun-2019 00:00	BH5 2.5m	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES		
- A4 - AU Tax Invoice (INV)	Email	mail@adgconsulting.com.au
MICHAEL CAMPBELL		
- *AU Certificate of Analysis - NATA (COA)	Email	mail@adgconsulting.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@adgconsulting.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@adgconsulting.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@adgconsulting.com.au
- Chain of Custody (CoC) (COC)	Email	mail@adgconsulting.com.au
- EDI Format - XTab (XTAB)	Email	mail@adgconsulting.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1916240**	Page	: 1 of 9
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Project	: ADG935.19	Date Samples Received	: 24-Jun-2019 14:10
Order number	:	Date Analysis Commenced	: 26-Jun-2019
C-O-C number	: ----	Issue Date	: 27-Jun-2019 18:16
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 35		
No. of samples analysed	: 35		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
~ = Indicates an estimated value.

- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 0.5m	BH1 1m	BH1 1.5m	BH1 2m	BH1 2.5m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916240-001	EB1916240-002	EB1916240-003	EB1916240-004	EB1916240-005
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.0	5.8	5.9	5.8	6.0
pH (Fox)	----	0.1	pH Unit	5.1	2.7	4.5	4.3	4.3
Reaction Rate	----	1	-	1	2	2	2	2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 3m	BH1 3.5m	BH1 4m	BH1 4.5m	BH1 5m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916240-006	EB1916240-007	EB1916240-008	EB1916240-009	EB1916240-010
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.9**	**5.8**	**5.2**	**5.4**	**5.5**
pH (Fox)	----	0.1	pH Unit	**4.4**	**3.1**	**2.0**	**2.6**	**2.5**
Reaction Rate	----	1	-	**2**	**2**	**2**	**2**	**2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 5.5m	BH1 6m	BH2 0.5m	BH2 1m	BH2 1.5m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	*CAS Number*	*LOR*	*Unit*	EB1916240-011	EB1916240-012	EB1916240-013	EB1916240-014	EB1916240-015
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	5.5	5.6	7.3	5.9	5.8
pH (Fox)	----	0.1	pH Unit	1.5	2.1	6.0	4.5	5.0
Reaction Rate	----	1	-	3	3	2	2	1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH2 2m	BH2 2.5m	BH2 3m	BH2 4m	BH2 5m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916240-016	EB1916240-017	EB1916240-018	EB1916240-019	EB1916240-020
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.2	6.1	6.0	5.7	5.6
pH (Fox)	----	0.1	pH Unit	4.6	4.9	4.9	2.7	2.9
Reaction Rate	----	1	-	2	1	1	2	2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH2 6m	BH3 0.5m	BH3 1m	BH3 1.5m	BH3 2m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916240-021	EB1916240-022	EB1916240-023	EB1916240-024	EB1916240-025
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	**5.7**	**5.6**	**6.3**	**6.0**	**6.0**
pH (Fox)	----	0.1	pH Unit	**3.9**	**4.6**	**5.7**	**5.2**	**5.2**
Reaction Rate	----	1	-	**2**	**3**	**2**	**2**	**2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH3 2.5m	BH3 3m	BH3 4 m	BH3 5m	BH3 6m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916240-026	EB1916240-027	EB1916240-028	EB1916240-029	EB1916240-030
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	6.5	6.5	6.2	6.0	5.6
pH (Fox)	----	0.1	pH Unit	4.8	5.0	3.2	3.2	1.8
Reaction Rate	----	1	-	2	2	2	2	3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH5 0.5m	BH5 1m	BH5 1.5m	BH5 2m	BH5 2.5m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916240-031	EB1916240-032	EB1916240-033	EB1916240-034	EB1916240-035
				Result	Result	Result	Result	Result
EA037: Ass Field Screening Analysis								
pH (F)	----	0.1	pH Unit	8.1	7.2	8.1	7.6	9.2
pH (Fox)	----	0.1	pH Unit	7.2	5.5	5.8	5.9	5.7
Reaction Rate	----	1	-	4	3	3	3	3

QUALITY CONTROL REPORT

Work Order	: **EB1916240**	Page	: 1 of 3
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Project	: ADG935.19	Date Samples Received	: 24-Jun-2019
Order number	:	Date Analysis Commenced	: 26-Jun-2019
C-O-C number	: ----	Issue Date	: 27-Jun-2019
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 35		
No. of samples analysed	: 35		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to higl

Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA037: Ass Field Screening Analysis (QC Lot: 2426769)									
EB1916240-001	BH1 0.5m	EA037: pH (F)	----	0.1	pH Unit	6.0	6.1	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	5.1	5.2	0.00	0% - 20%
EB1916240-011	BH1 5.5m	EA037: pH (F)	----	0.1	pH Unit	5.5	5.4	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	1.5	1.5	0.00	0% - 50%
EA037: Ass Field Screening Analysis (QC Lot: 2426770)									
EB1916240-021	BH2 6m	EA037: pH (F)	----	0.1	pH Unit	5.7	5.7	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	3.9	4.0	0.00	0% - 20%
EB1916240-031	BH5 0.5m	EA037: pH (F)	----	0.1	pH Unit	8.1	8.1	0.00	0% - 20%
		EA037: pH (Fox)	----	0.1	pH Unit	7.2	7.2	0.00	0% - 20%

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

- **No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.**

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1916240**	Page	: 1 of 4
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Telephone	: +61-7-3243 7222
Project	: ADG935.19	Date Samples Received	: 24-Jun-2019
Site	: ----	Issue Date	: 27-Jun-2019
Sampler	: SAMUEL GREGORY	No. of samples received	: 35
Order number	:	No. of samples analysed	: 35

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037)								
BH1 0.5m,	BH1 1m,	**21-Jun-2019**	**26-Jun-2019**	18-Dec-2019	✓	**27-Jun-2019**	18-Dec-2019	✓
BH1 1.5m,	BH1 2m,							
BH1 2.5m,	BH1 3m,							
BH1 3.5m,	BH1 4m,							
BH1 4.5m,	BH1 5m,							
BH1 5.5m,	BH1 6m,							
BH2 0.5m,	BH2 1m,							
BH2 1.5m,	BH2 2m,							
BH2 2.5m,	BH2 3m,							
BH2 4m,	BH2 5m,							
BH2 6m,	BH3 0.5m,							
BH3 1m,	BH3 1.5m,							
BH3 2m,	BH3 2.5m,							
BH3 3m,	BH3 4 m,							
BH3 5m,	BH3 6m,							
BH5 0.5m,	BH5 1m,							
BH5 1.5m,	BH5 2m,							
BH5 2.5m								

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
ASS Field Screening Analysis	EA037	4	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
ASS Field Screening Analysis	* EA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines, version 2.1 June 2004. As received samples are tested for pH field and pH fox and assessed for a reaction rating.

Preparation Methods	Method	Matrix	Method Descriptions
Drying only	EN020D	SOIL	In house

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

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☒BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 48 Callemondah Drive Gladstone QLD 4680 Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com
☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
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☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818

Environmental Division
Brisbane
Work Order Reference
EB1916880

Telephone : + 61-7-3243 7222

CLIENT: ADG Consulting	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	Standard TAT (List due date): 4.07.19 / Non Standard or urgent TAT (List due date):
OFFICE: PO Box 6405, Yatala DC, QLD		
PROJECT: Byron Bay PROJECT NO.: ADG965.19	ALS QUOTE NO.: BNBQ/004/18	COC SEQUENCE NUMBER (Circle)
ORDER NUMBER: PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	COC: 1 2 3 4 5 6 7
PROJECT MANAGER: Michael Campbell CONTACT PH: 0415 960 372		OF: 1 2 3 4 5 6 7
SAMPLER: Samuel Gregory SAMPLER MOBILE: 0418795859	RELINQUISHED BY: Samuel Gregory	RECEIVED BY:
COC Emailed to ALS? (YES / NO) YES EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au	DATE/TIME: 28.06.19	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au		

FOR LABORATORY USE ONLY: Custody Seal Intact? N/A; Free ice / frozen ice bricks present upon receipt? N/A; Random Sample Temperature on Receipt; Other comment

RELINQUISHED BY: DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES			EA033						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH1 0.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
2	BH1 1m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
3	BH1 1.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
4	BH1 2m	21/06/2019	S	ASS	1									Sample frozen day of sampling
5	BH1 2.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
6	BH1 3m	21/06/2019	S	ASS	1									Sample frozen day of sampling
7	BH1 3.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
8	BH1 4m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
9	BH1 4.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
10	BH1 5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
11	BH1 5.5m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
12	BH1 6m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
				TOTAL	12									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: *please tick* →

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095
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☑BRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Gladstone QLD 4680
Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com

☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740
Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com

☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 4.07.19**
Non Standard or urgent TAT **(List due date):**
ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	°C		
Other comment:			

RELINQUISHED BY: Samuel Gregory	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 28.06.19	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES			EA033						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH2 0.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
14	BH2 1m	21/06/2019	S	ASS	1									Sample frozen day of sampling
15	BH2 1.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
16	BH2 2m	21/06/2019	S	ASS	1									Sample frozen day of sampling
17	BH2 2.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
18	BH2 3m	21/06/2019	S	ASS	1									Sample frozen day of sampling
19	BH2 4m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
20	BH2 5m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
21	BH2 6m	21/06/2019	S	ASS	1									Sample frozen day of sampling
				TOTAL	9									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF COUNTODY

ALS Laboratory: *please tick* →

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095
Ph: 08 8162 5130 E: adelaide@alsglobal.com

☑BRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 48 Callemondah Drive Gladstone QLD 4680
Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com

☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740
Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5/585 [illegible] Smithfield NSW 2164
Ph: 02 4014 2500 E: [illegible] sydney@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com

☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting

OFFICE: PO Box 6405, Yatala DC, QLD

PROJECT: Byron Bay **PROJECT NO.:** ADG965.19

ORDER NUMBER: **PURCHASE ORDER NO.:**

PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372

SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859

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TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 4.07.19**
Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY: Samuel Gregory	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
DATE/TIME: 28.06.19	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES			EA033							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
22	BH3 0.5m	21/06/2019	S	ASS	1										Sample frozen day of sampling
23	BH3 1m	21/06/2019	S	ASS	1										Sample frozen day of sampling
24	BH3 1.5m	21/06/2019	S	ASS	1										Sample frozen day of sampling
25	BH3 2m	21/06/2019	S	ASS	1										Sample frozen day of sampling
26	BH3 2.5m	21/06/2019	S	ASS	1										Sample frozen day of sampling
27	BH3 3m	21/06/2019	S	ASS	1										Sample frozen day of sampling
28	BH3 4m	21/06/2019	S	ASS	1										Sample frozen day of sampling
29	BH3 5m	21/06/2019	S	ASS	1										Sample frozen day of sampling
30	BH3 6m	21/06/2019	S	ASS	1			X							
				TOTAL	9										

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF COUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095
Ph: 08 8162 5130 E: adelaide@alsglobal.com

☑BRISBANE 2 Byth Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 48 Callemondah Drive Gladstone QLD 4680
Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com

☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740
Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850
Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐NEWCASTLE 5/585 [illegible] Smithfield NSW 2164
Ph: 02 4014 2500 E: [illegible] sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818
Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com

☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
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Standard TAT **(List due date): 4.07.19**
Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY: Samuel Gregory	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
DATE/TIME: 28.06.19	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES			EA033						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
31	BH5 0.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
32	BH5 1m	21/06/2019	S	ASS	1									Sample frozen day of sampling
33	BH5 1.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
34	BH5 2m	21/06/2019	S	ASS	1			X						Sample frozen day of sampling
35	BH5 2.5m	21/06/2019	S	ASS	1									Sample frozen day of sampling
36	BH5 3m	21/06/2019	S	ASS	1									Sample frozen day of sampling
				TOTAL	6									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1916880**

Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: mail@adgconsulting.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: ADG965.19 Byron Bay	Page	: 1 of 2
Order number	:	Quote number	: EB2018ADGCON0001 (BNBQ/004/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SAMUEL GREGORY		

Dates

Date Samples Received	: 28-Jun-2019 09:41	Issue Date	: 01-Jul-2019
Client Requested Due Date	: 04-Jul-2019	Scheduled Reporting Date	: **04-Jul-2019**

Delivery Details

Mode of Delivery	: Samples On Hand	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: ----
Receipt Detail	: Rebatch	No. of samples received / analysed	: 8 / 8

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **This work order has been created to rebatch samples from EB1916240**
- **Please be advised, the requested reporting date cannot be accommodated by ALS in this instance. For more information please contact Client Services at ALSEnviro.Brisbane@alsglobal.com**
- ***01/07/19*: SRN has been resent to acknowledge revised reporting date.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1916880-001	21-Jun-2019 00:00	BH1 1m	✓
EB1916880-002	21-Jun-2019 00:00	BH1 4m	✓
EB1916880-003	21-Jun-2019 00:00	BH1 5.5m	✓
EB1916880-004	21-Jun-2019 00:00	BH1 6m	✓
EB1916880-005	21-Jun-2019 00:00	BH2 4m	✓
EB1916880-006	21-Jun-2019 00:00	BH2 5m	✓
EB1916880-007	21-Jun-2019 00:00	BH3 6m	✓
EB1916880-008	21-Jun-2019 00:00	BH5 2m	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	mail@adgconsulting.com.au

MICHAEL CAMPBELL

- *AU Certificate of Analysis - NATA (COA)	Email	mail@adgconsulting.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@adgconsulting.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@adgconsulting.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@adgconsulting.com.au
- Chain of Custody (CoC) (COC)	Email	mail@adgconsulting.com.au
- EDI Format - XTab (XTAB)	Email	mail@adgconsulting.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1916880**	Page	: 1 of 4
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Project	: ADG965.19 Byron Bay	Date Samples Received	: 28-Jun-2019 09:41
Order number	:	Date Analysis Commenced	: 03-Jul-2019
C-O-C number	: ----	Issue Date	: 05-Jul-2019 10:45
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 8		
No. of samples analysed	: 8		

NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime ($CaCO_3$) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	BH1 1m	BH1 4m	BH1 5.5m	BH1 6m	BH2 4m
Client sampling date / time				21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
				EB1916880-001	EB1916880-002	EB1916880-003	EB1916880-004	EB1916880-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.6	4.3	4.4	4.7	4.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	34	59	20	18
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	0.05	0.10	0.03	0.03
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	0.016	0.025	0.133	0.034	0.015
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	10	15	83	21	<10
EA033-D: Retained Acidity								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	<0.02	0.04	----	----
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	<0.02	0.05	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	<0.02	<0.02	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	<10	<10	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	<0.02	<0.02	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	0.08	0.24	0.07	0.04
Net Acidity (acidity units)	----	10	mole H+ / t	10	49	147	41	28
Liming Rate	----	1	kg CaCO3/t	<1	4	11	3	2
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	<0.02	0.08	0.24	0.07	0.04
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	10	49	147	41	28
Liming Rate excluding ANC	----	1	kg CaCO3/t	<1	4	11	3	2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH2 5m	BH3 6m	BH5 2m	----	----
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	----	----
Compound	CAS Number	LOR	Unit	EB1916880-006	EB1916880-007	EB1916880-008	--------	--------
				Result	Result	Result	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**4.8**	**4.4**	**9.0**	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**12**	**91**	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**0.14**	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.011**	**0.155**	**0.014**	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**97**	<10	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	**0.58**	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	**116**	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	**0.19**	----	----
EA033-D: Retained Acidity								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	**0.05**	----	----	----
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	**0.06**	----	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	<0.02	----	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	<10	----	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	<0.02	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.03**	**0.30**	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**19**	**190**	<10	----	----
Liming Rate	----	1	kg CaCO3/t	**1**	**14**	<1	----	----
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.03**	**0.30**	<0.02	----	----
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**19**	**190**	<10	----	----
Liming Rate excluding ANC	----	1	kg CaCO3/t	**1**	**14**	<1	----	----

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EB1916880**	Page	: 1 of 3
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Project	: ADG965.19 Byron Bay	Date Samples Received	: 28-Jun-2019
Order number	:	Date Analysis Commenced	: 03-Jul-2019
C-O-C number	: ----	Issue Date	: 05-Jul-2019
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 8		
No. of samples analysed	: 8		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 2440140)									
EB1916705-002	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.07	0.07	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	43	43	0.00	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.3	4.3	0.00	0% - 20%
EA033-B: Potential Acidity (QC Lot: 2440140)									
EB1916705-002	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.019	0.018	5.40	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	12	11	0.00	No Limit
EA033-D: Retained Acidity (QC Lot: 2440140)									
EB1916705-002	Anonymous	EA033: sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	0.12	0.11	9.78	No Limit
		EA033: Net Acid Soluble Sulfur (20Je)	----	0.02	% S	0.16	0.14	9.33	No Limit
		EA033: KCl Extractable Sulfur (23Ce)	----	0.02	% S	0.05	0.05	0.00	No Limit
		EA033: HCl Extractable Sulfur (20Be)	----	0.02	% S	0.20	0.19	6.09	0% - 50%
		EA033: acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	74	67	9.39	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 2440140)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.5 pH Unit	97.8	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	24.6 mole H+ / t	82.8	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2440140)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.23483 % S	114	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 2440140)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	10 % CaCO3	102	70	130
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-D: Retained Acidity (QCLot: 2440140)								
EA033: Net Acid Soluble Sulfur (20Je)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033: KCl Extractable Sulfur (23Ce)	----	0.02	% S	<0.02	0.052 % S	108	70	130
EA033: HCl Extractable Sulfur (20Be)	----	0.02	% S	<0.02	0.027 % S	88.9	70	130

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1916880**	Page	: 1 of 4
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Telephone	: +61-7-3243 7222
Project	: ADG965.19 Byron Bay	Date Samples Received	: 28-Jun-2019
Site	: ----	Issue Date	: 05-Jul-2019
Sampler	: SAMUEL GREGORY	No. of samples received	: 8
Order number	:	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **<u>NO</u> Method Blank value outliers occur.**
- **<u>NO</u> Duplicate outliers occur.**
- **<u>NO</u> Laboratory Control outliers occur.**
- **<u>NO</u> Matrix Spike outliers occur.**
- **For all regular sample matrices, <u>NO</u> surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **<u>NO</u> Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **<u>NO</u> Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL** — Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method		*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)			*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA033-A: Actual Acidity								
80* dried soil (EA033)								
BH1 1m,	BH1 4m,	**21-Jun-2019**	**03-Jul-2019**	20-Jun-2020	✓	**03-Jul-2019**	01-Oct-2019	✓
BH1 5.5m,	BH1 6m,							
BH2 4m,	BH2 5m,							
BH3 6m,	BH5 2m							
EA033-B: Potential Acidity								
80* dried soil (EA033)								
BH1 1m,	BH1 4m,	**21-Jun-2019**	**03-Jul-2019**	20-Jun-2020	✓	**03-Jul-2019**	01-Oct-2019	✓
BH1 5.5m,	BH1 6m,							
BH2 4m,	BH2 5m,							
BH3 6m,	BH5 2m							
EA033-C: Acid Neutralising Capacity								
80* dried soil (EA033)								
BH1 1m,	BH1 4m,	**21-Jun-2019**	**03-Jul-2019**	20-Jun-2020	✓	**03-Jul-2019**	01-Oct-2019	✓
BH1 5.5m,	BH1 6m,							
BH2 4m,	BH2 5m,							
BH3 6m,	BH5 2m							
EA033-D: Retained Acidity								
80* dried soil (EA033)								
BH1 1m,	BH1 4m,	**21-Jun-2019**	**03-Jul-2019**	20-Jun-2020	✓	**03-Jul-2019**	01-Oct-2019	✓
BH1 5.5m,	BH1 6m,							
BH2 4m,	BH2 5m,							
BH3 6m,	BH5 2m							
EA033-E: Acid Base Accounting								
80* dried soil (EA033)								
BH1 1m,	BH1 4m,	**21-Jun-2019**	**03-Jul-2019**	20-Jun-2020	✓	**03-Jul-2019**	01-Oct-2019	✓
BH1 5.5m,	BH1 6m,							
BH2 4m,	BH2 5m,							
BH3 6m,	BH5 2m							

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	10	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chromium Suite for Acid Sulphate Soils	EA033	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Appendix C: Site ASSMP

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Acid Sulfate Soil Management Plan

Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales

July 2019

Prepared for:
Mercato on Byron Pty Ltd
c/- Gaskin Construction Services Pty Ltd

Report details

Project ref:	ADG965.19
Project Manager:	Michael Campbell
Report title:	Acid Sulfate Soil Management Plan
	Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development:
	Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales
Version:	Rev0
Author:	Dr Samuel Gregory
Reviewer:	Michael Campbell
Client:	Mercato on Byron Pty Ltd
	c/- Gaskin Construction Services Pty Ltd
Client contact:	John Gaskin
Distribution date:	9 July 2019
Distributed to:	Gaskin Construction Services Pty Ltd
Copies:	1 PDF

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Director & Principal Environmental Scientist

Date: 9 July 2019

Table of Contents

1 Introduction

ADG Consulting Pty Ltd (ADG) was engaged by Mercato on Byron Pty Ltd care of Gaskin Construction Services Pty Ltd to undertake an acid sulfate soil investigation and acid sulfate soil management plan (as deemed necessary) as part of addressing a Byron Shire Council (BSC) request for information (RFI) for Development Application 10.2018.650.1 for the proposed mixed-use development for tourist and visitor accommodation, 'The Essence of Byron Hotel' within Lot 6 on DP619224 and Part of Lot 9 on DP617509, situated at 106 Jonson Street, Byron Bay, New South Wales (the site). The proposed scope of work was detailed in ADG's fee proposal dated 6 June 2019, and acceptance of the engagement was confirmed by email 13 June 2019.

1.1 Background

The site comprises two adjoining allotments with a total area of 0.55 hectares and it is proposed to be developed for mixed use (residential and commercial use). An ASS Investigation Report (ADG Consulting, 2019a) concluded that the site is affected by actual acid sulfate soils (AASS) and potential acid sulfate soils (PASS). An Acid Sulfate Soil Management Plan (ASSMP) (this report) has been developed to ensure that PASS/AASS that may be disturbed as a result of the proposed development are appropriately planned for and managed during construction to prevent environmental harm.

1.2 Relevant guidelines

This ASSMP makes reference to the following documents:

- *Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1, June 2004*. Ahern et al. (2004). Department of Natural Resources, Mines and Energy.
- *Acid Sulfate Soil Manual, 1998*. Stone et al. 1998. Acid Sulfate Soil Management Advisory Committee. Including Acid Sulfate Soil Planning Guidelines.

1.3 ASSMP objectives

The objectives of the ASSMP is to:

- Control any acid generation from in-situ materials that are to be excavated during the development of the site
- Reduce (to an acceptable level) any potential for on-site and off-site impacts to the environment and public.

2 ASS investigation summary (ADG Consulting, 2019a)

2.1 Methodology

An acid sulfate soil investigation was undertaken at the site on 21 June 2019. A total of four boreholes were constructed to a maximum depth of 6.0m below the ground surface within the proposed development footprint (3 x 6.0m and 1 x 3.0m).

2.2 Sub-surface conditions

The sub-surface conditions identified during the site investigation can generally be separated into two descriptions, as follows:

Fill: A filled sequence typically comprising pale grey-brown silty sand comprising fine grained sand / mineral sand throughout, to depths of 0.8-1.2m below the ground surface. Concentrated mineral sands were identified in BH1 and BH5 (although of varying layer thickness), with surface deposits recorded in BH1.

Natural soils: A sequence generally comprising silty sands and sands with fine grained sand and was encountered at depths ranging from 1.2m to termination depth.

The water table at the time of the investigation ranged from 0.340 to 1.865 metres below ground level (mbgl) across the site.

2.3 Results and discussion

A brief interpretation of the analytical results is provided below:

- Potential acid sulfate soils (PASS) were identified. Three samples reported oxidisable sulfur concentrations above the action criteria of 0.03%S and a further three samples reporting over the equivalent potential acidity trail of 18 moles H^+/tonne of soil.

- Actual acid sulfate soils (AASS) were also identified with five samples reporting over the titratable actual acidity (TAA) action criteria of 18 moles H^+/tonne of soil.

- Net acidity concentrations reported above the action criteria of 18 moles H^+/tonne for six samples.

PASS were identified with acidity concentrations ranging from <10 to 97 moles H^+/tonne with three samples exceeding the action criteria of 18 moles H^+/tonne. AASS was already identified with acidity concentrations ranging from <2 to 91 moles H^+/tonne. The results of the investigation indicate that *in situ* soils contain potential acidity (PASS), and actual acidity (AASS). It was recommended that a nominal rate of >10 kg of ag-lime per tonne of soil is applied to soils existing at a depth of >5.5mbgl and a nominal rate of >2kg of aglime per tonne of soil is applied to soils existing at a depth of <5.5mbgl.

3 Management strategy

Management strategies for ASS include:

- avoidance;
- minimisation of disturbance;
- neutralisation;
- hydraulic separation; and
- strategic reburial of potential ASS.

On the basis that disturbance of ASS during construction is considered unavoidable as part of development works, minimisation of ASS disturbance and neutralisation of disturbed ASS is proposed. To mitigate and manage potential adverse environmental impacts during the site development process, the following will be/has been undertaken:

- An ASS Specialist (such as ADG) should review planned site earthworks and operations
- The provision of appropriate erosion control measures to limit run-off from the site
- The provision of this ASSMP detailing the management strategy and procedures for lime treatment of any disturbed material
- Monitoring and treatment (if necessary) of groundwater as per the site specific Dewatering Management Plan (DMP)
- Site supervision and regular reporting to the Principal Contractor/Manager throughout the construction phase.

3.1 Neutralising agent and treatment rate

Neutralising agents should be slightly alkaline with a low solubility and a pH ranging from 7.0 to 9.0. These characteristics minimise the potential for the neutralising agent to leach from the soil during rainfall events, thereby preventing the contamination of surface waters and groundwater. The preferred neutralising agent is fine agricultural lime ($CaCO_3$) which has an acid neutralising value of approximately 97% $CaCO_3$.

The following maximum liming rate has been reported (excluding ANC) applicable to soils for the site. A safety factor of 1.5 has been included to allow for non-homogeneous mixing and poor reactivity of the lime, both of which reduce the theoretical neutralising efficiency.

The maximum liming rate is as follows:

- 14 kg CaCO3/tonne of soil.

If soil is to be excavated below the depths tested as indicated in the Acid Sulfate Soils Investigation Report (ADG Consulting, 2019a) and this ASSMP, further soil testing will be required prior to earthworks.

3.2 On-site soil treatment

A temporary treatment area will be established where all excavated material will be stockpiled within a bunded area (constructed to reduce surface water runoff). Excavated material will be spread out to a thickness of 0.25m with fine Ag-lime to be applied evenly over the surface and thoroughly blended in at a rate of between 2kg / tonne and 10 kg / tonne, depending on the excavation depth (ADG Consulting, 2019a).

- Bunding will be constructed around the perimeter of the designated ASS treatment pad to intersect and contain runoff from the pad during the soil treatment operations (refer to Figure 1).
- A suitably sized drain for the collection of soil leachate will be constructed to collect drainage water from the treatment pad in the event of heavy rainfall. This will be constructed in a manner to protect nearby sensitive receptors and be surface treated with fine Ag-lime.
- Leachate with these collection drains will be tested to determine the quality of the water (refer to section 3.5). The water may need be treated prior to discharge from the site.

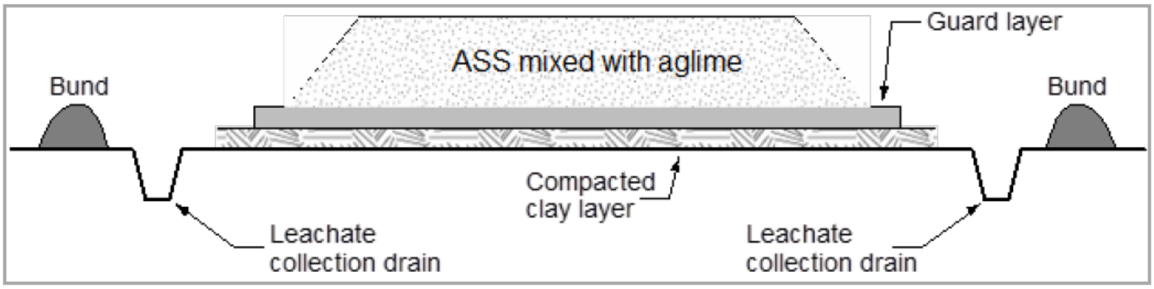

Figure 1. General depiction of ASS treatment pad

The compacted clay layer shown on Figure 1 at the base of the treatment pad (0.3m to 0.5m thick) must be constructed from low permeability (clay) soil and compacted such that it forms impermeable layer. This must be compacted sufficiently to restrict infiltration. A guard layer of neutralising agent must be placed across the surface of the treatment pad prior to the placement of untreated ASS.

3.3 Validation of treated material

Validation sampling is recommended and should be undertaken at a minimum rate of one sample per 200 m^3 of neutralised material to confirm sufficient neutralisation of the identified potential acidity trail. All samples will be recovered in accordance with Stone *et al.* (1998) and submitted to an approved acid sulfate soil laboratory for analysis. Validation samples will be analysed using the Chromium Reducible Sulfur suite.

If validation results indicate that neutralising treatment was insufficient to comply with the performance criteria provided, then additional treatment will need to be undertaken on the subject material with subsequent re-validation using the Chromium Reducible Sulfur suite.

3.4 Off-site treatment

If treatment is unable to be undertaken onsite, then excavated ASS material will be transported to an offsite disposal/treatment facility for lime treatment or strategic reburial with treatment to be carried out in accordance with an approved ASSMP for the site accepting the disposed soil.

3.4.1 Transportation

Stockpiling of ASS prior to disposal/treatment has the potential for oxidation. The risk of oxidation is considered to increase with the duration which material is stockpiled for and the number of times material is handled/re-handled. All material excavated must be immediately transported from the excavation area to the disposal/treatment location.

3.5 Performance indicators

3.5.1 Soil

Chromium Reducible Sulfur suite analysis carried out for validation of applied liming rates will be deemed to be acceptable if the net acidity recorded is <0.03%S.

3.5.2 Waters

Field monitoring and lab analysis of retained water will be carried out for pH, electrical conductivity (EC), total iron (Fe), total aluminium (Al), dissolved oxygen, turbidity and total dissolved solids (TDS) after a rainfall event or presence of retained water. Levels of these parameters considered acceptable are outlined within the site specific Dewatering Management Plan (groundwater) and also as outlined within Stone *et al*. (1998) for retained water as follows:

- pH 6.5 – 9.0
- TDS <1500 mg/L
- Fe (total) 500 µg/L
- Al (total) 5µg/L (pH < 6.5) and 100 µg/L (pH>6.5)

The monitoring frequency as outlined within the site specific dewatering management plan (ADG Consulting, 2019b) will be adhered to for groundwater monitoring.

3.6 Contingencies

If lime treatment of ASS is unsuccessful, or where validation targets are not being met as per the performance indicators, then the following contingencies shall be carried out:

- The earthworks program will be reviewed and action taken to mitigate any breach of standards.
- Onsite audit of the ASSMP will be carried out to ensure its proper implementation. Monitoring will be increased to ensure ongoing compliance.

3.7 Responsibilities

The satisfactory implementation of the ASSMP will be the responsibility of the Principal Contractor. The ASS Specialist will ensure that:

- The Principal Contractor is aware of ASS site specific conditions the management of ASS as per this ASSMP
- The collection of samples and subsequent testing is carried out and the reporting of results to the Principal Contractor is carried out in a timely manner.

The Principal Contractor responsibilities will include:

- Requirements for the implementation of the ASSMP
- The potential for modification of construction plans to comply with the ASSMP.

3.8 Reporting

The ASS Specialist shall report to the Principal Contractor on a regular basis in regard to laboratory reports and any issues in regard to on-site compliance for ASS.

4 Limitations

ADG Consulting Pty Ltd (ADG) has prepared this report for Mercato on Byron Pty Ltd in accordance with the agreed scope of work. The services performed by ADG have been conducted in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No other warranty or guarantee, expressed or implied, is made as to the professional advice included in this report.

This report is solely for the use of Mercato on Byron Pty Ltd & Byron Shire Council and ADG accepts no responsibility for the use of any part of this report for any other purpose or by third parties, as it may not contain sufficient information for the purposes of other parties or users. This report must only be presented in full, and may not be used for any other objective, except where prior written approval is obtained from ADG. This report does not comment on legal obligations, as legal advice can only be given by qualified legal practitioners.

The information contained in this report is provided to minimise potential impacts on the receiving environment, however implementation of the described management procedures does not guarantee that the objectives will be achieved.

The information contained in this report is considered to be accurate at the date of issue. Subsurface conditions, including contaminant concentrations can change in space and time, either through natural processes or by the accidental or intentional addition of contaminants to a site. Where conditions encountered subsequently at the site are significantly different from those reported herein, ADG must be notified and be provided the opportunity to review the conclusions and recommendations of this report.

5 References

ADG Consulting. 2019a. *Acid Sulfate Soil Investigation Report - Proposed 'Essence of Byron Hotel' Mixed Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales*.

ADG Consulting. 2019b. *Dewatering Management Plan - Proposed 'Essence of Byron Hotel' Mixed Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales*.

Ahern, C.R., McElnea, A.E. and Sullivan, L.A. (2004). *Acid Sulfate Soils Laboratory Methods Guidelines*. Queensland Department of Natural Resources, Mines and Energy, Indooroopilly, Queensland, Australia. ISBN 1 920920 66 8

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Department of Land and Water Conservation. 1997. *The Acid Sulfate Soil (ASS) Risk Map – Edition 2 1:25,000 Byron Bay.*

Stone et al. 1998. *Acid Sulfate Soil Manual, 1998*. Acid Sulfate Soil Management Advisory Committee. Including *Acid Sulfate Soil Planning Guidelines*.

2019NTH015

DA 10.2018.650.1 Mixed use development, Jonson Street, Byron Bay

ATTACHMENTS TO COUNCIL REPORT

8. PRELIMINARY SITE INVESTIGATION

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Stage 1 Preliminary Site Investigation:

Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales

July 2019

Prepared for:
Mercato on Byron Pty Ltd
c/- Gaskin Construction Services Pty Ltd

Report details

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Project Manager:	Michael Campbell
Report title:	Stage 1 Preliminary Site Investigation Proposed 'Essence of Byron Hotel' Mixed-Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales
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Table of Contents

1 Introduction

ADG Consulting Pty Ltd (ADG) was engaged by Mercato on Byron Pty Ltd care of Gaskin Construction Services Pty Ltd to undertake a Stage 1 Preliminary Site Investigation (PSI) for contamination as part of addressing a Byron Shire Council (BSC) request for information (RFI) for Development Application 10.2018.650.1 for the proposed mixed-use development for tourist and visitor accommodation, 'The Essence of Byron Hotel' within Lot 6 on DP619224 and Part of Lot 9 on DP617509, situated at 106 Jonson Street, Byron Bay, New South Wales (the site). The proposed scope of work was detailed in ADG's fee proposal dated 6 June 2019, and acceptance of the engagement was confirmed by email 13 June 2019.

1.1 Background

The site comprises two adjoining allotments with a total area of 0.55 hectares and it is proposed to be developed for mixed use (residential and commercial use). In response to the development application (10.2018.650.1) an RFI was issued by BSC for the site on 27 May 2019 identifying that the following additional information (not exhaustive) was needed to enable appropriate assessment:

- An Acid Sulfate Soil (ASS) investigation
- A Stage 1 Preliminary Site Investigation (PSI) for contamination
- A groundwater investigation to determine 'groundwater quality and quantity'
- Revision of the current Dewatering Management Plan (DMP) (Rev 0, ADG Consulting, 2019).

The Stage 1 Preliminary Site Investigation (Stage 1 PSI, this report) is required to confirm the site history and identify any potential sources of contamination and associated contaminants relating to previous and current land uses on the site. As part of the Stage 1 PSI, a limited ground penetrating investigation has been completed across the site (by way of vertical borehole drilling) in order to characterise contaminants of concern and to enable limited soil sampling and analysis of materials. The additional requirements of the BSC RFI are addressed in separate reports.

No information has been provided to ADG regarding site specific groundwater or acid sulfate soil conditions however ADG has previously undertaken water quality compliance monitoring of dewatering works for a development project adjacent to the site. The BSC RFI makes reference to the possibility of a 'rutile processing plant' and asbestos being present on or near the site, with this information being used to inform the soil sampling and analysis of this report.

1.2 Relevant guidelines

The investigation was conducted with reference to the following documents:

- *AS 4482.1, Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds.* Standards Australia. 2005.
- *AS 4482.2, Guide to the sampling and investigation of potentially contaminated soil, Part 2: Volatile substances.* Standards Australia. 1999.
- *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites.* Office of Environment and Heritage (OEH). 2011.
- *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd edition.* Department of Environment and Conservation (DEC). 2006.
- *Managing Land Contamination – Planning Guidelines SEPP 55–Remediation of Land.* Department of Urban Affairs and Planning & EPA. 1998.
- *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999 (April 2013).* National Environment Protection Council (NEPC). 2013.
- *Sampling Design Guidelines.* EPA NSW. 1995.
- *Waste Classification Guidelines (Part 1 : Classifying Waste).* EPA NSW. 2014.

1.3 Investigation objectives

The investigation objectives relating to this PSI were to:

- Develop a site history to determine if the site has been exposed to potentially contaminating activities.
- Identify potential sources of contamination and associated contaminants.
- Travel to site to carry out an inspection
- Describe the site and surrounding environment.
- Provide preliminary characterisation of potential contaminants in fill and natural materials from six (6) investigative boreholes.
- Establish semi-permanent groundwater monitoring wells in each of three (3) deeper boreholes to enable triangulation of groundwater flow direction
- Conduct a baseline groundwater monitoring event within the monitoring well network (described above) to establish standing groundwater levels, infer groundwater flow direction and enable preliminary characterisation of potential contaminants in groundwater underlying the site.
- Provide an opinion on whether or not the site is contaminated.
- Provide recommendations for additional investigations if required.
- Develop a Stage 1 PSI report.

1.4 Scope of work

To achieve the investigation objectives, the following scope of work was undertaken:

- A desktop study, including:

  1. Review of any previous reports, additional information and/or drawings provided by the Client.
  2. Review of published geology and soil maps for the area.
  3. Search of available state government records and development records.
  4. Review of current and historic aerial photographs of the site and surrounds.
  5. Search of licensed groundwater bores within a 1 km radius of the site.
  6. Review of the Byron Local Environmental Plan and other relevant planning framework.
  7. Search of the Department of Defence website for unexploded ordnance.
  8. Conduct a Dial Before You Dig search to identify underground service locations and potential contaminant migration pathways.

- Preparation of a site-specific Workplace Health and Safety Plan for the site investigation.

- Conduct an interview with current site owner representative/s and/or occupants (if possible) to confirm historic site activities.

- Travel to/from and conduct an inspection of the site and surrounding environment to identify potentially contaminating activities and areas.

- The construction of a six (6) investigative boreholes (3 at 6m and 3 at 3m below existing surface levels). The boreholes were situated in pre-determined locations and in areas with accessibility. Borehole profiles were photographed to support visual, olfactory and analytical assessments.

  Note: The investigation is a Stage 1 PSI, as AS4482.1:2005 recommended sampling density for 95% probability of detecting a 23.6m circular hotspot is ~15 equally spaced boreholes. The current limited investigation utilises only 6 boreholes, which is considered appropriate for initial investigations given the preliminary nature of the investigation.

- Disturbed soil samples were recovered at nominated discrete depth ranges (i.e. 0.1, 0.5 and 1.0m) or where visual or olfactory observations suggested otherwise. Soil samples were recovered from fill materials, and at the natural soil interface (if present) to termination depth. Spoil material was placed back into the borehole following sampling.

- Field screening of all recovered soil samples for volatile organic compounds (VOCs) using a photo-ionisation detector (PID).

- Selective laboratory analysis of 12 primary soil samples for typical contaminants associated with historical industrial/commercial land use, including metals/metalloids (arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury), total recoverable hydrocarbons (TRHs), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs) and organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and phenolic substances. Two additional samples were collected for potential asbestos containing materials (ACM). Field duplicates and inter-laboratory duplicates were analysed for QA/QC purposes at a rate of at least 5% (1 per 20 primary samples), and a trip spike & blank also analysed for QA/QC purposes. The primary samples selected for analysis were analysed by Australian Laboratory Services (ALS) Brisbane and the corresponding inter-laboratory duplicates analysed by ALS Sydney. ALS Environmental has National Association of Testing Authorities (NATA) accreditation for the above analyses.

- Selective laboratory analysis of 5 primary soil samples for low resolution gamma spectrometry. The primary samples selected for analysis were analysed by Queensland Health (Radiation & Nuclear Science Unit).

- Installation of a temporary monitoring well within three (3) boreholes to a depth of 3.0mbgl), using the following materials and methods:

    - 50mm diameter PN18 grade uPVC well casing, including a 1.5m screened casing underlying solid casing to approximately ground level — with end push-caps, filter sand to ~1000mm bgl, bentonite seal to 200mm bgl and concreting to existing surface level.

- Return seven (7) days following monitoring well installation to measure stabilised standing water levels (SWLs) and conduct sampling for baseline groundwater monitoring event (GME):
    - Measure SWLs using a groundwater interface probe.
    - Where standing groundwater was encountered in each well:
        - Purge ≥3x SWL casing volumes of groundwater and/or bail dry
        - Allow groundwater to recharge with sufficient volume for sample collection
    - Collection of 3x representative groundwater samples (1 per wet well) for analysis of field parameters: pH, electrical conductivity, redox potential, dissolved oxygen and turbidity.
    - Collection of 3x samples (1 per wet well) for laboratory analysis of potential contaminants of concern/interest for GME baseline (see below).

- Couriering and laboratory analysis of three (3) groundwater samples for typical contaminants associated with industrial/commercial land-use including dissolved heavy metals (aluminium, arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc and mercury), total iron, total aluminium, chloride, sulphate, total recoverable hydrocarbons (TRHs), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), and polycyclic aromatic hydrocarbons (PAHs). The samples were analysed by Australian Laboratory Services (ALS) Brisbane. ALS Environmental has National Association of Testing Authorities (NATA) accreditation for the above analyses.

- Preparation of a Stage 1 Preliminary Site Investigation Report (this Report) describing the findings and providing recommendations for any subsequent site investigations for contamination.

2 Site characteristics

2.1 Property description

The subject site is described as Lot 6 on DP619224 and Part of Lot 9 on DP617509 and is situated adjacent to the corner of Carlyle Street and Jonson Street at 106 Jonson Street in Byron Bay, New South Wales.

The site is rectangular in shape and is shown in Figure 1, Appendix A, and Images 1 to 5 below taken during the site inspection on 21 June 2019. Additional photographs showing specific features are provided in Appendix B.

Image 1. View west from Jonson Street, within carpark area of site

Image 2. View north-west from south-east corner of the site

Image 3. View south-west from north-east corner of the site

Image 4. View south from the rear of the site

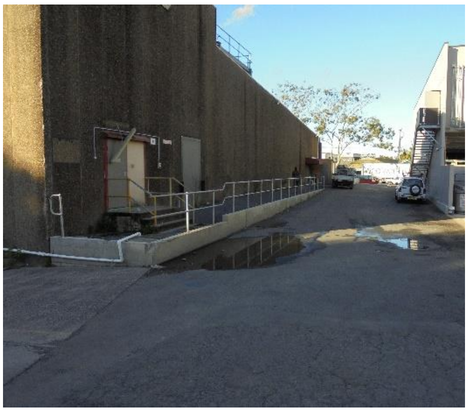

Image 5. View east from the rear of the site

2.2 Surrounding environment

The surrounding environment and land use is described briefly in Table 1.

Table 1 Surrounding land use and environment

Direction	Environment
North	Byron Plaza carpark & shopping centre commercial retail development, then more commercial retail development.
East	Jonson Street, then commercial retail development and commercial residential (backpacker) development, then residential development.
South	Mercato on Byron commercial retail development, then commercial residential (backpacker) development, then more commercial development
West	Former rail corridor land and associated drainage channel that leads to the Cumbebin Swamp wetland to the southwest, then residential development.

2.3 Topography

The site is considered to be generally level based on existing/previous site use for a Woolworths shopping centre.

2.4 Geology

The geology at the site is mapped at 1:250,000 as being Quaternary aged river gravels, alluvium, sand and clay (Tweed Heads, Geological Survey of NSW, 1972).

The Acid Sulfate Soil (ASS) Risk Map – Edition 2 1:25,000 Byron Bay Map categorises the site as 'HIGH PROBABILITY'. The map describes the area as high probability of occurrence of acid sulfate soil materials within the soil profile, within 1 metre of the ground surface (NSW Government, Department of Land and Water Conservation, 1997).

2.5 Hydrogeology

A search for licensed groundwater bores using the Australian Government Bureau of Meteorology, Australian Groundwater Explorer tool was carried out. A total of seven licenced groundwater bores were identified within a 500 m radius of the site. No groundwater level, quality or yield information has been provided. A summary of the bore information available is provided in Appendix C.

Based on the installation of a groundwater monitoring network at the site (this report), the sites' location, topography and geology, the inferred groundwater flow on the site is toward the east, south-east.

2.6 Vegetation

The site has been largely cleared of vegetation, although garden beds with sporadic vegetation for aesthetic appeal are present. No vegetation appeared stressed or discoloured as a result of likely or potential contamination.

3 Site history

3.1 Previous investigations

Previous investigations in relation to site contamination are summarised below.

3.1.1 HMC 2011

HMC (2011) conducted a preliminary contaminated land investigation in 2011 to assess the likelihood of contamination on or around the site. The report references the following:

- The operation of a sawmill on Lot 6 and Lot 9 (the site) from 1890 - 1911
- Mineral sand processing plant operating from 1935 to 1961 (Zircon Rutile Ltd) and then 1961 – 1972 (Associated Minerals Consolidated)
- Mineral sand processing ceased circa 1972 with the then development of the present-day supermarket building.

3.1.2 PE 2017

PE (2017) conducted a soil contamination and waste classification assessment for 98-114 Jonson Street that included the southern portions of Lot 6 and 9. Asbestos (both bonded and friable) were identified to various depths within fill materials. It is noted that the asbestos affected areas of Lot 6 and 9 detailed within the PE report are outside of the current development application.

The PE report also makes reference to a radiological site investigation being carried out with radiation levels for the majority of fill material existing at 98-114 Jonson Street being:

- *'below the Gamma Count Rate action criteria applied in NSW, however were higher than the more conservative residential limits applied in Qld'*

It is unclear if the radiological site investigation extended to the southern portion of Lot 6 and 9 (the site).

3.2 Historic aerial photograph review

A total of five historic aerial photographs of the site were reviewed (from previous reports and online sources) for the site to ascertain the historic site use and these are discussed below.

1958: A number of aboveground structures are obvious on Lot 6 although the image resolution is poor to make out what these may be.

1966: Lot 9 is devoid of aboveground structures and it appears that it is affected by a rail corridor on its western edge. Numerous aboveground structures are evident on Lot 6 along with service roads and access points to these structures and these indicate that the site was developed for industrial use.

1991: Previous aboveground structures mentioned above have been demolished and the site is now covered in hardstand (carparking and service roads) with the present day supermarket building existing in the north-west corner of Lot 6.

2016: No obvious change from 1991.

2019: An area to the south of the site has been converted from carparking to commercial use, with the development of a shopping centre along the southern boundary. No other obvious changes from 1991 are noted.

3.3 Government records

A review of the NSW Environmental Protection Agency (NSW EPA) contaminated sites register confirms that the site has not been notified to the NSW EPA (as of 19 June 2019). Further, a review of the NSW Department of Primary Industries' (NSW DPI) Cattle Dip Register confirms that the site is not included on the NSW DPI Cattle Dip Register.

A search for unexploded ordnance (UXO) reported no identified locations within 500 m of 106 Jonson Street.

Refer to search outputs included at Appendix D.

3.4 Historic site activities

The site history review indicates that the site was developed for industrial use pre-1972 with the following industries noted.

- Mineral sand processing
- Sawmill operations.

3.4.1 Waste disposal

No clear and obvious waste disposal areas were identified although there is some potential for waste disposal areas to exist on the site based on historic industrial use.

3.4.2 Chemical storage and transfer areas

No clear and obvious chemical storage and/or transfer areas were identified although it is presumed that chemical storage areas existed based on historic industrial use.

3.5 Summary of historic land-use

The site history information provides evidence to suggest the site has been subject to a range of potentially significant sources of contamination including the following information based on a review of previous investigation reports and searches:

- 1890 and 1911 - operation of sawmill and associated activities
- 1935 and 1972 - mineral sands processing and associated activities.
- Post 1972 to present - shopping centre / supermarket, with the majority of the site covered in hardstand pavements.

4 Site investigation

4.1 Site inspection

A site inspection was conducted by Dr Samuel Gregory and David Knight of ADG on 21 June 2019 during the soil/groundwater investigation. Only areas that were accessible were inspected. In accordance with NEPC (2013), the features listed in **Table 2** were noted during the site inspection. The site inspection provides minor evidence that the site has been subject to potentially significant sources of contamination.

Table 2 Site inspection observations

Features	Observations
Slope	Generally less than 5%.
Configuration	Two lots.
Aspect	East.
Erosion Potential	Very low.
Run on/flooding potential	Generally low – though it is expected that the loading ramp area to the rear of the site may be prone to flooding events.
Vegetation	Predominately cleared apart from a garden bed along the Jonson Street frontage.
Exposure	Moderate-high.
Presence of rock outcrops	None observed.
Site drainage	Controlled locally with curb side drainage on Jonson Street.
Presence of waterways	None observed.
Current uses of the site	Vacant, although recently has been used for commercial purposes (as a supermarket).
Disturbed, coloured or stained soil	None observed.
Bare soil patches	None observed.
Disturbed or distressed vegetation	None observed.
Presence of chemical holding containers, holding tanks etc.	None observed.
Unusual odours	None observed.
Quality of surface water	None observed.

Features	Observations
Condition of buildings, concrete and bitumen floors and roads etc.	Good quality. Potential asbestos containing materials (ACM) noted on wall cladding and the presence of two pad mounted substations in the south-eastern corner of the site.
Presence of fill, containment areas, sumps, drains and landfill sites – existing and buried	None noted apart from drains and sump located to the rear of the site (loading ramp area). Downpipes/drains associated with capturing rainfall present.
Underground structures that may be associated with sub-surface contamination	None observed.
Condition of materials storage and handling facilities, and any solid or liquid waste disposal areas	None observed.
Evidence of off-site migration, on-site spillage of dangerous goods, abnormal colouration of ground or surface waters or sheens on water surfaces	No discolouration of water or sheens were observed.

4.2 Notable Observations

Refer to Appendix B for photographic evidence of notable observations made during the site inspection.

As a summary these include:

- Potential ACM existing within wall cladding of the supermarket.
- Two pad mounted substations existing in the south eastern corner of the site.

5 Soil investigation

A soil investigation was undertaken across the site during the site inspection on 21 June 2019. The investigation employed the use of ute mounted drill rig and spiral flight auger to construct 6 boreholes to a maximum depth of 6.0m (refer to Figure 2, Appendix A). Details are provided in the following sections with investigative photographs provided in Appendix B.

5.1 Design

A judgemental sampling pattern was employed across the site based on accessibility and likely contamination status. The assessment of which sample depths were analysed was made on a judgmental basis to target any soils identified as likely to be impacted based on the soil log findings, and to ensure an appropriate representation of both fill materials and the underlying natural soils.

5.2 Methodology

The soil sampling methodology was undertaken in accordance with AS4482, and involved the following:

- Soil samples were extracted by a third-party contractor using ute mounted drill rig and auger capable of sampling to six metres below ground level (mbgl);
- Sampling locations were recorded by ADG using a handheld Global Positioning System unit;
- Observations regarding specific soil conditions at sample locations were recorded on soil logs by ADG, including:
  - depth of samples collected (every 500mm to termination depth);
  - evidence of:
    - disturbed, coloured or stained soil; or
    - unusual odour within soil profile; and
    - presence or absence of ACM.
- Soil samples were collected direct from the auger and placed in a resealable plastic bag and homogenised;
- All soil samples (unless noted) were field screened for the presence of volatile organic compounds (VOC's) using a photo-ionisation detector (PID);
- Soil samples were collected in laboratory supplied containers and placed in an esky containing ice bricks for transport under chain of custody procedures; and
- Each sample jar was labelled with location number, sub-sample number and date. Sample nomenclature included the project number (ADG965.19), sampling location and depth (i.e. BH1_0.5 metres) and sample date.

5.3 Soil analytical program

The total number of samples collected, and the number of samples identified for analysis at the laboratory are:

- 47 primary samples collected
- 12 primary samples analysed

Parameters routinely analysed were as follows:

- Heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc)
- TRH (C_6-C_{40})
- BTEXN (benzene, toluene, ethylbenzene, xylene and naphthalene)
- Polycyclic aromatic hydrocarbons (PAHs).

Limited analysis was also carried out for the following parameters of interest:

- Polychlorinated biphenyls (PCBs)
- Phenols
- Organochlorine Pesticides (OCPs) / Organophosphate Pesticides (OPPs)
- Low resolution gamma spectrometry.

The presence/absence of asbestos containing materials were also analysed where observed or suspected.

6 Groundwater investigation

A total of three groundwater monitoring wells (MW1 – MW3) were constructed during the soil investigation described above within soil locations BH1-BH3. The boreholes were advanced, where possible, to a depth of 6m. The monitoring well locations are shown in Figure 3, Appendix A. Due to borehole collapse from unconsolidated sand, groundwater monitoring wells were constructed to between 2.95 m and 2.96m depth using Class 18 50 mm diameter uPVC bore casing and screen. The wells were screened to 1.5 m below the ground surface. The boreholes were backfilled using filter grade silica sand and the annulus sealed to 0.1 m depth using hydrated bentonite pellets and further capped with 0.1 m concrete flush with the surface.

One round of groundwater sampling was conducted on 28 June 2019. The sampling was undertaken with reference to Australian and New Zealand Standard (AS/NZS) *5667.11:1998 – Water Quality: Sampling: Guidance on sampling of groundwaters*. Samples were recovered from each well.

The wells were purged to evacuate stagnant water prior to sampling. Approximately three casing volumes of water was purged or if unable, purged until each well was dry, prior to the recovery of representative groundwater samples. The groundwater samples were collected directly into laboratory supplied sample bottles using disposable clear-view bailers, which were dedicated to each well to prevent cross-contamination.

6.1 Groundwater analytical program

Field analysis of each sample was undertaken using a TPS 90-FLT logger. The instrument was calibrated in accordance with the manufacturer's instructions prior to use. The samples were immediately analysed on-site for pH, electrical conductivity, dissolved oxygen, redox potential, turbidity and temperature.

The three primary groundwater samples were collected for laboratory analysis of the following contaminants of concern:

- Dissolved metals including aluminium, arsenic, cadmium, chromium, copper, iron, lead, nickel, zinc and mercury
- Total metals (iron and aluminium)
- Chloride and sulphate
- TRH (C_6-C_{40})
- BTEXN
- PAHs

7 Assessment criteria

The following assessment criteria has been applied:

- National Environment Protection Council (NEPC 2013) *National Environment Protection (Assessment of Site Contamination) Measure* as amended in 2013;
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018*. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (ANZG, 2018), which supersedes *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (ANZECC/ARMCANZ). 2000.

The applicable investigation/screening levels (typically referred here as HIL-B/HSL-B) to be applied to the site considers the following generic land use:

> *"residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats".*

8 Quality assurance of data

An assessment of data quality in accordance with the ASC NEPM (NEPC 2013) is provided in the following sections.

8.1 Quality assurance (QA)

8.1.1 Sampling procedure

All sampling was conducted by Dr Samuel Gregory (soils) and David Knight (groundwater) of ADG. Samples were transferred into laboratory supplied sample containers using clean nitrile gloves to prevent the potential for cross contamination from sampling equipment.

8.1.2 Sample handling and transport

Sample containers were filled leaving no head space, and sealed with gas-tight, non-absorptive seals (where applicable). Samples were transferred immediately to an insulated, ice-filled container to minimise microbial activity, loss of volatiles and analyte degradation/oxidation. The samples remained chilled until arrival at the laboratory. All samples were received by the laboratories within the specified holding times.

8.1.3 Documentation

The samples were transported under chain of custody (COC) documentation which included the following information:

- Site identification
- Samplers details
- Sample identification and depth
- Sample matrix
- Collection time and date
- Preservation method
- Analyses to be performed
- Courier details.

Sample receipt notification (SRN) forms were provided by the receiving laboratories. The SRN's described the condition in which the samples and COC documentation were received and provided confirmation of the preservation methods and analyses required.

8.1.4 Duplicate samples

One field soil duplicate (DUP 1) and one inter-laboratory soil duplicate (TRIP 1) were recovered and analysed from a total of 12 primary soil samples. The soil duplicate sample frequency (16.7%) is greater than the 5% recommended minimum frequency. For the purposes of calculating statistical relative percent differences (RPDs), analytes reporting non-detectable concentrations were considered to have concentrations of 50% of the laboratory limit of reporting (LOR). RPDs shall only be considered to be material where both primary and duplicate results are greater than or equal to 10 times the LOR.

8.1.5 Laboratory QA

ALS Environmental (Brisbane) was the primary laboratory and ALS Environmental (Sydney) was the secondary laboratory used for all analyses. ALS has National Association of Testing Authorities (NATA) accreditation for the analyses conducted, and the analytical methods utilised comply with the requirements described in NEPC (2013).

Extraction and analysis of all samples was conducted within the appropriate holding times and the laboratory limits of reporting (LORs) were below the remediation criteria and therefore considered suitable for the analytes of interest.

8.2 Quality control (QC)

8.2.1 Field duplicates

One field soil duplicate (DUP 1) was analysed to assess the precision of the soil sampling program. AS 4482.1 – 2005 describes that typical RPD acceptance criteria for quality control samples is 30% – 50%, and higher variation can be expected for organic analysis and for low concentrations of analytes. No elevated RPD (>40%) was reported for inorganic analyses although one RPD of 89% was reported for C_{34-40}, which is due to the low concentrations reported in the primary and duplicate samples (<130 mg/kg respectively), both of which are less than 10 times the LOR for C_{34-40} of 100 mg/kg, and therefore this RPD exceedance is not considered material.

8.2.2 Inter-laboratory duplicates

One inter-laboratory soil duplicate (TRIP 1) was recovered and analysed to assess the precision of the primary laboratory. There were no elevated RPDs (>40%) reported for any analyses.

8.2.3 Trip blanks/spikes

A trip spike and trip blank were analysed to assess the potential for sample interferences and loss of volatiles during soil sampling and transportation. The trip spike and control spike reported RPDs ranging from 15 – 21% indicating potential loss of volatiles prior to analysis at the primary laboratory. These RPD exceedances are not considered material as volatile analytes were not identified as a primary contaminant of concern after primary analysis had been reviewed.

No detectable concentrations of TRH volatiles and/or BTEX were reported (all below the detection limits) in the trip blank, indicating that sample interference or cross contamination is unlikely.

8.3 Laboratory QC

The laboratory QC information is described in the ALS Quality Control Reports and Interpretive Quality Control Reports that are provided in Appendix E. QC outliers for primary samples were reported for the laboratory control only (OCP/OPPs), therefore the laboratory QC is generally considered to be acceptable.

8.4 QA/QC summary

The QA assessment indicates that the sampling methodology and analytical methods were appropriate for the media and contaminants of concern. The quality of the analytical data is considered to be acceptable to support the conclusions made herein.

9 Results

Results have been assessed against NEPM 2013 criteria for soil and groundwater. For clarity soil assessment criteria is based on health investigation level B (HIL-B) and health screening levels (HSL-B) while groundwater assessment criteria is based on groundwater investigation levels (GILs). Laboratory reports have been provided within Appendix E.

9.1 Soils

9.1.1 Soil Logs

The soil conditions encountered during the investigation are summarised as follows:

Fill: A filled sequence typically comprising pale grey-brown silty sand comprising fine grained sand / mineral sand throughout, to depths of 0.8-1.2m below the ground surface. Concentrated mineral sands were identified in BH1, BH5 and BH6 (although of varying layer thickness), with surface deposits recorded in BH1.

Natural soils: A sequence generally comprising silty sands and sands with fine grained sand and was encountered at depths ranging from 1.2m to termination depth.

9.1.2 Soil analytical results

Analytical data summary tables are presented below and the laboratory certificates are provided in Appendix E. Selective laboratory analysis of 12 primary soil samples for typical contaminants associated with industrial land use was carried out along with analysis of selected material analysis for ACM confirmation and radiological analysis.

9.1.3 Asbestos

Two bulk samples (ACM-1 and ACM-2) from wall cladding materials were analysed for asbestos presence. Both reported confirmation of asbestos detection with asbestos type reported as chrysotile.

9.1.4 Metals

A summary of the reported metal concentrations in soils is provided in Table 3 below.

Table 3 Summary of metal concentrations in soils

Analyte	Concentration (mg/kg)		HIL – B (mg/kg)
	Minimum	Maximum	
Arsenic	<5	<5	500
Cadmium	<1	<1	150
Chromium	<2	9	500
Copper	<5	14	30,000
Lead	<5	23	1200
Mercury	<0.1	0.4	120
Nickel	<2	8	1200
Zinc	<5	67	60,000

The reported metal concentrations in soils are below residential (HIL B) criteria. The LORs (0.1 to 5 mg/kg) are less than the respective criteria.

9.1.5 TRHs

A summary of the reported TRH concentrations in soils is provided in Table 4 below.

Table 4 Summary of TRH concentrations in soils

TRHs	Range (mg/kg)	HSL – B (mg/kg)*
C_6-C_{10} (F1^A)	<10	40
C_{10}-C_{16} (F2^B)	<50	110
C_{16}-C_{34}	<100 - 190	-
C_{34}-C_{40}	<100	-

Table notes:

^{A} = To obtain F1 subtract the sum of BTEX concentrations from the C_6-C_{10} fraction
^{B} = To obtain F2 subtract the naphthalene concentration from the >C_{10}-C_{16} fraction
* = Based on most sensitive soil type (conservative)

No detectable concentrations of volatile TRHs F1 (C_6-C_{10}) or semi-volatile TRHs F2 (C_{10}-C_{16}) were reported in any analysed primary soil sample. All soil samples were less than the applicable criteria (HSL-B). The LORs (10 to 100 mg/kg) are less than the respective criteria.

9.1.6 BTEXN

No detectable concentrations of benzene, toluene, ethyl-benzene, xylenes or naphthalene were reported in any analysed primary soil samples. The LORs (0.2 to 0.5 mg/kg) are less than the respective HSL-B criteria.

9.1.7 PAHs

No detectable concentrations of PAHs were reported above HIL B criteria. The LOR (0.5 mg/kg) are less than the available residential (HIL B) criteria.

9.1.8 OCPs

No detectable concentrations of OCPs were reported in any analysed primary soil samples. The LORs (0.05 to 0.2 mg/kg) are less than the available criteria.

9.1.9 OPPs

No detectable concentrations of OPPs were reported in any analysed primary soil samples. The LORs (0.05 to 0.2 mg/kg) are less than the available criteria.

9.1.10 Phenols

No detectable concentrations of phenolic compounds were reported in any analysed primary soil samples. The LORs (0.5 to 2.0 mg/kg) are less than the available criteria.

9.1.11 PCBs

No detectable concentrations of PCBs were reported in any analysed primary soil samples. The LOR (0.1 mg/kg) is less than the available criteria.

9.1.12 Radiological assessment

Derived Air Kerma Rates (dAKR) can be calculated from a subset of samples measured via high resolution gamma spectrometry (HRGS) using conversion factors. A linear correlation coefficient can be applied that relates dAKR determination by HRGS and counts per second per kilogram (cps/kg) that are determined by low resolution gamma spectroscopy (LRGS).

Five samples submitted for LRGS have used a linear correlation coefficient calculated for similar type of samples to estimate the approximate dAKR. Based on the dAKR for 5 samples the reported results were 0.007, 0.067, 0.147, 0.080, and 0.413 µGy/h with a reported range of 0.007 – 0.413 µGy/h.

Based on a worst case scenario (i.e. 0.413 µGy/h) the results suggest that the site may have more material of similar type which contains elevated concentrations of naturally occurring radiological material (NORM), in particular uranium-238 and thorium-232 and their associated decay progeny, which can result in elevated terrestrial air kerma rates and hence may constitute a radiological contaminant.

9.1.13 Photo-ionisation detector (PID) screening

The reported volatile organic compound (VOC) concentrations in soils from in-situ field testing is provided in Table 5 below. The instrument calibration certificate is provided in Appendix F.

Table 5 VOC concentrations in soil samples

Borehole	Concentration range (ppm)
BH1	0.3 – 0.9
BH2	0.2 – 0.9
BH3	0.0 – 0.1
BH4	0.2 – 0.4
BH5	0.0 – 0.3
BH6	0.1 – 0.4

While low level VOC screening levels ranged from 0.0 to 0.9 ppm, no detectable concentrations of volatile TRHs F1 (C_6-C_{10}) were reported in any soil samples analysed. No notable odorous smells were obvious in the field.

9.2 Groundwater

9.2.1 Groundwater observations

Standing water levels gauged 28 June 2019 ranged from 0.340 mbgl (MW1) to 1.865 mbgl (MW3), suggesting inferred groundwater flow is likely to be in an east, south-east direction towards Jonson Street. Groundwater was observed to be very turbid (>NTU) and contained a high concentration of sediment. Olfactory observations indicated the presence of a sulfidic smell.

Refer to Appendix E for laboratory reports.

9.2.2 Physico-chemical

Results of the field analysis indicate that the groundwater is generally mildly acidic, with pH levels ranging from approximately 5.74 to 6.11 and electrical conductivity ranging from fresh to brackish between 0.04 mS/cm to 0.91 mS/cm. Dissolved oxygen levels in static groundwater ranged from approximately 14.8 – 24.5 % saturation.

9.2.3 Groundwater analytical results

Concentrations of all dissolved metals (except for cadmium) were detected within the groundwater monitoring network. Concentrations of dissolved copper (MW1 – 0.011 mg/L) and dissolved zinc (0.009 – 0.028 mg/kg) were reported above the available freshwater water trigger values provided in ANZG (2018) for the receiving environment and the NEPM GILs.

Low level detections of hydrocarbons within the C_{16}-C_{34} fraction band were reported within MW2 (170 µg/L) and MW3 (150 µg/L). There were no reported BTEXN and PAH concentrations with all samples reporting below the LOR.

10 Conclusions and recommendations

The site has likely been subject to mineral sand processing and the presence of ACM used as part of wall cladding to aboveground structures (supermarket). It is expected that any underlying mineral sands will be removed by excavation with disposal of this material requiring consultation with the Department of Health with respect to radiation.

10.1 Soil disposal

Under the *Protection of the Environment Operations (Waste) Regulation 2014* trackable wastes (Schedule 1) must be transported within NSW or interstate under a Waste Transport Certificate and related waste tracking and disposal requirements – including the requirement for consignment authorisation notes for each load of waste.

Disposal locations for contaminated soil must be determined based on adherence to the proximity principle (Clause 71) which requires transport of waste to the nearest disposal destinations able to lawfully accept the waste, in addition to consideration of total concentrations of contaminants and the results of toxicity characteristic leaching procedure (TCLP) concentrations compared with lined and unlined landfill acceptance criteria for the licensed disposal site.

Based on the findings of the soil investigation:

- ACM will require disposal at an appropriately licensed landfill that can accept asbestos waste.
- Any remedial works involving bonded asbestos removal must be undertaken by a Class B licensed asbestos remover, while any works involving removal of friable asbestos removal must be undertaken by a Class A licenced asbestos remover. Byron Shire Council must be notified prior to commencement of remedial works in accordance with State Environmental Planning Policy (SEPP 55).
- Mineral sands should only be excavated after consultation with a qualified radiation specialist, and the Department of Health (DoH). It is expected that a detailed radiological survey of surface emission (i.e. gamma ray air kerma values) by a qualified radiological specialist to determine the level of health hazard posed by the identified mineral sand deposits may need to be undertaken prior to determining an appropriate remedial (i.e. vertical mixing) and/or disposal strategy. Disposal of this material also requires consultation with a landfill facility to determine acceptance and also the waste category with respect to radiation levels.

10.2 Groundwater

Elevated levels of aluminium and particularly iron are expected in the untreated extracted groundwater (in addition to elevated copper and zinc concentrations already reported) and have the potential to increase following oxidisation of PASS as dewatering progresses or as a result of existing acidic groundwater conditions.

While there is no relevant criterion provided for iron under ANZG (2018), concentrations of dissolved and total iron reported ranged from between 120 µg/L to 940 µg/L and 7,970 µg/L to 18,600 µg/L, respectively. High dissolved and total iron concentrations have the potential to cause unsightly plumes in receiving environments and therefore may require specialised treatment for removal.

11 Limitations of report

ADG Consulting (ADG) has prepared this report for Mercato on Byron Pty Ltd in accordance with the agreed scope of work. The services performed by ADG have been conducted in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No other warranty or guarantee, expressed or implied, is made as to the professional advice included in this report.

This report included limited soil and groundwater sampling. The reported results are not intended to rule out all sources of contamination and this is not implied. The full extent of contamination on the site remains unknown and contamination reported is limited to specific sampling locations only.

This report is solely for the use of Mercato on Byron Pty Ltd and Byron Shire Council and ADG accepts no responsibility for the use of any part of this report for any other purpose or by third parties, as it may not contain sufficient information for the purposes of other parties or users. This report must only be presented in full, and may not be used for any other objective, except where prior written approval is obtained from ADG.

The information contained in this report is considered to be accurate at the date of issue. Subsurface conditions, including contaminant concentrations can change in space and time, either through natural processes or by the accidental or intentional addition of contaminants to a site. Where conditions encountered subsequently at the site are significantly different from those reported herein, ADG must be notified and be provided the opportunity to review the conclusions and recommendations of this report.

12 References

ADG Consulting. 2019a. *Acid Sulfate Soil Investigation Report - Proposed 'Essence of Byron Hotel' Mixed Use Residential Development: Lot 6 on SP187063 and Part of Lot 9 on DP617509, 106 Jonson Street, Byron Bay, New South Wales*

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HMC. 2011. *Preliminary Contaminated Land Investigation – Proposed alterations to shopping centre: Lots 6-7 DP619224 & Lots 8-9 DP617509, No.98-114 Jonson Street, Byron Bay, NSW*.

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National Environment Protection Council. 2013. *National Environment Protection (Assessment of Site Contamination) Measure, 1999* (May 2013). National Environment Protection Council, Canberra.

PE. 2017. *Soil Contamination and Waste Classification Assessment – Mercato on Byron Stage 1, 98-144 Jonson Street, Byron Bay, New South Wales.*

Appendix A: Figures

Client: Mercato on Byron Pty Ltd

Project: Lot 6 on DP619224 & Lot 9 DP 619224, 106 Jonson Street, Byron Bay, NSW

Project ref: ADG965.19

Drawn by: Samuel Gregory   Date: 09.07.19   Base plan source: NSW Six Maps

Figure 1 Site Locality

N

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SOIL AIR WATER ENVIRONMENT

Client: Mercato on Byron Pty Ltd

Project: Lot 6 on DP619224 & Lot 9 DP 619224, 106 Jonson Street, Byron Bay, NSW

Project ref: ADG965.19

Drawn by: Samuel Gregory Date: 09.07.19 Base plan source: NSW Six Maps

Figure 2 Soil Sampling/Borehole Locality

N

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Drawn by: Samuel Gregory   Date: 09.07.19   Base plan source: NSW Six Maps

Figure 3 Groundwater Monitoring Well Locations

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Appendix B: Site photographs

Image 6. Drilling of BH1/MW1

Image 7. Mineral sands at BH1

Image 8. Installation of MW1

Image 9. Positional drilling of BH2/MW2

Image 10. Silty sand at BH2

Image 11. Asbestos within wall cladding

Appendix C: Bore Cards

Bore ID	State	Bore Depth (m)	Drilled Date	Purpose	Status	Geology	Water Level	Salinity	Construction Log	Lithology Log	Hydrostratigraphy Log	Latitude	Longitude
GW303643.1.1	NSW	4.0	1983-01-01 00:00:00.0	Household water supply	Unknown	Unknown	false	false	false	false	false	-28.644880	153.609570
GW303447.1.1	NSW			Drainage	Unknown	Unknown	false	false	false	true	false	-28.643524	153.614033
GW303689.1.1	NSW	3.1	1981-06-01 00:00:00.0	Household water supply	Unknown	Unknown	false	false	true	false	false	-28.643970	153.613269
GW303661.1.1	NSW		1913-01-01 00:00:00.0	Household water supply	Unknown	Unknown	false	false	false	false	false	-28.645106	153.609449
GW301091.1.1	NSW	7.0	1995-05-20 00:00:00.0	Household water supply	Unknown	Unknown	false	false	true	true	false	-28.647202	153.615129
GW306401.1.1	NSW	1.5	2007-12-20 00:00:00.0	Monitoring	Functional	Unknown	false	false	true	true	false	-28.646538	153.615499
GW300932.1.1	NSW	10.0	1997-10-15 00:00:00.0	Recreation and culture	Unknown	Unknown	false	false	true	true	false	-28.646064	153.615112

Appendix D: Government Searches

BUNGALORA	Former landfill area	Part of 840 Terranora ROAD	Other Industry	Regulation under CLM Act not required	-28.245029	153.476206
BUNGENDORE	Former Timber Treatment Plant	Corner King Street and Butmaroo STREET	Other Industry	Contamination formerly regulated under the CLM Act	-35.26151273	149.4434907
BURONGA	Caltex Service Station	Sturt Hwy Cnr Silver City HIGHWAY	Service Station	Regulation under CLM Act not required	-34.17056496	142.1813847
BURWOOD	Burwood STA Depot	Cnr Shaftesbury and Parramatta ROADS	Other Industry	Contamination formerly regulated under the CLM Act	-33.86982934	151.1089057
BYRON BAY	Residential Development	Lot 15 Seaview STREET	Unclassified	Regulation under CLM Act not required	-28.65214464	153.6165573
BYRON BAY	Butler Street Reserve Byron Bay	Butler STREET	Landfill	Under preliminary investigation order	-28.6434329	153.6101099
CABARITA	Dulux (Orica Australia)	Cabarita ROAD	Chemical Industry	Contamination formerly regulated under the CLM Act	-33.84643972	151.1157115
CABARITA	Cabarita Wellcome	47 and 48 Phillips STREET	Other Industry	Ongoing maintenance required to manage residual contamination (CLM Act)	-33.85250251	151.1176366
CABRAMATTA	Caltex Service Station Cabramatta	168 John STREET	Service Station	Regulation under CLM Act not required	-33.89422314	150.9279279
CABRAMATTA	Cabramatta Creek	17 A and 19A Liverpool Street STREET	Unclassified	Regulation under CLM Act not required	-33.90282	150.941563
CALGA	Former service station	101 Peats Ridge ROAD	Service Station	Contamination formerly regulated under the CLM Act	-33.37592138	151.2254951
CALLALA BEACH	Callala Beach General Store	(formerly 1 Quay Rd) 114A Quay ROAD	Service Station	Regulation under CLM Act not required	-35.0101817	150.6964322
CAMBRIDGE GARDENS	Caltex Cambridge Park	1 Boomerang PLACE	Service Station	Regulation under CLM Act not required	-33.74068794	150.717174
CAMDEN	Camden High School (former)	John STREET	Gasworks	Regulation under CLM Act not required	-34.05114079	150.6951285
CAMDEN	Caltex Camden Service Station	21 Barsden STREET	Service Station	Regulation under CLM Act not required	-34.05808413	150.6914744

Cattle dip site locator

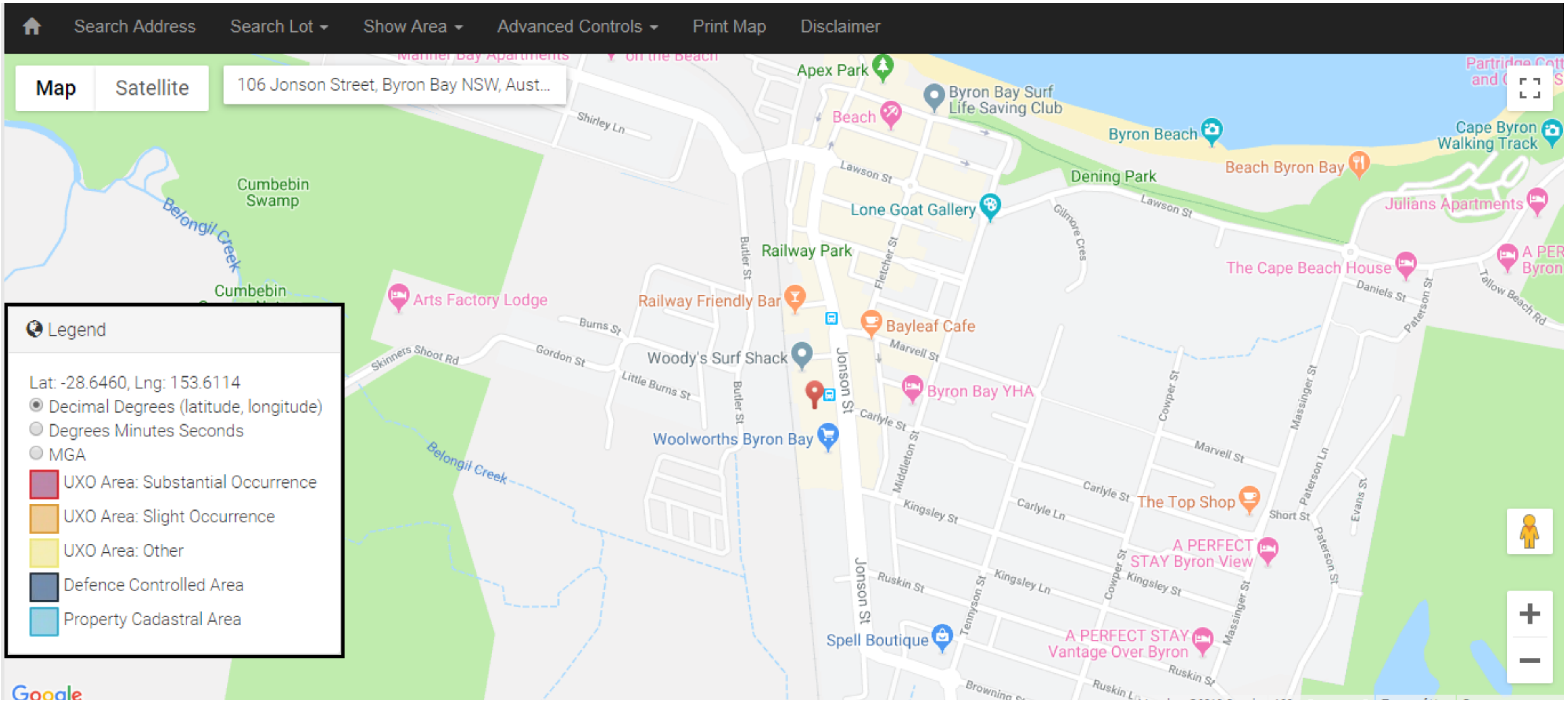
This search retrieved 4 dip sites.

For more information about each dip site, click on the name below.

Dip name	Road	Town/Locality	Council
ANDERSONS A.W.	KENDALL STREET	BYRON BAY	BYRON
BYRON BAY	BEACHCOMBER & COOPER ST	BYRON BAY	BYRON
FLICKS	MCGETTIGANS ROAD	BYRON BAY	BYRON
GRISSELLS GOAT DIP	UNKNOWN	BYRON BAY	BYRON

Find dip sites

Dip name


Search Address
Search Lot
Show Area
Advanced Controls
Print Map
Disclaimer
Map
Satellite
106 Jonson Street, Byron Bay NSW, Aust...
Legend
Lat: -28.6460, Lng: 153.6114
Decimal Degrees (latitude, longitude)
Degrees Minutes Seconds
MGA
UXO Area: Substantial Occurrence
UXO Area: Slight Occurrence
UXO Area: Other
Defence Controlled Area
Property Cadastral Area
Apex Park
Byron Bay Surf Life Saving Club
Beach
Byron Beach
Cape Byron Walking Track
Beach Byron Bay
Dening Park
Julians Apartments
Lone Goat Gallery
Railway Park
The Cape Beach House
Cumbebin Swamp
Belongil Creek
Arts Factory Lodge
Railway Friendly Bar
Bayleaf Cafe
Woody's Surf Shack
Byron Bay YHA
Woolworths Byron Bay
The Top Shop
A PERFECT STAY Byron View
A PERFECT STAY Vantage Over Byron
Spell Boutique
Jonson St
Lawson St
Marvell St
Carlyle St
Kingsley St
Ruskin St
Butler St
Burns St
Gordon St
Skinners Shoot Rd
Google

Appendix E: Laboratory Reports

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095 Ph: 08 8162 5130 E: adelaide@alsglobal.com
☑BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Gladstone QLD 4680 Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com
☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland ... Ph: 02 4014 2500 E: samples...
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐TOWNS... Ph: 07 47...
☐WOLLO... Ph: 02 422...

Environmental Division
Brisbane
Work Order Reference
EB1916251

Telephone : + 61-7-3243 7222

CLIENT: ADG Consulting		**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	Standard TAT (**List due date**): 28.06.19 Non Standard or urgent TAT (**List due date**):
OFFICE: PO Box 6405, Yatala DC, QLD			
PROJECT: Byron Bay	**PROJECT NO.:** ADG965.19	**ALS QUOTE NO.:** BNBQ/004/18	
ORDER NUMBER:	**PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN:**	
PROJECT MANAGER: Michael Campbell	**CONTACT PH:** 0415 960 372		
SAMPLER: Samuel Gregory	**SAMPLER MOBILE:** 0418795859		
COC Emailed to ALS? (YES / NO) YES	**EDD FORMAT (or default):**		
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au			
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**			

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORAT...
Custody Seal Inta...
Free ice / frozen ic... receipt?
Random Sample T...
Other comment:

RELINQUISHED BY: Samuel Gregory	**RECEIVED BY:** M Birks	**RELINQUISHED BY:**
DATE/TIME: 24.06.19	DATE/TIME: 14.10 24/6/19	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	S-26	S-19	S-2	On Hold					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH1 0.5m	21-06-19	S	ST	1				x					
2	BH1 1m	21-06-19	S	ST	1				x					
3	BH1 1.5m	21-06-19	S	ST	1		x							
4	BH1 2m	21-06-19	S	ST	1				x					
5	BH1 2.5m	21-06-19	S	ST	1				x					
6	BH1 3m	21-06-19	S	ST	1	x								
7	BH1 3.5m	21-06-19	S	ST	1				x					
8	BH1 4m	21-06-19	S	ST	1				x					
9	BH1 4.5m	21-06-19	S	ST	1				x					
10	BH1 5m	21-06-19	S	ST	1				x					
11	BH1 5.5m	21-06-19	S	ST	1				x					
12	BH1 6m	21-06-19	S	ST	1				x					
				TOTAL	12	1	1	0	10					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

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☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com
☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
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ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
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COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
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COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: Samuel Gregory	RECEIVED BY: M. Brew	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 24.06.19	DATE/TIME: 24/6/19 14.10	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	**SAMPLE ID**	**DATE / TIME**	**MATRIX**	**TYPE & PRESERVATIVE** *(refer to codes below)*	**TOTAL BOTTLES**	**S-26**	**S-19**	**S-2**	**On Hold**					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH2 0.5m	21-06-19	S	ST	1	X								
14	BH2 1m	21-06-19	S	ST	1				X					
15	BH2 1.5m	21-06-19	S	ST	1			X						
16	BH2 2m	21-06-19	S	ST	1				X					
17	BH2 2.5m	21-06-19	S	ST	1				X					
18	BH2 3m	21-06-19	S	ST	1				X					
19	BH2 4m	21-06-19	S	ST	1				X					
20	BH2 5m	21-06-19	S	ST	1				X					
21	BH2 6m	21-06-19	S	ST	1				X					
				TOTAL	9	1	0	1	7					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095 Ph. 08 8162 5130 E: adelaide@alsglobal.com
☑BRISBANE 2 Byth Street Stafford QLD 4053 Ph. 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Gladstone QLD 4680 Ph. 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com
☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
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☐NEWCASTLE 5/585 [illegible] Smithfield NSW 2164 Ph: 02 4014 2500 E: [illegible] sydney@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph. 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com
☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 28.06.19**
Non Standard or urgent TAT **(List due date):**
ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: Samuel Gregory	**RECEIVED BY:** M Birch	**RELINQUISHED BY:**	**RECEIVED BY:**
DATE/TIME: 24.06.19	DATE/TIME: 24/6/19 14:10	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	**SAMPLE ID**	**DATE / TIME**	**MATRIX**	**TYPE & PRESERVATIVE** *(refer to codes below)*	**TOTAL BOTTLES**	**S-26**	**S-19**	**S-2**	**On Hold**					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
22	BH3 0.5m	21-06-19	S	ST	1				x					
23	BH3 1m	21-06-19	S	ST	1	x								
24	BH3 1.5m	21-06-19	S	ST	1				x					
25	BH3 2m	21-06-19	S	ST	1		x							
26	BH3 2.5m	21-06-19	S	ST	1				x					
27	BH3 3m	21-06-19	S	ST	1				x					
28	BH3 4m	21-06-19	S	ST	1				x					
29	BH3 5m	21-06-19	S	ST	1				x					
30	BH3 6m	21-06-19	S	ST	1				x					
				TOTAL	9	1	1	0	7					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

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☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting

OFFICE: PO Box 6405, Yatala DC, QLD

PROJECT: Byron Bay **PROJECT NO.:** ADG965.19

ORDER NUMBER: **PURCHASE ORDER NO.:**

PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372

SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859

COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**

Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au

Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 28.06.19**
Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	°C		
Other comment:			

RELINQUISHED BY: Samuel Gregory	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
	M. Birch		
DATE/TIME: 24.06.19	DATE/TIME: 14.10 24/6/19	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	S-26	S-19	S-2	On Hold					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
31	BH4 0.5m	21-06-19	S	ST	1				x					
32	BH4 1m	21-06-19	S	ST	1				x					
33	BH4 1.5m	21-06-19	S	ST	1	x								
34	BH4 2m	21-06-19	S	ST	1				x					
35	BH4 2.5m	21-06-19	S	ST	1				x					
36	BH4 3m	21-06-19	S	ST	1			x						
				TOTAL	6	1	0	1	4					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting

OFFICE: PO Box 6405, Yatala DC, QLD

PROJECT: Byron Bay **PROJECT NO.:** ADG965.19

ORDER NUMBER: **PURCHASE ORDER NO.:**

PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372

SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859

COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**

Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au

Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 28.06.19**
Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: Samuel Gregory	RECEIVED BY: M. Bireci	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 24.06.19	DATE/TIME: 24/6/19 14:10	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	S-26	S-19	S-2	On Hold					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
37	BH5 0.5m	21-06-19	S	ST	1				x					
38	BH5 1m	21-06-19	S	ST	1	x								
39	BH5 1.5m	21-06-19	S	ST	1				x					
40	BH5 2m	21-06-19	S	ST	1		x							
41	BH5 2.5m	21-06-19	S	ST	1				x					
				TOTAL	5	1	1	0	3					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: *please tick →*

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Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting

OFFICE: PO Box 6405, Yatala DC, QLD

PROJECT: Byron Bay **PROJECT NO.:** ADG965.19

ORDER NUMBER: **PURCHASE ORDER NO.:**

PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372

SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859

COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**

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Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT **(List due date): 28.06.19**
Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY: Samuel Gregory	RECEIVED BY: M. Birch	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 24.06.19	DATE/TIME: 14:10 24/6/19	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	**SAMPLE ID**	**DATE / TIME**	**MATRIX**	**TYPE & PRESERVATIVE** *(refer to codes below)*	**TOTAL BOTTLES**	**S-26**	**S-19**	**S-2**	**On Hold**					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
42	BH6 0.5m	21-06-19	S	ST	1				x					
43	BH6 1m	21-06-19	S	ST	1			x						
44	BH6 1.5m	21-06-19	S	ST	1				x					
45	BH6 2m	21-06-19	S	ST	1	x								
46	BH6 2.5m	21-06-19	S	ST	1				x					
47	BH6 3m	21-06-19	S	ST	1				x					
				TOTAL	6	1	0	1	4					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

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CLIENT: ADG Consulting

OFFICE: PO Box 6405, Yatala DC, QLD

PROJECT: Byron Bay **PROJECT NO.:** ADG965.19

ORDER NUMBER: **PURCHASE ORDER NO.:**

PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372

SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859

COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**

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TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

Standard TAT **(List due date): 28.06.19**

Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: BNBQ/004/18

COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	°C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Samuel Gregory	M. Sireh		
DATE/TIME: 24.06.19	DATE/TIME: 14.10 24/6/19	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA200B	S-18	S-26	S-2	On Hold				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
48	ACM1	21-06-19	S	B	1	X								
49	ACM2	21-06-19	S	B	1	X								
50	Trip Spike 5	19-06-19	S	ST	1		X							
51	Trip Blank 060642	19-06-19	S	ST	1		X							
52	DUP1	21-06-19	S	ST	1			X						
53	DUP2	21-06-19	S	ST	1					X				
54	DUP3	21-06-19	S	ST	1					X				
	TRIP1	21-06-19	S	ST	1			X						<u>Forward on to ALS Sydney</u>
	TRIP2	21-06-19	S	ST	1					X				<u>Forward on to ALS Sydney</u>
				TOTAL	9	2	2	2	0	3				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EB1916251**

Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: mail@adgconsulting.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: ADG965.19 Byron Bay	Page	: 1 of 4
Order number	:	Quote number	: EB2018ADGCON0001 (BNBQ/004/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SAMUEL GREGORY		

Dates

Date Samples Received	: 24-Jun-2019 14:10	Issue Date	: 24-Jun-2019
Client Requested Due Date	: 03-Jul-2019	Scheduled Reporting Date	: **03-Jul-2019**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 2.8, 3.0°C - Ice Bricks present
Receipt Detail	: MEDIUM ESKIES	No. of samples received / analysed	: 55 / 18

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please be advised that samples "TRIP 1" and "TRIP2" have been forwarded to ALS Sydney for analysis, as per the Chain of Custody request.**
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- **Asbestos analysis will be conducted by ALS Environmental, Melbourne, NATA accreditation No. 825, Site No. 13778.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-19 TRH/BTEXN/PAH/Ph/OC/OP/PCB/8 metals	SOIL - S-26 8 metals/TRH/BTEXN/PAH
EB1916251-001	21-Jun-2019 00:00	BH1 0.5m	✓					
EB1916251-002	21-Jun-2019 00:00	BH1 1m	✓					
EB1916251-003	21-Jun-2019 00:00	BH1 1.5m		✓			✓	
EB1916251-004	21-Jun-2019 00:00	BH1 2m	✓					
EB1916251-005	21-Jun-2019 00:00	BH1 2.5m	✓					
EB1916251-006	21-Jun-2019 00:00	BH1 3m		✓				✓
EB1916251-007	21-Jun-2019 00:00	BH1 3.5m	✓					
EB1916251-008	21-Jun-2019 00:00	BH1 4m	✓					
EB1916251-009	21-Jun-2019 00:00	BH1 4.5m	✓					
EB1916251-010	21-Jun-2019 00:00	BH1 5m	✓					
EB1916251-011	21-Jun-2019 00:00	BH1 5.5m	✓					
EB1916251-012	21-Jun-2019 00:00	BH1 6m	✓					
EB1916251-013	21-Jun-2019 00:00	BH2 0.5m		✓				✓
EB1916251-014	21-Jun-2019 00:00	BH2 1m	✓					
EB1916251-015	21-Jun-2019 00:00	BH2 1.5m		✓	✓			
EB1916251-016	21-Jun-2019 00:00	BH2 2m	✓					
EB1916251-017	21-Jun-2019 00:00	BH2 2.5m	✓					
EB1916251-018	21-Jun-2019 00:00	BH2 3m	✓					
EB1916251-019	21-Jun-2019 00:00	BH2 4m	✓					
EB1916251-020	21-Jun-2019 00:00	BH2 5m	✓					
EB1916251-021	21-Jun-2019 00:00	BH2 6m	✓					
EB1916251-022	21-Jun-2019 00:00	BH3 0.5m	✓					
EB1916251-023	21-Jun-2019 00:00	BH3 1m		✓				✓
EB1916251-024	21-Jun-2019 00:00	BH3 1.5m	✓					
EB1916251-025	21-Jun-2019 00:00	BH3 2m		✓			✓	
EB1916251-026	21-Jun-2019 00:00	BH3 2.5m	✓					
EB1916251-027	21-Jun-2019 00:00	BH3 3m	✓					
EB1916251-028	21-Jun-2019 00:00	BH3 4m	✓					
EB1916251-029	21-Jun-2019 00:00	BH3 5m	✓					
EB1916251-030	21-Jun-2019 00:00	BH3 6m	✓					
EB1916251-031	21-Jun-2019 00:00	BH4 0.5m	✓					
EB1916251-032	21-Jun-2019 00:00	BH4 1m	✓					
EB1916251-033	21-Jun-2019 00:00	BH4 1.5m		✓				✓
EB1916251-034	21-Jun-2019 00:00	BH4 2m	✓					
EB1916251-035	21-Jun-2019 00:00	BH4 2.5m	✓					

			(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-19 TRH/BTEXN/PAH/Ph/OC/OP/PCB/8 metals	SOIL - S-26 8 metals/TRH/BTEXN/PAH
EB1916251-036	21-Jun-2019 00:00	BH4 3m		✓	✓			
EB1916251-037	21-Jun-2019 00:00	BH5 0.5m	✓					
EB1916251-038	21-Jun-2019 00:00	BH5 1m		✓				✓
EB1916251-039	21-Jun-2019 00:00	BH5 1.5m	✓					
EB1916251-040	21-Jun-2019 00:00	BH5 2m		✓			✓	
EB1916251-041	21-Jun-2019 00:00	BH5 2.5m	✓					
EB1916251-042	21-Jun-2019 00:00	BH6 0.5m	✓					
EB1916251-043	21-Jun-2019 00:00	BH6 1m		✓	✓			
EB1916251-044	21-Jun-2019 00:00	BH6 1.5m	✓					
EB1916251-045	21-Jun-2019 00:00	BH6 2m		✓				✓
EB1916251-046	21-Jun-2019 00:00	BH6 2.5m	✓					
EB1916251-047	21-Jun-2019 00:00	BH6 3m	✓					
EB1916251-050	19-Jun-2019 00:00	Trip Spike 5				✓		
EB1916251-051	19-Jun-2019 00:00	Trip Blank 060642				✓		
EB1916251-052	21-Jun-2019 00:00	DUP1		✓				✓
EB1916251-053	21-Jun-2019 00:00	DUP2	✓					
EB1916251-054	21-Jun-2019 00:00	DUP3	✓					
EB1916251-055	19-Jun-2019 00:00	ALS CONTROL SPIKE 5				✓		

Matrix: **SOLID**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOLID - EA200B Asbestos Identification in Bulk Solids (Excluding
EB1916251-048	21-Jun-2019 00:00	ACM1	✓
EB1916251-049	21-Jun-2019 00:00	ACM2	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	mail@adgconsulting.com.au

MICHAEL CAMPBELL

- *AU Certificate of Analysis - NATA (COA)	Email	mail@adgconsulting.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@adgconsulting.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@adgconsulting.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@adgconsulting.com.au
- Chain of Custody (CoC) (COC)	Email	mail@adgconsulting.com.au
- EDI Format - XTab (XTAB)	Email	mail@adgconsulting.com.au

CERTIFICATE OF ANALYSIS

Work Order	: **EB1916251**	Page	: 1 of 18
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Project	: ADG965.19 Byron Bay	Date Samples Received	: 24-Jun-2019 14:10
Order number	:	Date Analysis Commenced	: 25-Jun-2019
C-O-C number	: ----	Issue Date	: 02-Jul-2019 12:03
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 55		
No. of samples analysed	: 18		

NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Emily Daos	Team Leader - Asbestos	Melbourne Asbestos, Springvale, VIC
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- **EA200 Legend**
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: N/A - Not Applicable
- Negative results for vinyl tiles should be confirmed by an independent analytical technique.

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	BH1 1.5m	BH1 3m	BH2 0.5m	BH2 1.5m	BH3 1m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
				EB1916251-003	EB1916251-006	EB1916251-013	EB1916251-015	EB1916251-023
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**18.6**	**21.2**	**4.5**	**3.4**	**4.2**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	<2	**3**	<2	**4**
Copper	7440-50-8	5	mg/kg	<5	<5	**10**	<5	**14**
Lead	7439-92-1	5	mg/kg	<5	<5	**23**	<5	**7**
Nickel	7440-02-0	2	mg/kg	<2	<2	**3**	<2	**3**
Zinc	7440-66-6	5	mg/kg	<5	<5	**61**	<5	**22**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 1.5m	BH1 3m	BH2 0.5m	BH2 1.5m	BH3 1m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-003	EB1916251-006	EB1916251-013	EB1916251-015	EB1916251-023
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	----	----	----
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	----	----	----
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	----	----	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	----	----	----
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	----	----	----
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	----	----	----
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 1.5m	BH1 3m	BH2 0.5m	BH2 1.5m	BH3 1m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-003	EB1916251-006	EB1916251-013	EB1916251-015	EB1916251-023
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	----	----	----
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	----	----	----
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	----	----	----
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	**0.7**	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	**0.7**	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	**1.4**	----	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	----	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	<50	----	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 1.5m	BH1 3m	BH2 0.5m	BH2 1.5m	BH3 1m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-003	EB1916251-006	EB1916251-013	EB1916251-015	EB1916251-023
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**90.8**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**114**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**91.5**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**98.1**	**97.4**	**105**	----	**104**
2-Chlorophenol-D4	93951-73-6	0.5	%	**92.3**	**88.1**	**101**	----	**100**
2.4.6-Tribromophenol	118-79-6	0.5	%	**74.6**	**72.9**	**82.1**	----	**76.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**99.9**	**96.2**	**108**	----	**105**
Anthracene-d10	1719-06-8	0.5	%	**90.6**	**91.0**	**93.9**	----	**93.5**
4-Terphenyl-d14	1718-51-0	0.5	%	**102**	**97.6**	**101**	----	**99.3**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**124**	**123**	**111**	----	**120**
Toluene-D8	2037-26-5	0.2	%	**98.3**	**98.8**	**80.8**	----	**89.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH1 1.5m	BH1 3m	BH2 0.5m	BH2 1.5m	BH3 1m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-003	EB1916251-006	EB1916251-013	EB1916251-015	EB1916251-023
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	113	118	100	----	105

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH3 2m	BH4 1.5m	BH4 3m	BH5 1m	BH5 2m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-025	EB1916251-033	EB1916251-036	EB1916251-038	EB1916251-040
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	4.5	3.4	21.2	2.0	7.3
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	3	<2	<2	4
Copper	7440-50-8	5	mg/kg	6	<5	<5	6	12
Lead	7439-92-1	5	mg/kg	7	10	<5	7	19
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	4
Zinc	7440-66-6	5	mg/kg	21	26	26	19	59
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.4
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	----	----	----	<0.1
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH3 2m	BH4 1.5m	BH4 3m	BH5 1m	BH5 2m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-025	EB1916251-033	EB1916251-036	EB1916251-038	EB1916251-040
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	----	----	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	<0.05
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	----	----	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	----	----	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	----	----	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	----	----	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	----	----	<0.5
2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	----	----	<0.5
2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	----	----	<0.5
2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	----	----	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH3 2m	BH4 1.5m	BH4 3m	BH5 1m	BH5 2m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-025	EB1916251-033	EB1916251-036	EB1916251-038	EB1916251-040
				Result	Result	Result	Result	Result
EP075(SIM)A: Phenolic Compounds - Continued								
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	----	----	<0.5
2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	----	----	<0.5
2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	----	----	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	----	----	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	----	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	----	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	**150**	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	----	**150**	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH3 2m	BH4 1.5m	BH4 3m	BH5 1m	BH5 2m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-025	EB1916251-033	EB1916251-036	EB1916251-038	EB1916251-040
				Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued								
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	**190**	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	----	**190**	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	**89.6**	----	----	----	**92.3**
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	**117**	----	----	----	**120**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	**94.2**	----	----	----	**102**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**102**	**102**	----	**101**	**99.3**
2-Chlorophenol-D4	93951-73-6	0.5	%	**98.6**	**98.4**	----	**96.6**	**96.5**
2.4.6-Tribromophenol	118-79-6	0.5	%	**75.0**	**72.6**	----	**76.5**	**79.6**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**104**	**104**	----	**104**	**104**
Anthracene-d10	1719-06-8	0.5	%	**92.2**	**91.4**	----	**91.7**	**92.5**
4-Terphenyl-d14	1718-51-0	0.5	%	**97.4**	**96.0**	----	**96.5**	**97.3**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**110**	**119**	----	**112**	**114**
Toluene-D8	2037-26-5	0.2	%	**83.3**	**96.6**	----	**80.4**	**82.7**

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL)**

			Client sample ID	BH3 2m	BH4 1.5m	BH4 3m	BH5 1m	BH5 2m
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-025	EB1916251-033	EB1916251-036	EB1916251-038	EB1916251-040
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**102**	**108**	**----**	**100**	**102**

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	BH6 1m	BH6 2m	Trip Spike 5	Trip Blank 060642	DUP1
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	19-Jun-2019 00:00	19-Jun-2019 00:00	21-Jun-2019 00:00
				EB1916251-043	EB1916251-045	EB1916251-050	EB1916251-051	EB1916251-052
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**5.4**	**19.5**	----	----	**1.9**
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	----	----	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	<1
Chromium	7440-47-3	2	mg/kg	**9**	<2	----	----	<2
Copper	7440-50-8	5	mg/kg	**14**	<5	----	----	**5**
Lead	7439-92-1	5	mg/kg	**16**	<5	----	----	**8**
Nickel	7440-02-0	2	mg/kg	**8**	<2	----	----	<2
Zinc	7440-66-6	5	mg/kg	**67**	<5	----	----	**24**
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	<0.1
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	----	----	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	----	----	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	----	----	<0.5
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	----	----	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	----	----	<0.5
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	----	----	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	----	----	<0.5
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	----	----	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	----	----	<0.5
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	----	----	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	----	----	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	----	----	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	----	----	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	----	----	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	----	----	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	----	----	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	----	----	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	----	----	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	**0.6**	----	----	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	**1.2**	----	----	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	**35**	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH6 1m	BH6 2m	Trip Spike 5	Trip Blank 060642	DUP1
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	19-Jun-2019 00:00	19-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-043	EB1916251-045	EB1916251-050	EB1916251-051	EB1916251-052
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	<50
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	**140**
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	**220**
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	**360**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	**43**	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	**22**	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	----	<50
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	----	**270**
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	**130**
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	----	**400**
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	**0.6**	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	----	<0.5	**7.9**	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	**1.7**	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	**7.5**	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	**2.9**	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	----	<0.2	**20.6**	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	----	<0.5	**10.4**	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	----	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	----	**96.4**	----	----	**99.8**
2-Chlorophenol-D4	93951-73-6	0.5	%	----	**92.4**	----	----	**94.6**
2.4.6-Tribromophenol	118-79-6	0.5	%	----	**74.9**	----	----	**79.4**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	----	**99.2**	----	----	**106**
Anthracene-d10	1719-06-8	0.5	%	----	**92.0**	----	----	**94.8**
4-Terphenyl-d14	1718-51-0	0.5	%	----	**98.0**	----	----	**99.0**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	----	**130**	**120**	**123**	**116**
Toluene-D8	2037-26-5	0.2	%	----	**93.7**	**98.5**	**86.9**	**77.8**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH6 1m	BH6 2m	Trip Spike 5	Trip Blank 060642	DUP1
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	19-Jun-2019 00:00	19-Jun-2019 00:00	21-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EB1916251-043	EB1916251-045	EB1916251-050	EB1916251-051	EB1916251-052
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	----	113	106	108	102

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ALS CONTROL SPIKE 5	----	----	----	----
			Client sampling date / time	19-Jun-2019 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EB1916251-055	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	28	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	35	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	18	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	0.5	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	6.6	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	1.4	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	6.4	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	2.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	17.4	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	8.9	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	116	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	90.6	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%	100	----	----	----	----

Analytical Results

Sub-Matrix: **SOLID**
(Matrix: **SOLID**)

			Client sample ID	ACM1	ACM2	----	----	----
			Client sampling date / time	21-Jun-2019 00:00	21-Jun-2019 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EB1916251-048	EB1916251-049	--------	--------	--------
				Result	Result	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	Yes	Yes	----	----	----
Asbestos Type	1332-21-4	-	--	Ch	Ch	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	N/A	N/A	----	----	----
Sample weight (dry)	----	0.01	g	3.13	1.35	----	----	----
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	U.DALKIN	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	No	----	----	----
Organic Fibre	----	0.1	g/kg	Yes	Yes	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOLID**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	ACM1 - 21-Jun-2019 00:00	Asbestos sheeting fragment with attached paint and organic fibres approx 25 x 10 x 5mm
EA200: Description	ACM2 - 21-Jun-2019 00:00	Asbestos sheeting fragment with attached paint and organic fibres approx 16 x 10 x 5mm.

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	*CAS Number*	*Recovery Limits (%)* Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	16	134
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	10	138
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	23	135
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	35	155
2-Chlorophenol-D4	93951-73-6	42	153
2.4.6-Tribromophenol	118-79-6	26	157
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	34	157
Anthracene-d10	1719-06-8	37	153
4-Terphenyl-d14	1718-51-0	42	172
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	53	134
Toluene-D8	2037-26-5	60	131
4-Bromofluorobenzene	460-00-4	59	127

QUALITY CONTROL REPORT

Work Order	: **EB1916251**	Page	: 1 of 11
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 5580 8063	Telephone	: +61-7-3243 7222
Project	: ADG965.19 Byron Bay	Date Samples Received	: 24-Jun-2019
Order number	:	Date Analysis Commenced	: 25-Jun-2019
C-O-C number	: ----	Issue Date	: 02-Jul-2019
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 55		
No. of samples analysed	: 18		

ilac-MRA NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Emily Daos	Team Leader - Asbestos	Melbourne Asbestos, Springvale, VIC
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Santusha Pandra	Organic Chemist	Brisbane Organics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2424260)									
EB1916251-003	BH1 1.5m	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.00	No Limit
EB1916251-043	BH6 1m	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	9	6	36.3	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	8	<2	124	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	12	19.2	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	16	13	19.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	67	41	48.9	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2424267)									
EB1916251-003	BH1 1.5m	EA055: Moisture Content	----	0.1	%	18.6	17.6	5.61	0% - 50%
EB1916251-043	BH6 1m	EA055: Moisture Content	----	0.1	%	5.4	5.5	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2424261)									
EB1916251-003	BH1 1.5m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EB1916251-043	BH6 1m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2424266)									
EB1916251-003	BH1 1.5m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2424265)									
EB1916251-003	BH1 1.5m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2424265) - continued									
EB1916251-003	BH1 1.5m	EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2424265)									
EB1916251-003	BH1 1.5m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2424265) - continued									
EB1916251-003	BH1 1.5m	EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 2424264)									
EB1916280-001	Anonymous	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EB1916251-003	BH1 1.5m	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.00	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.00	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2424264)									
EB1916280-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2424264) - continued									
EB1916280-001	Anonymous	EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EB1916251-003	BH1 1.5m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2424262)									
EB1916251-003	BH1 1.5m	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EB1916251-051	Trip Blank 060642	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2424263)									
EB1916280-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	110	10.6	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	190	220	14.9	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EB1916251-003	BH1 1.5m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2424262)									
EB1916251-003	BH1 1.5m	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EB1916251-051	Trip Blank 060642	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2424263)									
EB1916280-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	200	220	13.6	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	210	250	17.6	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EB1916251-003	BH1 1.5m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2424262)									
EB1916251-003	BH1 1.5m	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EB1916251-051	Trip Blank 060642	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2424260)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	98 mg/kg	102	84	123
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
EG005T: Chromium	7440-47-3	2	mg/kg	<2	15.4 mg/kg	118	83	125
EG005T: Copper	7440-50-8	5	mg/kg	<5	48 mg/kg	101	86	122
EG005T: Lead	7439-92-1	5	mg/kg	<5	50 mg/kg	116	84	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	12.4 mg/kg	110	89	126
EG005T: Zinc	7440-66-6	5	mg/kg	<5	115 mg/kg	112	87	127
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2424261)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.0847 mg/kg	92.7	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2424266)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	117	72	155
EP068A: Organochlorine Pesticides (OC) (QCLot: 2424265)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	113	54	121
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	# 116	54	112
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	112	49	121
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	111	76	136
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.5	61	122
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	104	65	130
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	99.4	70	130
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	104	58	118
EP068: Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	107	56	119
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	51	125
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	109	57	118
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	67	129
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	107	62	121
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.4	60	137
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	61	122
EP068: Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	107	60	123
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	85.0	52	125
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.0	55	125
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	93.8	80	142
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	55	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High
EP068A: Organochlorine Pesticides (OC) (QCLot: 2424265) - continued								
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	96.8	53	136
EP068: Sum of DDD + DDE + DDT	72-54-8/72-5 5-9/50-2	0.05	mg/kg	<0.05	----	----	----	----
EP068: Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2424265)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	102	41	114
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	118	25	120
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	93.7	35	135
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	104	44	131
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	116	70	131
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	113	70	130
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	98.2	60	122
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	64	125
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	100	69	115
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	95.1	66	120
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	108	57	118
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	116	70	130
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.6	62	127
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	93.7	80	130
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	# 109	55	106
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	93.1	80	134
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.3	61	123
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	114	57	124
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	72.7	35	127
EP075(SIM)A: Phenolic Compounds (QCLot: 2424264)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	1.5 mg/kg	108	85	129
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	1.5 mg/kg	101	85	127
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	1.5 mg/kg	106	78	132
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	3 mg/kg	105	77	135
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	1.5 mg/kg	91.1	43	156
EP075(SIM): 2.4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	1.5 mg/kg	98.7	70	141
EP075(SIM): 2.4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	1.5 mg/kg	102	70	135
EP075(SIM): 2.6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	1.5 mg/kg	99.4	73	136
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	1.5 mg/kg	104	53	138
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	1.5 mg/kg	83.6	51	140
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	1.5 mg/kg	82.8	46	140
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	3 mg/kg	83.1	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2424264)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2424264) - continued								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	1.5 mg/kg	96.9	73	133
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	1.5 mg/kg	93.7	63	144
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	1.5 mg/kg	93.6	84	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	1.5 mg/kg	97.3	76	134
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	1.5 mg/kg	98.9	72	137
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	1.5 mg/kg	95.6	77	143
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.5 mg/kg	98.1	74	140
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	1.5 mg/kg	94.2	72	139
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	1.5 mg/kg	89.0	58	145
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	1.5 mg/kg	95.7	63	147
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	1.5 mg/kg	108	71	142
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	1.5 mg/kg	93.8	76	138
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	1.5 mg/kg	94.2	69	140
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	1.5 mg/kg	113	58	143
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	1.5 mg/kg	115	52	149
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	1.5 mg/kg	106	65	140
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2424262)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	16 mg/kg	60.9	60	125
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2424263)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	310 mg/kg	89.9	79	123
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	490 mg/kg	87.6	77	123
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2424262)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	18.5 mg/kg	61.3	58	124
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2424263)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	450 mg/kg	90.3	81	122
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	320 mg/kg	85.4	74	122
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
EP080: BTEXN (QCLot: 2424262)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	69.3	67	115
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	69.7	69	116
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	69.0	69	116
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	74.4	70	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	75.6	72	116
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	85.6	73	116

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2424260)							
EB1916251-006	BH1 3m	EG005T: Arsenic	7440-38-2	50 mg/kg	89.3	70	130
		EG005T: Cadmium	7440-43-9	25 mg/kg	91.7	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	92.6	70	130
		EG005T: Copper	7440-50-8	50 mg/kg	94.8	70	130
		EG005T: Lead	7439-92-1	50 mg/kg	93.6	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	93.6	70	130
		EG005T: Zinc	7440-66-6	50 mg/kg	95.2	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2424261)							
EB1916251-006	BH1 3m	EG035T: Mercury	7439-97-6	5 mg/kg	105	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2424266)							
EB1916251-025	BH3 2m	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	112	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2424265)							
EB1916251-025	BH3 2m	EP068: gamma-BHC	58-89-9	0.5 mg/kg	105	76	136
		EP068: Heptachlor	76-44-8	0.5 mg/kg	101	65	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	97.0	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	87.9	67	129
		EP068: Endrin	72-20-8	0.5 mg/kg	88.3	60	137
		EP068: 4.4`-DDT	50-29-3	0.5 mg/kg	95.2	80	142
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2424265)							
EB1916251-025	BH3 2m	EP068: Diazinon	333-41-5	0.5 mg/kg	110	70	131
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	108	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	112	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	92.2	80	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	92.3	80	134
EP075(SIM)A: Phenolic Compounds (QCLot: 2424264)							
EB1916251-006	BH1 3m	EP075(SIM): Phenol	108-95-2	1.5 mg/kg	111	70	130
		EP075(SIM): 2-Chlorophenol	95-57-8	1.5 mg/kg	102	70	130
		EP075(SIM): 2-Nitrophenol	88-75-5	1.5 mg/kg	89.8	70	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1.5 mg/kg	95.7	70	130
		EP075(SIM): Pentachlorophenol	87-86-5	3 mg/kg	97.0	20	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2424264)							
EB1916251-006	BH1 3m	EP075(SIM): Acenaphthene	83-32-9	1.5 mg/kg	93.3	70	130
		EP075(SIM): Pyrene	129-00-0	1.5 mg/kg	93.6	70	130

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	Recovery Limits (%) High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2424262)							
EB1916251-006	BH1 3m	EP080: C6 - C9 Fraction	----	8 mg/kg	73.3	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2424263)							
EB1916251-006	BH1 3m	EP071: C10 - C14 Fraction	----	310 mg/kg	88.9	70	130
		EP071: C15 - C28 Fraction	----	490 mg/kg	85.9	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2424262)							
EB1916251-006	BH1 3m	EP080: C6 - C10 Fraction	C6_C10	8 mg/kg	73.9	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2424263)							
EB1916251-006	BH1 3m	EP071: >C10 - C16 Fraction	----	450 mg/kg	89.1	70	130
		EP071: >C16 - C34 Fraction	----	320 mg/kg	84.0	70	130
EP080: BTEXN (QCLot: 2424262)							
EB1916251-006	BH1 3m	EP080: Benzene	71-43-2	2 mg/kg	83.4	70	130
		EP080: Toluene	108-88-3	2 mg/kg	80.8	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1916251**	Page	: 1 of 8
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MR MICHAEL CAMPBELL	Telephone	: +61-7-3243 7222
Project	: ADG965.19 Byron Bay	Date Samples Received	: 24-Jun-2019
Site	: ----	Issue Date	: 02-Jul-2019
Sampler	: SAMUEL GREGORY	No. of samples received	: 55
Order number	:	No. of samples analysed	: 18

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Laboratory Control outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries							
EP068A: Organochlorine Pesticides (OC)	QC-2424265-002	----	**Hexachlorobenzene (HCB)**	118-74-1	116 %	54-112%	**Recovery greater than upper control limit**
EP068B: Organophosphorus Pesticides (OP)	QC-2424265-002	----	**Fenamiphos**	22224-92-6	109 %	55-106%	**Recovery greater than upper control limit**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055)							
BH1 1.5m, BH1 3m, BH2 0.5m, BH2 1.5m, BH3 1m, BH3 2m, BH4 1.5m, BH4 3m, BH5 1m, BH5 2m, BH6 1m, BH6 2m, DUP1	**21-Jun-2019**	**----**	----	----	**25-Jun-2019**	05-Jul-2019	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
BH1 1.5m, BH1 3m, BH2 0.5m, BH2 1.5m, BH3 1m, BH3 2m, BH4 1.5m, BH4 3m, BH5 1m, BH5 2m, BH6 1m, BH6 2m, DUP1	**21-Jun-2019**	**25-Jun-2019**	18-Dec-2019	✓	**27-Jun-2019**	18-Dec-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**25-Jun-2019**	19-Jul-2019	✓	**27-Jun-2019**	19-Jul-2019	✓
BH2 0.5m,	BH2 1.5m,							
BH3 1m,	BH3 2m,							
BH4 1.5m,	BH4 3m,							
BH5 1m,	BH5 2m,							
BH6 1m,	BH6 2m,							
DUP1								
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
BH1 1.5m,	BH3 2m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH5 2m								
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
BH1 1.5m,	BH3 2m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH5 2m								
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
BH1 1.5m,	BH3 2m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH5 2m								
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH1 1.5m,	BH3 2m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH5 2m								
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH2 0.5m,	BH3 1m,							
BH3 2m,	BH4 1.5m,							
BH5 1m,	BH5 2m,							
BH6 2m,	DUP1							

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP080)								
Trip Spike 5,	Trip Blank 060642,	**19-Jun-2019**	**25-Jun-2019**	03-Jul-2019	✓	**28-Jun-2019**	03-Jul-2019	✓
ALS CONTROL SPIKE 5								
Soil Glass Jar - Unpreserved (EP080)								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**25-Jun-2019**	05-Jul-2019	✓	**28-Jun-2019**	05-Jul-2019	✓
BH2 0.5m,	BH3 1m,							
BH3 2m,	BH4 1.5m,							
BH5 1m,	BH5 2m,							
BH6 2m,	DUP1							
Soil Glass Jar - Unpreserved (EP071)								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH2 0.5m,	BH3 1m,							
BH3 2m,	BH4 1.5m,							
BH5 1m,	BH5 2m,							
BH6 2m,	DUP1							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP080)								
Trip Spike 5,	Trip Blank 060642,	**19-Jun-2019**	**25-Jun-2019**	03-Jul-2019	✓	**28-Jun-2019**	03-Jul-2019	✓
ALS CONTROL SPIKE 5								
Soil Glass Jar - Unpreserved (EP080)								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**25-Jun-2019**	05-Jul-2019	✓	**28-Jun-2019**	05-Jul-2019	✓
BH2 0.5m,	BH3 1m,							
BH3 2m,	BH4 1.5m,							
BH5 1m,	BH5 2m,							
BH6 2m,	DUP1							
Soil Glass Jar - Unpreserved (EP071)								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**26-Jun-2019**	05-Jul-2019	✓	**26-Jun-2019**	05-Aug-2019	✓
BH2 0.5m,	BH3 1m,							
BH3 2m,	BH4 1.5m,							
BH5 1m,	BH5 2m,							
BH6 2m,	DUP1							
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080)								
Trip Spike 5,	Trip Blank 060642,	**19-Jun-2019**	**25-Jun-2019**	03-Jul-2019	✓	**28-Jun-2019**	03-Jul-2019	✓
ALS CONTROL SPIKE 5								
Soil Glass Jar - Unpreserved (EP080)								
BH1 1.5m,	BH1 3m,	**21-Jun-2019**	**25-Jun-2019**	05-Jul-2019	✓	**28-Jun-2019**	05-Jul-2019	✓
BH2 0.5m,	BH3 1m,							
BH3 2m,	BH4 1.5m,							
BH5 1m,	BH5 2m,							
BH6 2m,	DUP1							

Matrix: **SOLID**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Matrix: **SOLID**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
ACM1, ACM2	**21-Jun-2019**	**----**	----	----	**26-Jun-2019**	18-Dec-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	11	**18.18**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	14	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.
Asbestos Identification in Bulk Solids	EA200	SOLID	In house: Referenced to AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **EB1916762**		
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: DAVID KNIGHT	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
E-mail	: david@adgconsulting.com.au	E-mail	: ALSEnviro.Brisbane@alsglobal.com
Telephone	: ----	Telephone	: +61-7-3243 7222
Facsimile	: ----	Facsimile	: +61-7-3243 7218
Project	: ADG965.19	Page	: 1 of 2
Order number	: -	Quote number	: EB2019ADGCON0001 (BN/093/19 Compass V2)
C-O-C number	: 2141	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: DAVID KNIGHT, SAMUEL GREGORY		

Dates

Date Samples Received	: 28-Jun-2019 14:10	Issue Date	: 28-Jun-2019
Client Requested Due Date	: 03-Jul-2019	Scheduled Reporting Date	: **03-Jul-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 1	Temperature	: 10.1°C - Ice present
Receipt Detail	: SMALL HARD ESKY	No. of samples received / analysed	: 3 / 3

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- ***A 10% surcharge applies for results returned within 3 days.***
- Discounted Package Prices apply only when specific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs.
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958).
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA025H Suspended Solids - Standard Level	WATER - ED041G Sulfate (Turbidimetric) as SO4 2 by Discrete	WATER - ED045G Chloride by Discrete Analyser	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG020T Total Metals by ICP/MS (including digestion)	WATER - W-26 TRH/BTEXN/PAH/8 Metals
EB1916762-001	28-Jun-2019 12:01	MW1	✓	✓	✓	✓	✓	✓
EB1916762-002	28-Jun-2019 12:03	MW2	✓	✓	✓	✓	✓	✓
EB1916762-003	28-Jun-2019 12:06	MW3	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- *AU Certificate of Analysis - NATA (COA)	Email	mail@adgconsulting.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@adgconsulting.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@adgconsulting.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@adgconsulting.com.au
- A4 - AU Tax Invoice (INV)	Email	mail@adgconsulting.com.au
- Chain of Custody (CoC) (COC)	Email	mail@adgconsulting.com.au

DAVID KNIGHT

- *AU Certificate of Analysis - NATA (COA)	Email	david@adgconsulting.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	david@adgconsulting.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	david@adgconsulting.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	david@adgconsulting.com.au
- Chain of Custody (CoC) (COC)	Email	david@adgconsulting.com.au
- EDI Format - ENMRG (ENMRG)	Email	david@adgconsulting.com.au
- EDI Format - XTab (XTAB)	Email	david@adgconsulting.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB1916762**	Page	: 1 of 6
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: DAVID KNIGHT	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: ADG965.19	Date Samples Received	: 28-Jun-2019 14:10
Order number	: -	Date Analysis Commenced	: 29-Jun-2019
C-O-C number	: 2141	Issue Date	: 03-Jul-2019 17:20
Sampler	: DAVID KNIGHT, SAMUEL GREGORY		
Site	: ----		
Quote number	: BN/093/19 Compass V2		
No. of samples received	: 3		
No. of samples analysed	: 3		

NATA
Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	MW1	MW2	MW3	----	----
			Client sampling date / time	28-Jun-2019 12:01	28-Jun-2019 12:03	28-Jun-2019 12:06	----	----
Compound	CAS Number	LOR	Unit	EB1916762-001	EB1916762-002	EB1916762-003	--------	--------
				Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**2510**	**3540**	**1870**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**3**	**49**	**58**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**5**	**56**	**86**	----	----
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.19**	**0.13**	**0.52**	----	----
Arsenic	7440-38-2	0.001	mg/L	**0.012**	**0.003**	**0.002**	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	**0.003**	----	----
Copper	7440-50-8	0.001	mg/L	**0.011**	**0.002**	**0.001**	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Nickel	7440-02-0	0.001	mg/L	**0.002**	**0.002**	**0.004**	----	----
Zinc	7440-66-6	0.005	mg/L	**0.028**	**0.009**	**0.011**	----	----
Iron	7439-89-6	0.05	mg/L	**0.12**	**0.28**	**0.94**	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**35.3**	**30.2**	**26.7**	----	----
Iron	7439-89-6	0.05	mg/L	**17.4**	**7.97**	**18.6**	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Client sample ID	MW1	MW2	MW3	----	----
			Client sampling date / time	28-Jun-2019 12:01	28-Jun-2019 12:03	28-Jun-2019 12:06	----	----
Compound	CAS Number	LOR	Unit	EB1916762-001	EB1916762-002	EB1916762-003	--------	--------
				Result	Result	Result	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L	<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	<100	**120**	**110**	----	----
C29 - C36 Fraction	----	50	µg/L	<50	**70**	**70**	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	**190**	**180**	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	**170**	**150**	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	**170**	**150**	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	1.0	%	**28.8**	**26.6**	**21.9**	----	----
2-Chlorophenol-D4	93951-73-6	1.0	%	**80.3**	**74.4**	**58.9**	----	----
2.4.6-Tribromophenol	118-79-6	1.0	%	**91.2**	**93.1**	**67.6**	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			*Client sample ID*	MW1	MW2	MW3	----	----
			Client sampling date / time	28-Jun-2019 12:01	28-Jun-2019 12:03	28-Jun-2019 12:06	----	----
Compound	*CAS Number*	*LOR*	*Unit*	EB1916762-001	EB1916762-002	EB1916762-003	--------	--------
				Result	Result	Result	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	73.3	63.0	47.1	----	----
Anthracene-d10	1719-06-8	1.0	%	82.1	75.6	54.2	----	----
4-Terphenyl-d14	1718-51-0	1.0	%	90.0	82.0	54.7	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	121	108	99.9	----	----
Toluene-D8	2037-26-5	2	%	92.3	94.5	96.2	----	----
4-Bromofluorobenzene	460-00-4	2	%	101	105	108	----	----

Surrogate Control Limits

Sub-Matrix: **GROUNDWATER**

Compound	*CAS Number*	*Recovery Limits (%)* Low	*Recovery Limits (%)* High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2.4.6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	66	138
Toluene-D8	2037-26-5	79	120
4-Bromofluorobenzene	460-00-4	74	118

QUALITY CONTROL REPORT

Work Order	: **EB1916762**	Page	: 1 of 6
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: DAVID KNIGHT	Contact	: Customer Services EB
Address	: PO Box 6405 Yatala DC 4207	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: ADG965.19	Date Samples Received	: 28-Jun-2019
Order number	: -	Date Analysis Commenced	: 29-Jun-2019
C-O-C number	: 2141	Issue Date	: 03-Jul-2019
Sampler	: DAVID KNIGHT, SAMUEL GREGORY		
Site	: ----		
Quote number	: BN/093/19 Compass V2		
No. of samples received	: 3		
No. of samples analysed	: 3		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane Organics, Stafford, QLD
Tom Maloney	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2435479)									
EB1916757-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	6	6	0.00	No Limit
EB1916807-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	58	54	6.65	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2436109)									
EB1916762-001	MW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	3	0.00	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 2436110)									
EB1916762-001	MW1	ED045G: Chloride	16887-00-6	1	mg/L	5	5	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2436131)									
EB1916710-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	1.31	1.27	3.31	0% - 20%
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.36	3.16	5.92	0% - 20%
EB1916766-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
		EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	0.02	0.00	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2436131) - continued									
EB1916766-004	Anonymous	EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 2436262)									
EB1916688-001	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.15	0.16	7.27	0% - 50%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	9.75	9.73	0.230	0% - 20%
EB1916721-002	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.08	0.09	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2436132)									
EB1916710-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EB1916766-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2436306)									
EB1915776-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EB1916467-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2436306)									
EB1915776-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EB1916467-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2436306)									
EB1915776-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EB1916467-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2435479)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	105	88	112
				<5	1000 mg/L	95.8	88	112
				<5	951 mg/L	107	88	116
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2436109)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	108	85	118
				<1	100 mg/L	95.0	85	118
ED045G: Chloride by Discrete Analyser (QCLot: 2436110)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.6	90	115
				<1	1000 mg/L	103	90	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 2436131)								
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	101	79	118
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	88	116
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	88	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	106	87	113
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.2 mg/L	100	88	114
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	89	110
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	106	89	113
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.2 mg/L	104	87	113
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	110	82	114
EG020T: Total Metals by ICP-MS (QCLot: 2436262)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	104	80	114
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	110	82	118
EG035F: Dissolved Mercury by FIMS (QCLot: 2436132)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.8	84	118
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2436229)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	10 µg/L	81.2	50	110
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	10 µg/L	92.6	49	124
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	10 µg/L	83.8	55	114
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	10 µg/L	87.4	55	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	10 µg/L	85.2	51	127
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	10 µg/L	87.7	55	127
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	10 µg/L	88.9	55	127
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	10 µg/L	88.3	54	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	10 µg/L	91.5	47	136

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2436229) - continued								
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	10 µg/L	85.9	51	129
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	10 µg/L	93.2	55	132
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	10 µg/L	86.0	58	128
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	10 µg/L	92.9	55	131
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	10 µg/L	82.6	52	133
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	10 µg/L	84.0	48	137
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	10 µg/L	81.0	53	131
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2436231)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	1070 µg/L	78.4	65	135
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1770 µg/L	73.8	62	138
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2436306)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	160 µg/L	93.0	67	125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2436231)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	1560 µg/L	77.9	66	134
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	1190 µg/L	74.5	61	139
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2436306)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	185 µg/L	92.5	66	123
EP080: C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
EP080: BTEXN (QCLot: 2436306)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	96.4	73	119
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	94.5	75	119
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	94.3	73	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	96.3	77	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	97.1	76	121
EP080: Total Xylenes	----	2	µg/L	<2	----	----	----	----
EP080: Sum of BTEX	----	1	µg/L	<1	----	----	----	----
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	93.6	75	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2436109)							
EB1916762-002	MW2	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	20 mg/L	97.3	70	130
ED045G: Chloride by Discrete Analyser (QCLot: 2436110)							
EB1916762-002	MW2	ED045G: Chloride	16887-00-6	400 mg/L	105	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2436131)							
EB1916710-002	Anonymous	EG020A-F: Aluminium	7429-90-5	0.5 mg/L	105	70	130
		EG020A-F: Arsenic	7440-38-2	0.1 mg/L	121	70	130
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	103	70	130
		EG020A-F: Chromium	7440-47-3	0.1 mg/L	102	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	94.5	70	130
		EG020A-F: Lead	7439-92-1	0.1 mg/L	104	70	130
		EG020A-F: Nickel	7440-02-0	0.1 mg/L	111	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	113	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2436132)							
EB1916710-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	81.2	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2436306)							
EB1916237-001	Anonymous	EP080: C6 - C9 Fraction	----	40 µg/L	76.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2436306)							
EB1916237-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	40 µg/L	77.5	70	130
EP080: BTEXN (QCLot: 2436306)							
EB1916237-001	Anonymous	EP080: Benzene	71-43-2	10 µg/L	91.7	70	130
		EP080: Toluene	108-88-3	10 µg/L	84.1	70	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EB1916762**	Page	: 1 of 7
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Brisbane
Contact	: DAVID KNIGHT	Telephone	: +61-7-3243 7222
Project	: ADG965.19	Date Samples Received	: 28-Jun-2019
Site	: ----	Issue Date	: 03-Jul-2019
Sampler	: DAVID KNIGHT, SAMUEL GREGORY	No. of samples received	: 3
Order number	: -	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	19	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	0	17	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation: Date extracted	Due for extraction	Evaluation	Analysis: Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
MW1, MW3	MW2,	**28-Jun-2019**	**----**	----	----	**29-Jun-2019**	05-Jul-2019	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
MW1, MW3	MW2,	**28-Jun-2019**	**----**	----	----	**01-Jul-2019**	26-Jul-2019	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
MW1, MW3	MW2,	**28-Jun-2019**	**----**	----	----	**01-Jul-2019**	26-Jul-2019	✓
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
MW1, MW3	MW2,	**28-Jun-2019**	**----**	----	----	**01-Jul-2019**	25-Dec-2019	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)								
MW1, MW3	MW2,	**28-Jun-2019**	**02-Jul-2019**	25-Dec-2019	✓	**02-Jul-2019**	25-Dec-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
MW1, MW3	MW2,	**28-Jun-2019**	**----**	----	----	**01-Jul-2019**	26-Jul-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
MW1, MW3	MW2,	**28-Jun-2019**	**01-Jul-2019**	05-Jul-2019	✓	**01-Jul-2019**	10-Aug-2019	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
MW1, MW3	MW2,	**28-Jun-2019**	**01-Jul-2019**	05-Jul-2019	✓	**01-Jul-2019**	10-Aug-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
MW1, MW3	MW2,	**28-Jun-2019**	**02-Jul-2019**	12-Jul-2019	✓	**02-Jul-2019**	12-Jul-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
MW1, MW3	MW2,	**28-Jun-2019**	**01-Jul-2019**	05-Jul-2019	✓	**01-Jul-2019**	10-Aug-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)								
MW1, MW3	MW2,	**28-Jun-2019**	**02-Jul-2019**	12-Jul-2019	✓	**02-Jul-2019**	12-Jul-2019	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
MW1, MW3	MW2,	**28-Jun-2019**	**02-Jul-2019**	12-Jul-2019	✓	**02-Jul-2019**	12-Jul-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chloride by Discrete Analyser	ED045G	1	3	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	19	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	5	**20.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Chloride by Discrete Analyser	ED045G	2	3	**66.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	5	**40.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	17	**17.65**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	3	**33.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	19	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	5	**20.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	0	17	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to USEPA SW846-3005. Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

ALSCompass
SAMPLING Intelligence

Environmental Division
Brisbane
Work Order Reference
EB1916762

Custody Document for Submissions via ALS Compass App

Project: ADG 965.19 **Client:** ADG Consulting Pty Ltd **Project Manager:** Michael Campbell
Phone: (0415 960 372

Telephone : + 61-7-3243 7222

ALS Compass COC Reference: 2141 **# Samples:** 3 **Sampler:** David Knight
Phone: (0490 353 162

SCANNED

Turnaround Requirements: Standard – Urgent 3

Special Instructions:

PLEASE LOG AS A PLANNED EVENT, PLEASE ENSURE THAT CLIENT REQUESTED REPORTING DATE IS ACCURATE ON SRN - CHEERS

pre approved with Kylie.

URGENT

Custody:

Relinquished by: ~~Josh Smith~~ Dave Knight 28/6/19	**Received by:** Mc Birch 28/6/19 14:10	**Relinquished by:**	**Received by:**
Date / Time: 12:15	**Date / Time:**	**Date / Time:**	**Date / Time:**

CHAIN OF CUSTODY

COC#: **2141** *ALS Laboratory:* EB Brisbane

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: ADGCON - ADG CONSULTING P/L

PROJECT: Groundwater

SITE: ADG965.19

ORDER NO:

TURNAROUND REQUIREMENTS : 3 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

PROJECT MANAGER: David Knight CONTACT PH: 0490 353 162 SAMPLER MOBILE: 0490 353 162

PRIMARY SAMPLER: David Knight QUOTE NO: BN/093/19 Compass V2 / EB2019ADGCON0001

EMAIL REPORTS TO:

EMAIL INVOICES TO:

SAMPLE DETAILS							ANALYSIS REQUIRED					
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Table 2: W-26 (TRH/BTEXN/PAH/8 Metals) WATER	Table 6: Additional Dissolved Al,Fe WATER	Table 7: Additional Total Metals Al, Fe WATER	Table 8: TSS,SO4, Cl WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	MW1		28/06/2019 12:01 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X		
002	MW2		28/06/2019 12:03 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X		
003	MW3		28/06/2019 12:06 PM	Water	ALS: 6 Non ALS: 0	No	X	X	X	X		

CHAIN OF CUSTODY

COC#: **2141** ALS Laboratory: EB Brisbane

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: ADGCON - ADG CONSULTING P/L

PROJECT: Groundwater

SITE: ADG965.19

ORDER NO:

PROJECT MANAGER: David Knight CONTACT PH: 0490 353 162 SAMPLER MOBILE: 0490 353 162

PRIMARY SAMPLER: David Knight QUOTE NO: BN/093/19 Compass V2 / EB2019ADGCON0001

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 3 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: ˚C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	MW1	Clear Plastic Bottle - Natural	250 mL	00071018005830	Green	No	
001	MW1	Amber Glass Bottle - Unpreserved	100 mL	00401018014536	Orange	No	
001	MW1	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00121018075653	Red	No	Totals
001	MW1	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00121018075683	Red	Yes	
001	MW1	Amber VOC Vial - Sulfuric Acid	40 mL	00161018000762	Purple	No	
001	MW1	Amber VOC Vial - Sulfuric Acid	40 mL	00161018000763	Purple	No	
002	MW2	Clear Plastic Bottle - Natural	250 mL	00071018011060	Green	No	
002	MW2	Amber Glass Bottle - Unpreserved	100 mL	00401018014535	Orange	No	
002	MW2	Amber VOC Vial - Sulfuric Acid	40 mL	00161018000764	Purple	No	
002	MW2	Amber VOC Vial - Sulfuric Acid	40 mL	00161018000765	Purple	No	
002	MW2	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00121018075642	Red	No	Total
002	MW2	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00121018078768	Red	Yes	
003	MW3	Clear Plastic Bottle - Natural	250 mL	00071018011059	Green	No	
003	MW3	Clear Plastic Bottle - Nitric Acid; Unfiltered	60 mL	00121018075690	Red	No	Total
003	MW3	Clear Plastic Bottle - Nitric Acid; Filtered	60 mL	00121018097428	Red	Yes	
003	MW3	Amber Glass Bottle - Unpreserved	100 mL	00401018014532	Orange	No	
003	MW3	Amber VOC Vial - Sulfuric Acid	40 mL	00161018000758	Purple	No	
003	MW3	Amber VOC Vial - Sulfuric Acid	40 mL	00161018000759	Purple	No	

Total Bottle Count: ALS: 18, Non ALS: 0

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 3/1 Burma Road Pooraka SA 5095 Ph: 08 8162 5130 E: adelaide@alsglobal.com
☒BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Gladstone QLD 4680 Ph: 07 4978 7944 E: ALSEnviro.Gladstone@alsglobal.com
☐MACKAY Unit 2/20 Caterpillar Drive Paget QLD 4740 Ph: 07 4952 5795 E: ALSEnviro.Mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 / SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com / samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: ALSEnviro.Townsville@alsglobal.com
☐WOLLONGONG 1/19-21 Ralph Black Drive, Nth Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ADG Consulting
OFFICE: PO Box 6405, Yatala DC, QLD
PROJECT: Byron Bay **PROJECT NO.:** ADG965.19
ORDER NUMBER: **PURCHASE ORDER NO.:**
PROJECT MANAGER: Michael Campbell **CONTACT PH:** 0415 960 372
SAMPLER: Samuel Gregory **SAMPLER MOBILE:** 0418795859
COC Emailed to ALS? (YES / NO) YES **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): mail@adgconsulting.com.au
Email Invoice to (will default to PM if no other addresses are listed): **mail@adgconsulting.com.au**

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
Standard TAT (List due date): 28.06.19
Non Standard or urgent TAT (List due date):
ALS QUOTE NO.: BNBQ/004/18
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: Samuel Gregory
DATE/TIME: 24.06.19

RECEIVED BY: M.Siren
DATE/TIME: 24/6/19 14.10

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY: FAS:
DATE/TIME: 26/6/19 1230pm

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).					Additional Information Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	EA200B	S-18	S-26	S-2	On Hold	
48	ACM1	21-06-19	S	B	1	X					
49	ACM2	21-06-19	S	B	1	X					
50	Trip Spike 5	19-06-19	S	ST	1		X				
51	Trip Blank 060642	19-06-19	S	ST	1		X				
52	DUP1	21-06-19	S	ST	1			X			
53	DUP2	21-06-19	S	ST	1					X	
54	DUP3	21-06-19	S	ST	1					X	
	TRIP1 (1)	21-06-19	S	ST	1			X			Forward on to ALS Sydney
	TRIP2 (2)	21-06-19	S	ST	1					X	Forward on to ALS Sydney
				TOTAL	9	2	2	2	0	3	

Environmental Division
Sydney
Work Order Reference
ES1919713

Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order	: **ES1919713**		
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services ES
Address	: PO Box 6405 Yatala DC 4207	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: mail@adgconsulting.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 07 5580 8063	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: ADG965.19 Byron Bay	Page	: 1 of 2
Order number	:	Quote number	: EB2018ADGCON0001 (BNBQ/004/18)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SAMUEL GREGORY		

Dates

Date Samples Received	: 26-Jun-2019 12:30	Issue Date	: 27-Jun-2019
Client Requested Due Date	: 02-Jul-2019	Scheduled Reporting Date	: **02-Jul-2019**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 11.1'C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 2 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1919713-001	21-Jun-2019 00:00	TRIP1		✓	✓
ES1919713-002	21-Jun-2019 00:00	TRIP2	✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL INVOICES

- A4 - AU Tax Invoice (INV)	Email	mail@adgconsulting.com.au

MICHAEL CAMPBELL

- *AU Certificate of Analysis - NATA (COA)	Email	mail@adgconsulting.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	mail@adgconsulting.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	mail@adgconsulting.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	mail@adgconsulting.com.au
- Chain of Custody (CoC) (COC)	Email	mail@adgconsulting.com.au
- EDI Format - XTab (XTAB)	Email	mail@adgconsulting.com.au

CERTIFICATE OF ANALYSIS

Work Order	: **ES1919713**	Page	: 1 of 6
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services ES
Address	: PO Box 6405 Yatala DC 4207	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 5580 8063	Telephone	: +61-2-8784 8555
Project	: ADG965.19 Byron Bay	Date Samples Received	: 26-Jun-2019 12:30
Order number	:	Date Analysis Commenced	: 27-Jun-2019
C-O-C number	: ----	Issue Date	: 01-Jul-2019 18:55
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 2		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP071: Results of sample TRIP1 have been confirmed by re-extraction and re-analysis.

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	TRIP1	----	----	----	----
			Client sampling date / time	21-Jun-2019 00:00	----	----	----	----
				ES1919713-001	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**2.1**	----	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	<2	----	----	----	----
Copper	7440-50-8	5	mg/kg	**6**	----	----	----	----
Lead	7439-92-1	5	mg/kg	**7**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**26**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	TRIP1	----	----	----	----
Client sampling date / time				21-Jun-2019 00:00	----	----	----	----
				ES1919713-001	--------	--------	--------	--------
				Result	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction	----	50	mg/kg	<50	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**140**	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	**140**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**190**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**190**	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	----	----	----	----
^ Total Xylenes	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**73.3**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**81.5**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**62.9**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**100**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**82.1**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**96.0**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**77.7**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**122**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**
(Matrix: **SOIL)**

			Client sample ID	**TRIP1**	----	----	----	----
			Client sampling date / time	21-Jun-2019 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1919713-001**	--------	--------	--------	--------
				Result	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	**92.6**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1919713**	Page	: 1 of 7
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Contact	: Customer Services ES
Address	: PO Box 6405 Yatala DC 4207	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 07 5580 8063	Telephone	: +61-2-8784 8555
Project	: ADG965.19 Byron Bay	Date Samples Received	: 26-Jun-2019
Order number	:	Date Analysis Commenced	: 27-Jun-2019
C-O-C number	: ----	Issue Date	: 01-Jul-2019
Sampler	: SAMUEL GREGORY		
Site	: ----		
Quote number	: BNBQ/004/18		
No. of samples received	: 2		
No. of samples analysed	: 1		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
- Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
- CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
- LOR = Limit of reporting
- RPD = Relative Percentage Difference
- # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 2434309)									
ES1919571-017	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	16	16	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	15	17	12.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	6	32.4	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	31	32	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	63	54	16.4	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	98	102	4.61	0% - 20%
ES1919717-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	2	2	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	7	24.9	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	16	17	10.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	13	87.1	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	24	35	35.8	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	26	42	48.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	374	412	9.75	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2434315)									
ES1919571-022	Anonymous	EA055: Moisture Content	----	0.1	%	13.2	12.0	9.93	0% - 50%
ES1919718-002	Anonymous	EA055: Moisture Content	----	0.1	%	13.7	12.9	5.96	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2434310)									
ES1919571-017	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1919717-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.2	0.4	38.7	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2433048)									
ES1919958-003	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2433048) - continued									
ES1919958-003	Anonymous	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	1.4	96.2	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.5	1.5	95.3	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	0.6	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	0.6	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	0.5	# 5.6	167	0% - 50%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	0.6	22.2	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2432278)									
ES1919416-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1919846-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2433049)									
ES1919958-003	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	500	430	15.8	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	450	400	10.6	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2432278)									
ES1919416-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1919846-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2433049)									
ES1919958-003	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	820	700	15.1	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	320	320	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080: BTEXN (QC Lot: 2432278)									
ES1919416-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
				Laboratory Duplicate (DUP) Report					
EP080: BTEXN (QC Lot: 2432278) - continued									
ES1919846-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2434309)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100.0	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	98.1	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	97.7	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	101	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	106	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	114	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2434310)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	88.5	70	105
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2433048)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	103	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	109	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	102	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	109	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	108	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	108	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	113	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	113	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	100	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	99.2	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	101	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	98.5	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	105	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	70.3	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	68.9	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	67.4	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2432278)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	80.4	68	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2433049)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	93.0	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	95.3	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	95.9	71	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2432278)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2432278) - continued								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	78.4	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2433049)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	91.2	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	93.8	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	80.5	63	131
EP080: BTEXN (QCLot: 2432278)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	91.0	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	79.6	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	80.0	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	80.4	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	80.8	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	104	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 2434309)							
ES1919571-017	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	92.7	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.7	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	123	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	93.7	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	118	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	114	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2434310)							
ES1919571-017	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	96.2	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2433048)							
ES1919958-003	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	86.9	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	93.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2432278)							
ES1919416-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	92.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2433049)							

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2433049) - continued							
ES1919958-003	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	102	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	123	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	124	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2432278)							
ES1919416-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	92.7	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2433049)							
ES1919958-003	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	104	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	121	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	89.9	52	132
EP080: BTEXN (QCLot: 2432278)							
ES1919416-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	83.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	87.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	112	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	95.9	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	90.7	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	113	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1919713**	Page	: 1 of 5
Client	: **ADG CONSULTING P/L**	Laboratory	: Environmental Division Sydney
Contact	: MR MICHAEL CAMPBELL	Telephone	: +61-2-8784 8555
Project	: ADG965.19 Byron Bay	Date Samples Received	: 26-Jun-2019
Site	: ----	Issue Date	: 01-Jul-2019
Sampler	: SAMUEL GREGORY	No. of samples received	: 2
Order number	:	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1919958--003	Anonymous	**Sum of polycyclic aromatic hydrocarbons**	----	167 %	0% - 50%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) TRIP1	**21-Jun-2019**	**----**	----	----	**28-Jun-2019**	05-Jul-2019	✓
EG005(ED093)T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) TRIP1	**21-Jun-2019**	**28-Jun-2019**	18-Dec-2019	✓	**29-Jun-2019**	18-Dec-2019	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) TRIP1	**21-Jun-2019**	**28-Jun-2019**	19-Jul-2019	✓	**01-Jul-2019**	19-Jul-2019	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) TRIP1	**21-Jun-2019**	**28-Jun-2019**	05-Jul-2019	✓	**29-Jun-2019**	07-Aug-2019	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080) TRIP1	**21-Jun-2019**	**27-Jun-2019**	05-Jul-2019	✓	**28-Jun-2019**	05-Jul-2019	✓
Soil Glass Jar - Unpreserved (EP071) TRIP1	**21-Jun-2019**	**28-Jun-2019**	05-Jul-2019	✓	**29-Jun-2019**	07-Aug-2019	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Soil Glass Jar - Unpreserved (EP080) TRIP1	**21-Jun-2019**	**27-Jun-2019**	05-Jul-2019	✓	**28-Jun-2019**	05-Jul-2019	✓
Soil Glass Jar - Unpreserved (EP071) TRIP1	**21-Jun-2019**	**28-Jun-2019**	05-Jul-2019	✓	**29-Jun-2019**	07-Aug-2019	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
TRIP1	**21-Jun-2019**	**27-Jun-2019**	05-Jul-2019	✓	**28-Jun-2019**	05-Jul-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	7	**14.29**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

Queensland Government

Forensic and Scientific Services

HealthSupport Queensland

CERTIFICATE OF ANALYSIS

CLIENT: ADG CONSULTING
PO BOX 6405
YATALA
QLD 4207

Laboratory Reference : 19060100
Client Order Number :
Quote Number :
Client Project : ADG965.19
Client Batch Reference :
Date Received : 25th June 2019
Laboratory Number/s : 18PX496 – 18PX500

ATTN: MICHAEL CAMPBELL

CC: mail@adgconsulting.com.au

Submitting Authority: Samuel Gregory, ADG Consulting

Number of Samples: 5

Reason for Analysis: Undefined

LOW RESOLUTION GAMMA SPECTROMETRY

Method of Analysis QHFSS in-house method.

Remarks Results indicate gross count rate (cps/kg for 0 – 4 MeV).
Special preparations: Nil

Sample Geometry

☐ 85mL Aluminium Jar (with radon tight viton gasket)
☐ 2L Marinelli Beaker
☐ Well Detector Vial
☒ 20mL Super Polyethylene Vial

Detector Specifications

☒ Sys: HIDEX GROSS GAMMA COUNTER Model: 425-601 s/n: 2150009

Traceability

☒ Standard Radionuclide Source: Three 20 mL, DRSS-408-U238-01-06, DRSS-421-Th232-03-01, and DRSS-411-K40-01-03 certified reference material traceable to IAEA.

Uncertainty Counts per second per kilogram (cps/kg) stated as x ± U (k=2, 95%CI).

Pushpendra

…………………………………………………
Pushpendra Chauhan, A/Senior Health Physicist
Radiation and Nuclear Sciences
27th June 2019

Enquiries: Principal Health Physicist
Phone (+61) 7 3096 2901

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AUSTRALIA

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Archerfield QLD 4108
AUSTRALIA

Phone (+61 7) 3096 2900
Fax (+61 7) 3096 2913
Email FSS-RadiationScience@health.qld.gov.au

Method	Analysis Description	Sample Description/Area	Client Reference	Sampling Time / Date	Preparation Date	Analysis Date	Count Rate/mass ± U cps/kg
QHFSS In-house	Low Resolution Gamma Spectroscopy (LRGS)	18PX496	BH2 1.5m	21-06-19	26-06-19	27-06-19	16 ± 3
QHFSS In-house	Low Resolution Gamma Spectroscopy (LRGS)	18PX497	BH3 1m	21-06-19	26-06-19	27-06-19	157 ± 4
QHFSS In-house	Low Resolution Gamma Spectroscopy (LRGS)	18PX498	BH4 1.5m	21-06-19	26-06-19	27-06-19	346 ± 5
QHFSS In-house	Low Resolution Gamma Spectroscopy (LRGS)	18PX499	BH5 1m	21-06-19	26-06-19	27-06-19	188 ± 5
QHFSS In-house	Low Resolution Gamma Spectroscopy (LRGS)	18PX500	BH6 1m	21-06-19	26-06-19	27-06-19	975 ± 8

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Appendix F: PID Calibration Certificate

PID Calibration Certificate

Instrument PhoCheck Tiger
Serial No. T-111084

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments			
Battery	Charge Condition	✓				
	Fuses	✓				
	Capacity	✓				
	Recharge OK?	✓				
Switch/keypad	Operation	✓				
Display	Intensity	✓				
	Operation (segments)	✓				
Grill Filter	Condition	✓				
	Seal	✓				
Pump	Operation	✓				
	Filter	✓				
	Flow	✓				
	Valves, Diaphragm	✓				
PCB	Condition	✓				
Connectors	Condition	✓				
Sensor	PID	✓	10.6 ev			
Alarms	Beeper	✓	Low	High	TWA	STEL
	Settings	✓	50ppm	100ppm		
Software	Version	✓				
Data logger	Operation	✓				
Download	Operation	✓				
Other tests:						

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Diffusion mode Aspirated mode

Sensor	Serial no	Calibration gas and concentration	Certified	Gas bottle No		Instrument Reading
PID Lamp		93ppm Isobutylene	NIST	BR100		93.2ppm

Calibrated by: **Braeden Curtis**

Calibration date: **18/06/2019**

Next calibration due: **18/07/2019**

2019NTH015

DA 10.2018.650.1 Mixed use development, Jonson Street, Byron Bay

ATTACHMENTS TO COUNCIL REPORT

9. SOCIAL IMPACT ASSESSMENT

Social Impact Assessment Report

Essence of Byron

98-106 Jonson St, Byron Bay

real options

Prepared by Real Options Consultancy Services
April 2019

TABLE OF CONTENTS

List of Tables

1. INTRODUCTION

Social impact assessment (SIA) is a sub-field of the social sciences that is developing a knowledge base to provide a systematic appraisal in advance of the impacts, on the day-to-day quality of life of persons and communities whose environment may be affected by a proposed project or development.

Social impacts refer to changes to individuals and communities due to a proposed action or development that has the potential to alter the day-to-day way in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society.

SIA is done as part of the planning process to identify the likelihood of social impacts of particular development proposals. Like environmental or economic impact assessments, social impacts have to be identified and measured in order to be understood and communicated to decision-makers and other stakeholders including residents. Social impact assessment provides a realistic appraisal of possible social ramifications and suggestions for project alternatives and possible mitigation measures.

The Byron Shire Council's Development Control Plan 2014 requires a social impact assessment to be completed for *tourist and visitor accommodation for 50 or more persons.*[1] This Social Impact Assessment Report has been commissioned by Mercato on Byron Pty Ltd, in regards to a Development Application for a Mixed use development at 98-106 Jonson St, Byron Bay, comprising a 146 room Hotel, Function Centre and retail premises. The project is known as 'Essence of Byron'.

This social impact assessment has been conducted in accordance with Chapter B12: Social Impact Assessment of the Byron Shire Development Control Plan 2014.

2. OUTLINE OF THE PROPOSED DEVELOPMENT

The proposed works comprise the construction of a new 3 storey - 146 room Hotel development (situated on the former Woolworths site) adjacent to Mercato on Byron. The proposed Hotel – *Essence of Byron* will comprise:

- **Basement** – contains 103 parking spaces, 5 motorbike spaces, as well as hotel facilities and services such as gym, administration, staff lockers and facilities, storage and building services.
- **Ground level** – includes a proposed function space with a 236m2 conference room, and two 54m2 meeting rooms. The hotel lobby is accessed from Jonson street and via a lift from the basement. Also facing Jonson street is a proposed restaurant/lobby lounge which provides for up to 250 seats with a bar and service kitchen.

[1] Byron Shire Development Control Plan 2014, Chapter B12 Social Impact Assessment p 6.

The ground floor also contains a landscaped open-air courtyard and atrium rising the full height of the building which will assist with internal lighting to the ground floor and provide outlook, amenity and natural light to the inward facing rooms above. There is also provision for 40 bicycles at street level.

- **First level** – includes 73 hotel rooms ranging in size from 25m2 to 45m2. Of the 73 hotel rooms on this level, four rooms are dual-key rooms.
- **Second level** – this level contains the same layout and rooms as the level below, but this level has three dual key rooms.
- **Roof level** – the roof level of the hotel includes extensive landscaped space which can be used for recreation and functions. The landscaping is located to the Jonson Street frontage with pockets surrounding the solar panels to the rear of the site. In the centre of the roof level is a lap pool with an infinity edge and a transparent bottom. Adjacent to the pool is decking that includes a bar, lounge chairs, tables and chairs as well as amenities and building services.

The Hotel incorporates 103 car park spaces with all service vehicle functions situated at the rear of the site away from Jonson St. Primary vehicular access is taken from Jonson Street using the crossover, ramps and driveway shared with the Mercato on Byron shopping centre adjacent to the development. A second vehicle crossover is proposed at the northern boundary of the site, allowing entry to the hotel basement via a single lane ramp. Pedestrian access is available directly from Jonson Street to the retail premises and hotel lobby.

Figure 1: Architectural perspective of the proposed development

3. METHODOLOGY

The report has been developed through the following process:

1. **Research and Review** - Consideration was given to existing documentation and previous reports including those involving significant consultation and feedback from local residents such as *Our Byron Our Future – Community Strategic Plan 2028, Byron Bay Town Centre Masterplan* and relevant recent research such as the Southern Cross University's research regarding the impact of Airbnb on the Byron Shire and the University of Western Sydney's research on *Planning Responses to online Short-term holiday rental platforms.*

2. **Analysis of statistical data** – A detailed analysis was conducted in regard to the 2016 ABS Population and Housing Census data for the Byron Bay State Suburb in comparison with Suffolk Park State Suburb, the Byron LGA and National data to provide a description of the current community demographics

3. **Site Visit**–A site visit was conducted on the 12 April 2019 and coincided with a **meeting** with Mr Rob Van Iesel, Major Projects Planner Byron Shire Council.

4. **Preparation of Report** – the report was prepared taking into consideration relevant statistical data and planning documents, strategies and policies of Byron Shire Council and the NSW Department of Planning and relevant research documents.

4. UNDERSTANDING THE LOCAL COMMUNITY – Byron Bay

The following ABS data relates to people who are residents of Byron Bay (state Suburb) with comparisons given to Suffolk Park (state suburb), Byron LGA, and national statistics. It should be noted that these figures do not include the significant number of tourists who visit the Byron Bay region. Information regarding tourists will be documented separately. Use of the terminology Byron Bay in this report will be in reference to the geographic area identified by the ABS classification system as Byron Bay State Suburb.

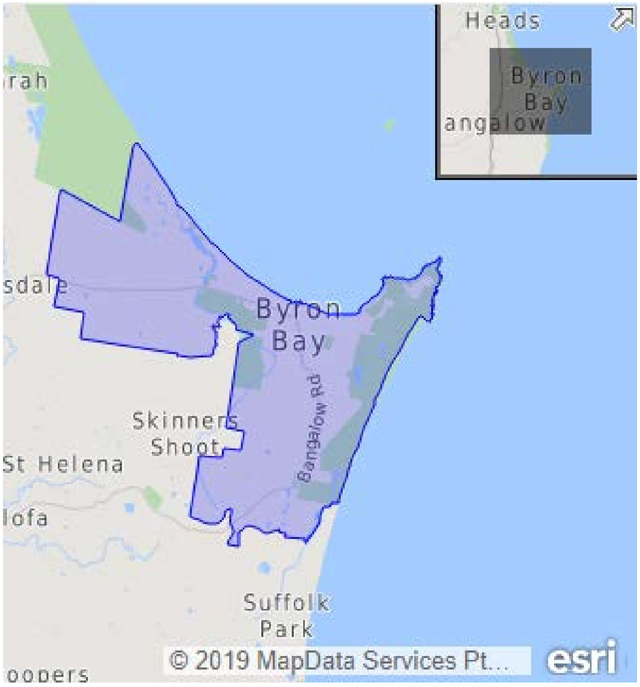

Figure 2: Byron Bay State Suburb – Geographic area

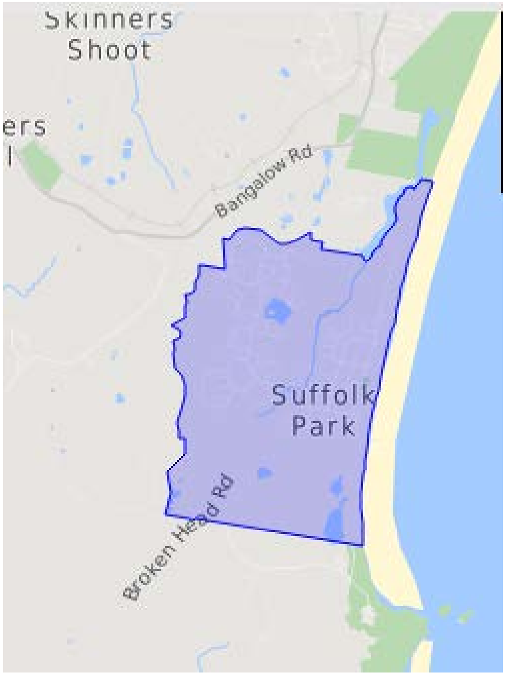

Figure 3: Suffolk Park – Geographic area

4.1 DEMOGRAPHIC INFORMATION

In the 2016 census, there were 5,521 people residing in Byron Bay (SS), which was an 11.3% increase from 2011 (4,959 persons). Suffolk Park had an 8.1% increase growing from a population of 3,468 residents in 2011 to 3,750 people in 2016. The population of the overall Byron Shire grew by 8% over the five years to 2016 (31,556 people) and is further expected to increase to 36,550 by 2036 (NSW Government Planning and Environment, Population Projections) which is an increase of 15% over the 20-year period. This reflects a moderate growth rate which is lower than the average growth rate for New South Wales over the same period.

While this Census data relates to permanent residents it should be noted that with more than 2 Million people visiting the Byron Shire each year, visitors outnumber residents by a ratio of 70 to 1.

4.1.1 Age Distribution

Overall the Median age for Byron Bay at 42 years is higher than the national and state median age (38yrs) and also higher than Suffolk Park (40 yrs). The area has a much lower population of children aged 0-14 years and a lower proportion of young people aged between 15-24 yrs than Suffolk Park, NSW or Australia. However, the proportion of older people aged over 65 years (17.1%) is greater than Australia (15.8%) or Byron Shire (16.9%) while Suffolk Park has a much lower proportion of people over 65 years than the national average.

Table 1: Age composition

Age	Byron Bay (SS)	Suffolk Park (SS)	Byron LGA	Australia
0-4yrs	219 (4.0%)	220 (5.9%)	1,553 (4.9%)	6.3%
5-14yrs	459 (8.3%)	422 (11.2%)	3,733 (11.9%)	12.4%
15-24 yrs	562 (10.1%)	331 (8.9)	2,801 (8.9%)	12.8%
25-54 yrs	2389 (43.3%)	1746 (46.6)	12,672 (40.1%)	41.2%
55-64 yrs	944 (17.1%)	540 (14.3%)	5,488 (17.4%)	11.8%
>65yrs	946 (17.1%)	493 (13.1%)	5,324 (16.9%)	15.8%
Median Age	42 yrs	40 yrs	44 yrs	38 yrs

Source: 2016 Census

4.1.2 Household Type

Family households constitute just over half of the household types in Byron Bay (53.7%) while in comparison these comprise over 70% for Australia, 68% for Suffolk Park and just under 65% for the Byron Shire. In contrast, there are three times as many households that are group households than the national percentage and a third of households are lone person households which is much higher than the Australian proportion.

Table 2: Household Type- Occupied private Dwellings

Household Type	Byron Bay	Suffolk Park	Byron Bay LGA	Australia
Family Households	992 (53.7%)	881 (68.0%)	7,338 (64.6%)	71.3%
Lone Person Household	615 (33.3%)	270 (20.8%)	3,132 (27.6%)	24.4%
Group Household	239 (12.9%)	145 (11.2%)	896 (7.9%)	4.3%

Source: 2016 Census

4.1.3 Family Composition

The predominant family types in Byron Bay are couple families without children (44.6%) which again is much higher than the percentage for Australia, Suffolk Park or the Byron Shire. In both Australia and Suffolk Park the trend is for Couple Families with Children to be the predominant family group, while in Byron Shire, couple families without children is only slightly higher than Couple families with children. One parent families in Byron Bay, Suffolk Park and Byron Shire also constitute a higher percentage of families than Australia.

Table 3: Family Composition

Family Characteristics	Byron Bay	Suffolk Park	Byron LGA	Australia
Couple Families with children	337 (33.2%)	365 (40.6%)	2,862 (38.1%)	44.7%
Couple families without children	452 (44.6%)	347 (38.6%)	2,995 (39.8%)	37.8%
One parent family	199 (19.6%)	172 (19.19%)	1,566 (20.8%)	15.8%
Other family	26 (2.6%)	16 (1.8%)	96 (1.3%)	1.7%

Source: 2016 Census

4.1.4 Income

Overall, the median income levels in Byron Bay are lower than the National levels but slightly higher than Byron LGA. In contrast the median income levels for individuals and households in Suffolk Park are higher than for Australia, with only family incomes being slightly less that the national level.

Table 4: Income

	Byron Bay	Suffolk Park	Byron LGA	Australia
Median Individual income ($ weekly)	621	706	596	662
Median Household Income ($weekly)	1197	1514	1,149	1438
Median Family Income ($ weekly)	1469	1723	1,389	1734

Source: 2016 Census

4.2 LABOUR FORCE

The proportion of people who are working in Byron Bay (88.8%) is similar to the proportion for Australia, however the major difference is that a much greater proportion of the Byron Bay works on a part -time basis and there are less residents who work full -time. A similar trend exists for Suffolk Park and the Byron LGA. The unemployment rate in both Byron Bay and Suffolk Park is lower than the national percentage

Table 5: Labour Force

	% Persons in Labour Force Byron Bay	% Persons in Labour Force Suffolk Park	% Persons in Labour Force Byron LGA	% persons in Labour Force Australia
Employed full-time	1097 (44.1%)	862 (44%)	6,120 (42.2%)	57.9%
Employed Part-time	1112 (44.7%)	873 (44.5%)	6,602 (45.5)	30.4%
Away from work	137 (5.5%)	109 (5.6%)	839 (5.8%)	5.0%
Unemployed	139 (5.6%)	116 (5.9%)	945 (6.5%)	6.9%

Source: 2016 Census

4.2.1 Occupation

Professionals and managers feature highly in the Byron Bay, Suffolk Park and Byron LGA workforce. There are also a greater proportion of community and personal service workers across these locations than the national percentage which is likely due to the high levels of tourism and hospitality jobs as well as the higher proportion of people aged over 65 years and the close proximity of the Byron Bay Hospital.

Table 6: Occupation

	% employed Persons Byron Bay	% employed Persons Suffolk Park	% employed Persons Byron LGA	% employed Persons Australia
Professionals	560 (23.8%)	499 (27.1%)	3,312 (24.4%)	22.2%
Managers	395 (16.8%)	281 (15.3%)	2,034 (15.0%)	13.0%
Technicians & Trades	314 (13.4%)	237 (12.9%)	1,924 (14.2%)	13.5%
Community & Personal Service Workers	304 (12.9%)	243 (13.2%)	1,666 (12.3%)	10.8%
Labourers	229 (9.7%)	154 (8.4%)	1,318 (9.7%)	9.5%
Sales Workers	224 (9.5%)	193 (10.5%)	1,310 (9.7%)	9.4%
Clerical & Admin	207 (8.8%)	154 (8.4%)	1,285 (9.5%)	13.6%
Machinery Operators & drivers	76 (3.2%)	56 (3.0%)	473 (3.5%)	6.3%

4.2.2 Industry of Employment

The predominant industries in which workers across the whole Byron Shire are employed are Accommodation and Cafés and restaurants, due to the high tourism and visitor numbers to the area. Workers employed in these industries are significantly higher than the national percentage. Similarly, workers in the clothing and retail sector make up a greater proportion of the workforce in Byron Bay and Suffolk Park than for Australia.

Table 7: Industry of Employment

	% employed Persons Byron Bay	% employed Persons Suffolk Park	% employed Persons Byron LGA	% employed Persons Australia
Accommodation	192 (8.5%)	96 (5.4%)	536 (4.0%)	1.1%
Cafes and Restaurants	140 (6.2%)	101 (5.7%)	577 (4.3%)	2.4%
Secondary Education	53 (2.4%)			1.7%
Building & other Industrial	48 (2.1%)			1.2%
Clothing Retail	47 (2.1%)	46 (2.6%)		0.9%
Hospitals (except Psychiatric Hospitals)		44 (2.5%)	372 (2.8%)	3.9%
Other Social Assistance		42 (2.4%)	320 (2.4%)	1.5%
Supermarket and Grocery Stores			285 (2.1%)	2.4%

Source: 2016 Census

4.2.3 Travel to Work

For those Byron Bay residents working on the day of the 2016 Census, the majority (55.7%) drove to work, either as a driver (52.2%), or passenger in a car (3.5%), however it should be noted that this is 10% lower than the national proportion. Similarly, a lot more Byron Bay workers (14.6%) travelled by Bicycle or walked to work compared to the general Australian population (4.5%). Suffolk Park residents were much more likely to drive to work than Byron bay residents and were slightly higher than the national percentage. Accordingly, the percentage of Suffolk park residents who travelled by bicycle or walked was a lot less than the Byron Bay residents. People are much more likely to work from home in the Byron LGA, Byron Bay and Suffolk Park than the percentage for the nation.

Table 8: Method of Travel to work

	Byron Bay	Suffolk Park	Byron LGA	Australia
Car, as driver	1224 (52.2%)	1144 (62.3%)	8,048 (59.4%)	61.5%
Car, as passenger	84 (3.6%)	83 (4.5%)	471 (3.5%)	4.6%
Bicycle	172 (7.3%)	62 (3.4%)	334 (2.5%)	1.0%
Walked only	194 (7.3%)	40 (2.2%)	572 (4.2%)	3.5%
Worked at home	272 (11.6%)	214 (11.7%)	1,819 (13.4%)	4.7%

4.3 HOUSING INFORMATION

4.3.1 Dwelling characteristics

Almost a quarter of private dwellings in Byron Bay were unoccupied on Census night 2016, compared to just 11.2% for Australia. This is likely due to the fact that many of these dwellings are used for short-term tourist/visitor accommodation and Census night was 9 August 2016, which is outside the peak tourist season.

The majority of dwellings in Byron Bay are separate houses (although 10% less than for Australia) with semi-detached or townhouses and unit/apartments making up a greater proportion than for Australia. A review of property numbers across the 5-year period from 2011 to 2016, has shown that there has been a small decline in the number of separate houses (from 1182 dwellings to 1138), semi-detached or townhouses have decreased from 526 to 235, while flat/unit or apartments have increased from 132 to 321. Overall there has been a net decrease in dwellings from 1840 to 1694 properties.

Table 9: Dwelling Characteristics

Private Dwellings	Byron Bay	Suffolk Park	Byron Bay LGA	Australia
Occupied private dwellings	75%	86.8%	11,374 (84.7%)	88.8%
Unoccupied Dwellings	25%	13.2%	2,057 (15.3%)	11.2%
Separate house	1138 (61.8%)	993 (71.9%)	9,266 (81.5%)	72.9%
Semi-detached or townhouse	235 (12.8%)	288 (22.2%)	814 (7.2%)	9.9%
Flat, unit or apartment	321 (17.4%)	27 (2.1%)	731 (6.4%)	13.6%
Other dwelling Caravan, tent, cabin, houseboat, house or flat attached to shop etc	116 (6.4%)	18 (1.4%)	392 (3.4%)	0.8%

Source: 2016 Census

4.3.2 Dwelling Tenure

More residents rent their property in Byron Bay than the national percentage, however those living in this suburb who own their own home are more likely to do so without a mortgage than the percentage for Australia. Properties in Byron Bay are most likely to be rented through a real estate agent, however over a third of properties will be through a person not in the same household. This would include private rental arrangements and those listed through online rental platforms. Public housing rentals also feature much higher in Byron Bay (12.2%) than the Byron Shire or Australia (4.4%)

Table 10: Tenure and Landlord Type

	Byron Bay	Suffolk Park	Byron Bay LGA	Australia
Owned outright	649 (35.4%)	407 (31.4%)	4,150 (36.5%)	31%
Owned with a mortgage	408 (22.2%)	414 (31.9%)	3,233 (28.5%)	34.5%
Rented:	670 (36.5%)	435 (33.5%)	3,500 (30.8%)	30.9%
Real estate agent	283 (42.2%)	256 (58.8%)	1,490 (42.5%)	42.2%
State housing authority	82 (12.2%)	10 (2.2%)	158 (4.5%)	4.5%
Person not in same household	224 (33.4%)	144 (33.1%)	1,567 (44.7%)	44.7%
Housing co-op/community/church group	28 (4.1%)	3 (0.6%)	59 (1.6%)	1.6%
Other landlord type	42 (6.2%)	8 (1.8%)	115 (3.2%)	3.2%

Source: 2016 Census

4.3.3 Dwelling Size

Byron Bay has a significantly greater proportion of properties that are 2 bedrooms or less (30%) than the national percentage (24.4%) and a lower proportion of larger properties with 4 or more bedrooms. Subsequently the average number of bedrooms per dwelling and the average number of persons per household are lower in Byron Bay than for the Byron Shire, Suffolk Park or Australia.

Table 11: Dwelling Size of Occupied private dwellings

Number of Bedrooms	Byron Bay (SS)	Suffolk Park (SS)	Byron LGA	Australia
None (includes Bedsitters	30 (1.6%)	9 (0.7%)	175 (1.5%)	0.5%
1 bedroom	153 (8.3%)	46 (3.5%)	818 (7.2%)	5.0%
2 bedrooms	370 (20.1%)	183 (14.1%)	1,974 (17.4%)	18.9%
3 bedrooms	784 (42.6%)	637 (49.0%)	5,077 (44.6%)	41.1%
4 or more bedrooms	413 (22.4%)	398 (30.6%)	2,990 (26.3%)	32.2%
Average no. Bedrooms per dwelling	2.8	3.1	3	3.1
Average No. persons/household	2.2	2.5	2.4	2.6

Source: 2016 Census

4.3.5 Household Income

More than a quarter of households in Byron Bay and the Byron Shire have a weekly income of less than $650. This is in part due to the higher number of lone person households. Similarly, this area has a lower proportion of households that have a gross weekly income of more than $3000.

Table 12: Household Income

	Byron Bay	Suffolk Park	Byron Bay LGA	Australia
Less than $650 Gross Weekly Income	26.7%	19.9%	25.8%	20.0%
More than $3000 gross weekly Income	12.0%	16.3%	10.0%	16.4%

Source: 2016 Census

4.3.6 Dwelling Characteristics

Both the median Mortgage and the median rent in Byron Bay are much higher than for Australia. The high mortgage payments in Byron Bay and Suffolk Park are likely to be a reflection of the higher housing prices in these areas, while the higher rental rates are a reflection of the demand for accommodation from tourists as well as the supply of permanently rented properties.

As a result of the lower income levels of households in Byron Bay and the higher mortgage and rental costs, there are a greater proportion of households in Byron Bay where rental payments or mortgage repayments account for more than 30% of the Household Income.

Table 13: Mortgage and Rental costs of Occupied private dwellings

	Byron Bay	Suffolk Park	Byron Bay LGA	Australia
Median monthly mortgage repayment ($)	$2,000	$2,000	$1,733	$1,755
Households where Mortgage repayments are less than 30% of household income	92.4%	91.0%	91.5%	92.8%
Households with Mortgage repayments greater than or equal to 30% of household income	7.6%	9.0%	8.5%	7.2%
Median Weekly Rent	$460	$550	$400	$335
Household where rent is less than 30% of household income	79.9%	83.5%	82.8%	88.5%
Households where rent is greater than or equal to 30% of household income	20.1%	16.5%	17.2%	11.5%

Source: 2011 Census

4.3.7 Number of Registered Motor Vehicles

Residents in Suffolk Park (60%) are much more likely to have multiple vehicles parked at their property than those in Byron Bay (44.5%). The proportion of people who have just one motor vehicle at the property is higher in Byron bay than Australia or the Byron LGA. This is likely to be due to the higher number of lone person households in this area.

Table 14: Registered Motor Vehicles at Occupied private dwellings

	Byron Bay	Suffolk Park	Byron Bay LGA	Australia
None	137 (7.4%)	34 (2.6%)	411 (3.6%)	7.5%
1 Motor Vehicle	770 (41.7%)	432 (33.3%)	4,114 (36.2%)	34.8%
2 Motor Vehicles	560 (30.3%)	531 (41.0%)	4,407 (38.8%)	36.2%
3 or more motor vehicles	263 (14.2%)	248 (19.1%)	1,893 (16.7%)	18.1%
Average motor vehicles per dwelling	1.6	1.9	1.8	1.8

5. TOURISM

Byron Shire is one of Australia's most well-loved tourist destinations – the 4th most visited in NSW and the 11th most visited in Australia amongst International visitors (Tourism Research Australia, 2018).

According to Destination Byron Bay in 2018, there were 2,040,000 annual visitors to Byron Bay, which represents a 49% increase between 2014 and 2018. Day trippers increased by 74% over the last decade and domestic overnight visitors grew by 57%. International visitor nights are forecast to grow by 900,000 over the next decade and domestic nights by 700,000.

The cost of servicing this temporary population is estimated at $23,000,000 per year however the value of Tourism to Byron Shire was estimated at $701,000,000. Half of Byron's visitors stay overnight (domestic and international) and the total visitor nights of accommodation totaled 4,030,000 nights.

In 2016/17, Tourism and Hospitality generated 23% of Byron's jobs (3,506 jobs) and 14.1% of output/sales ($463M). As a sector it is Byron's largest employer. The visitor dollar is spent much wider than accommodation or tourist operators. It also includes supermarkets, restaurants, cafés and bars, petrol stations, local retailers, real estate agents, cleaners, gardeners, chemists, primary producers and laundries.

6. ACCOMMODATION IN BYRON BAY

According to the Australian Coastal Council's Association, the Byron Shire is one of Australia's least affordable regional rental housing markets with 17.6% of properties in the Shire listed as short-term lettings. The majority of these properties are listed on online rental platforms, mostly Airbnb – which is the fastest growing online accommodation site.

Airbnb listings have increased from a few hundred in 2012 to 1,172 at the end of 2016 and 3,037 at the end of 2018 (Cox 2019). Of these listings 78.7% were for entire houses or apartments, with a 20% estimated occupancy, meaning that houses were only rented for approximately 70 days of the year. Over half of individual Airbnb hosts (54%) in Byron Shire had multiple listings and one single host listed 108 properties (Cox 2019). Private rental accommodation is more commonly used by visitors in Byron than elsewhere in NSW, which can be attributed to the shortage in traditional hotel accommodation. In the three years to 2016/17, 17% of domestic overnight visitors used rental properties which is double most benchmarks. Byron Shire has more Airbnb listings than all but three Greater Sydney LGAs. [2]

A study into planning responses to the impact of short-term holiday rental platforms was conducted by a University of Sydney research team led by Professor Nicole Gurran, Chair of Urban and Regional Planning and Policy. The research project was commissioned by the Australian Coastal Councils Association.

[2] Byron Shire Council. Talking Future Tourism: Kitchen Table Discussion Handbook 2019. A 10 year Plan for Sustainable Tourism in Byron Shire.p13

This report found that since Airbnb was launched in Australia in 2011, more than 130,000 properties were listed, equating to approximately 0.2 percent of total housing stock. In coastal communities, however, the study identified a median rate of 4 percent of all housing stock, with rates in key locations found to be even higher. In the Byron Shire Council area over 17 percent of all housing is listed on online holiday rental platforms.

A recent research report undertaken by the School of Business and Tourism, Southern Cross University examined the impact of Airbnb on the local Byron bay community. Interviews were conducted with 22 key Byron Shire informants including councillors, Airbnb hosts, local journalists, licenced accommodation providers, 'victims of holiday lettings'[3], and residents who either lived in their own property or rented as tenants.

Participants recognised a range of benefits of Airbnb on the Byron Shire community including:

- Extra income for Airbnb hosts
- Increased revenues for local businesses
- Increased choice and variety of accommodation for tourists
- Opportunity for residents and tourists to connect

However, the number of negative impacts of Airbnb on the Byron Shire community outweighed the positive and included:

- Reduced supply of and increased prices for long-term rentals (82%)
- Displacement of locals and loss of community and neighbourhood (68%)
- Added strain on local infrastructure (68%)
- Decreased employment-pool in Byron Bay (BB), particularly in hospitality (54%)
- Disruptive behaviour of tourists in residential areas (54%)
- Increased noise levels (45%)
- More non-approved 'illegal' tourist accommodation ('unfair playing field') leading to decline in bookings for accredited accommodation providers (41%)
- More traffic congestion (locals forced to live further away but driving in to Byron Bay for work; overcrowding of Byron Bay by tourists) (41%).

A written survey comprising 819 complete responses identified the following negative impacts relating to Airbnb properties.

- Reduces the availability of affordable housing for residents (77%)
- Increases traffic and parking congestion (75%)
- Leads to increased waste management issues (72%)

[3] The Terminology 'Victims of holiday letting' was used in the Southern Cross University report- *Airbnb in the Byron Shire – Bane or Blessing? An Investigation into the Nature and Range of Impacts of Airbnb on a Local Community* to describe those residents who were negatively impacted by Airbnb such as neighbours.

- Leads to extra costs to rate payers to provide infrastructure (71%)
- Leads to increased noise levels (70%)
- Adversely affects lifestyle of neighbourhood residents (69%)
- Leads to overuse of public facilities (e.g. toilets) (60%)
- Increases the property prices (61%)
- Leads to increased anti-social behavior (54%)

"*Some permanent residents felt their community had been invaded by tourism and spoke of the stress involved in not knowing when a new party of visitors was likely to arrive next door and how they were going to behave within residential neighbourhoods.*"

Local police in Byron Bay have also raised concerns about home owners renting out their homes or rooms for significant sums of money whilst failing to consider their neighbours and the broader community. "*I don't see such a trend as sustainable as there will be increasing anti-social issues within the Byron Township and disharmony within the communities these tourists stay in. This leads to a negative view of tourism which is harmful to a future positive direction for tourism within our shire."* (Detective Inspector Matt Kehoe, Byron Bay Police Station, Tweed Byron Police District.)[4]

Complaints regarding the leasing of residential properties for the purpose of temporary holiday accommodation for visitors have been received by Byron Shire Council since as early as 2003. Complaints then included:

- Prohibited development in residential areas
- Loss of neighbourhood amenity
- Noise and anti-social behavior, particularly from late night parties
- Excessive numbers of people and cars
- Cars blocking driveways
- Traffic impeding visibility and traffic movement
- Excess or poorly managed garbage and bins[5]

The Shire's accommodation industry is estimated to generate almost $100M per year. However, it is estimated to have less registered accommodation providers and bed spaces (hotel, hostels, caravan parks) than other areas. Private Airbnb listings generate considerable revenue that is not necessarily able to be taxed under traditional rate-based methods and therefore contribute to servicing costs. This type of accommodation generates much less direct employment than other registered accommodation (e.g. hotels). Other issues linked to short-term holiday letting include a high level of unoccupied homes (25% in Byron Bay at the time of the 2016 Census); upward pressure on house prices and rental rates; the removal of housing stock from long-term rental to short-term; traffic issues in residential areas and impacts on infrastructure and waste management.

[4] Byron Shire Council. Talking Future Tourism. Kitchen Table Discussion Handbook 2019. A 10-year plan for Sustainable Tourism in Byron Bay p19.

[5] Byron Shire Council. Kitchen Table discussion handbook 2019 p.24

In 2018 Twelve local councils in association with the Australian Coastal Council Association Inc. (ACCA): Byron, Port Macquarie, Kiama, Shoalhaven and Eurobodalla in New South Wales (NSW), Douglas, Sunshine Coast and Moreton Bay in Queensland, Bass Coast, Mornington Peninsula and Moyne in Victoria (VIC), and Busselton in Western Australia (WA) contracted the University of Sydney to identify appropriate planning responses to the rise of online platforms for short term holiday rental accommodation in coastal Australia.

This research project compared Airbnb listings against traditional tourism accommodation (hostels, hotels and caravan parks) and found that Airbnb beds, account for more than five times (517%) the number of traditional tourist accommodation offerings.[6]

Other issues found through this study were that in some communities, tourist industry representatives were concerned about destination 'risk' if tourists were disappointed by a poorly located or badly managed holiday rental property. In one community, it was reported that visitors frequently sought assistance from tourist information services because of online rentals which were found to be in an unacceptable condition.

The study also found that online holiday rental properties permeate residential neighbourhoods which were formally places for lower income earners and local workers to find permanent rental housing. In these localities, interviewees described a tightening rental market where renters struggled to find accommodation in the towns where they worked or faced eviction notices prior to holiday seasons. In Byron, interviewees described a process of tourism displacement whereby local workers and aspiring first home buyers with ties to the locality, have been priced out of the market by high rents and unaffordable prices. New residential development in these areas, including detached homes and medium density apartments, was ostensibly intended to increase the housing supply, thus increasing the availability of permanent rental properties and easing affordability pressures. However, interviewees advised that investors often purchased these homes with the intention of listing them as holiday rentals rather than offering them to long term tenants.

A Northern Rivers Housing Study 2018 which was commissioned by North Coast Community Housing also found that the supply of affordable rental housing has declined. Sea change and tree change migration has increased demand for well-located housing often in the form of holiday homes that are only occupied for part of the year. The report found that in 2017, Byron Shire had the least affordable rent of any council area in NSW and only 1 rental property in Ballina and 1 rental property in Byron bay were affordable to low income renters and people on benefits.[7]

[6] Gurran,N; Zhang, Y; Shretha, P; Gilbert, C. *Planning Responses to online Short-term holiday rental platforms* p 29
[7] Gilmour, T. *Providing Homes, Improving Lives, Strengthening Communities. Housing Needs: Northern Rivers Housing Study 2018.* North Coast Community Housing

7. BYRON BAY TOWN CENTRE MASTERPLAN

In 2011, Byron Shire Council undertook resident and visitor research to develop a Masterplan for the Byron Bay Town Centre. The Town Plan specifically references Jonson Street South with feedback from residents being that it should be transformed into a mixed-use district that supports medium density living and local business. One of the key actions suggested included:

> *Some local commercial (for example Professional, creative offices) and some hotel services could be located in this zone as they offer an important employment base for Byron Bay Town Centre.*[8]

Other key issues raised and of relevance to this report included:

- Residents emphasized the importance of a maximum 3 story buildings[9]
- Ensure future buildings provide vertical façade treatments to establish a street rhythm making walks more interesting
- Establish building height deviation through differing roof treatments. This ensures build height variety and a strengthened street rhythm;
- Encourage future buildings to achieve allowable building heights increasing in density within the Town Centre and ensuring appropriate street definition[10]
- Reducing vehicular movements in the Town and creating a people centric Town Centre.

[8] Byron Bay Town Centre Master Plan. Final Master Plan Report p69.
[9] Byron Bay Town Centre Master Plan. Final Master Plan Report p74.
[10] Byron Bay Town Centre Master Plan. Final Master Plan Report p79.

8. SOCIAL IMPACT

8.1 Summary of the Community and local needs

Byron Bay has experienced rapid changes over the last 30 years growing from a small seaside village to the 4th most visited destination in NSW. While resident numbers have grown moderately over this time, visitor numbers have rapidly increased with tourists to the area estimated to be over 2 Million per annum which outnumbers local residents by 70:1.

The permanent residents who reside in Byron Bay (state suburb) are in the main older than the median age for Australia (42 years); including a much greater proportion of lone person households and group households than Australia and most family households are couple families without children. In contrast Family households including those with children are most likely to live in Suffolk Park.

There are slightly more residents in Byron Bay who are employed part-time in comparison to those that are full-time employees and they are predominantly employed in the Accommodation and Café and restaurants sectors. Median income levels for people residing in Byron Bay are less than Australia, while in Suffolk Park the median individual and household incomes are greater than the national median. While most people in Byron Bay drove to work, a significantly greater proportion (7 times the national average) rode a bicycle and more than double the national average walked to work. In Byron Bay a greater proportion of households will own one vehicle compared to the national average, but less households have two or more vehicles than the average for Australia.

Overall there has been a net decrease in dwelling supply numbers in Byron Bay during the 5-year period to 2016. A quarter of private dwellings are unoccupied in Byron Bay. More residents rent their home than the national percentage and over a third rent from a private owner who does not live in the same household. Dwelling sizes are generally smaller than the national average (2.8 bedrooms) and there is an average of 2.2 persons per household. One of the big issues for residents is the high costs of rents and the higher mortgage repayment rates in Byron Bay, both of which are linked to higher house prices (on a par with Sydney housing prices).

One of the biggest issues in Byron Bay is *'Tourism displacement'* where local workers and aspiring home owners can no longer afford to rent or buy in the locality, but there are abundant short-term rentals. New housing supply is at high risk of conversion to the short-term rental market. Byron exhibits the characteristics of a housing market which has been distorted by holiday rental accommodation.

8.2 Impact on the local community

8.2.1 Increased short-term accommodation

Currently Byron Bay has an undersupply of traditional short-term accommodation options for tourists and visitors such as hotels, hostels and motels and an increasing supply of short-term rental accommodation which is creating rental shortages for permanent residents and pushing up long-term rental costs. Increasing the supply of hotel accommodation, while not resolving this issue will provide some significant benefits. With a capacity of up to 292 persons per night, this hotel is likely to provide healthy competition and divert those smaller groups of local travelers who are staying overnight and/or international travelers away from Airbnb options in residential areas. Visitors will be attracted by the Hotel's close proximity to the Town Centre, retail and the beachfront as well as the additional service features that are unique to hotels and not provided with Airbnb accommodation. If the hotel has a significant impact on the demand for local Airbnb properties, then it is feasible that those owners who do not occupy the property may consider leasing their property on a long-term basis to improve occupancy rates. Just as a shortage of long-term rental accommodation is responsible for driving rents and values up, an increase in supply of short-term accommodation will provide competition for the short-term market

With International visitor nights forecast to grow by 900,000 over the next decade and domestic nights by 700,000, the only way to accommodate this growth will be through increasing the supply of traditional accommodation such as hotels or alternatively the area may see a further increase in Airbnb properties.

The development will also provide an additional resource to the community by way of a conference facility, which will provide capacity to service the significant wedding reception venue demand in the area.

8.2.2 Economic Impacts

The construction delivery and ongoing operational services offered by the hotel will have significant economic advantages for the community, given that Accommodation and Cafés and Restaurants are the two highest employment sectors for people living in Byron Bay and Suffolk Park. In addition to short term employment associated with the construction of the hotel, it is estimated that approximately 120 Full-time jobs (including core staff of 60-70 persons plus a casual staff count of approximately 50 to cater for peak demand) will be created in the operation of the hotel including restaurant and bar staff, hotel operations and housekeeping staff. This does not include the extra staff required for general maintenance work such as grounds and building maintenance.

As outlined previously, the visitor dollar is spent much wider than on just accommodation or tourist operators and this development will also likely result in increased spending across supermarkets, other restaurants and cafés, petrol stations, local retailers, chemists, primary producers and laundries.

The brief attached to the development indicates that the hotel will use local organic produce from suppliers, thereby providing further benefits for primary producers and others in the local food supply chain. Additional economic benefits to the community will also accrue from major events being held in the function centre such as weddings or conferences with additional staff being engaged and extra produce being sourced from local suppliers to the hotel's food and beverage operations.

8.2.3 Environmental Impacts

Sustainability principles have been incorporated into the hotel design including:

- A solar array panel to one wing of the roof will provide daily power and a backup battery system will be provided
- Solar electric bikes and bicycles will be available for use by guests
- Electric car chargers will be available in the basement
- Waste water will be recycled
- Rainwater tanks in the basement will be used for irrigation
- Water efficient plumbing fittings will be used
- No plastic bottles will be used and waste recycled
- Demolition materials from the existing building will be recycled and recycled timber or plantation grown timber will be used where possible.
- Natural cross ventilation is provided to corridors
- Natural ventilation via the sunken courtyard is used to reduce basement ventilation
- Heat sinks will be reduced with landscaping to horizontal surfaces
- All windows will have sun protection

The building is being established on an existing commercial site with no significant existing vegetation. A row of existing mature Eucalyptus Trees line the footpath and it is intended that these trees be retained pending arborcultural assessment.

8.2.4 Traffic impacts

Primary vehicular access to the hotel will be from Jonson Street with pedestrian access from Jonson Street to the retail premises and hotel lobby. An ongoing issue of concern for the community has been traffic congestion particularly in regard to the fact that there are just 2 main entry points into the Town Centre.

In order to reduce traffic impacts it is proposed to provide alternative options to motor vehicles for guests including Solar electric bikes and bicycles. The proposed development includes provision for 40 bicycles via three racks along Jonson Street and provides end of trip facilities for cyclists within the basement with the inclusion of both male and female lockers. This will provide amenities for those employees who travel by bike to work. The proposed development is located on the commercial street of Byron and therefore also has direct access to bus services on Jonson Street.

The site also includes 103 basement level car parks, therefore removing parked vehicles from the streetscape.

The location of the hotel in the Town Centre also means that guests do not require motor vehicles to access local restaurants, retail stores and beaches, thereby reducing the level of constant vehicular movements that occur when visitors staying outside of the Town Centre make frequent trips in and out to access the beach and major entertainment precinct.

8.2.5 Built Form, Aesthetics and Amenity

The proposed development, built form and supporting landscape treatments aim to achieve a harmonious balance between Architecture, landscape design, public access, climate and local character. The property features significant landscaping and greenery including a water feature and subtropical plants presenting a shady green oasis to the porte cochere, roof top gardens and street front that will help with the natural cooling of these spaces. The lobby will feature a series of green walls, on ground courtyard and potted planting while the row of existing mature Eucalyptus trees that line the footpath will be maintained.

The building looks to satisfy the building height deviation through differing roof treatments to the neighbouring buildings on the right-hand side and also provides an arched vertical façade treatment to integrate into the Jonson Street rhythm, making walks more interesting. It also meets the three storey height preference required under the Town Centre Master plan, however, the use of the roof space including the lift overrun, roof of the bar area and the pool deck slightly exceed the maximum height requirement. The excess height represents only 5% of the total building footprint and is located in the centre of the building, not visible from the street.

The Hotel also has a balance of hard and soft landscaping including a central courtyard with water feature, vertical garden walls and groups of pots to soften the built form and retain the leafy green look which is sympathetic to the Byron Bay landscape. The recreational rooftop terrace includes terraced turf zones, as well as an event lawn which could accommodate activities such as yoga classes.

9. CONCLUSION

The proposed *Essence of Byron* provides additional hotel accommodation, offering alternative short-term options to the proliferation of Airbnb accommodation that currently dominates the tourist and visitor market in Byron Bay. In addition to creating a significant number of jobs and increased spending to the local economy, the number of accommodation beds are significant enough to provide healthy competition and an impact on the use of Airbnb options in other areas including those located in local residential communities. 'Tourism displacement' is a major issue in Byron Bay and increasing alternative choices to the use of a decreasing and depleted private rental pool has the potential to increase the availability of longer-term rental options for permanent residents.

The hotel design and functionality have been developed in keeping with the Town Centre Masterplan and have a focus on sustainability principles and achieving a harmonious balance between Architecture, landscape design, public access, climate and local character. The hotel meets a demand for additional hotel accommodation and provides a function centre that has multiple uses in the community.

The building Form and Aesthetics are consistent with a number of the features outlined in the Byron Bay Town Centre Masterplan such as maintaining existing vegetation; the hotel satisfies the building height deviation through differing roof treatments to the neighbouring buildings on the right-hand side and it also provides vertical façade treatments. Although the hotel meets the Town Plan limit of three storey buildings, the use of the roof space slightly exceeds the maximum height requirements.

Overall it is considered that the benefits of this project outweigh the negative impacts, meeting a need in responding to local visitor accommodation demands (which are predicted to increase in the future), while helping to alleviate the current issue where visitors seek accommodation in local Airbnb properties and subsequently reduce the availability of rental properties for local residents.

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DA 10.2018.650.1 Mixed use development, Jonson Street, Byron Bay

ATTACHMENTS TO COUNCIL REPORT

10. NOISE IMPACT ASSESSMENT

DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

Essence on Byron

Noise Impact Assessment

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DOCUMENT CONTROL REGISTER

Project Number	20181328.1
Project Name	Essence on Byron
Document Title	Noise Impact Assessment
Document Reference	20181328.1/2911A/R2/TS
Issue Type	Email
Attention To	MERCATO on BYRON Pty Ltd James Vallis

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	10/10/2018	20181328.1/1010A/R0/TS	TS		TS
1	12/11/2018	20181328.1/1211A/R1/TS	TS		TS
2	29/11/2018	20181328.1/2911A/R2/TS	TS		TS

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged by Mercato on Byron Pty Ltd to conduct an acoustic assessment of potential noise emissions associated with the proposed commercial (i.e. Hotel) development at 106 Jonson Street, Byron Bay. The development is known as Essence on Byron.

Noise impacts addressed in this assessment include:

- Noise emissions from entertainment areas within the development;
- Delivery area noise emissions;
- Mechanical plant noise emissions in principle.

Noise impacts have been addressed in accordance with:

- NSW Liquor and Gaming; and
- Environment Protection Authority (EPA) Noise Policy for Industry

ALC confirm that the proposed design can comply with the noise emission requirements of the aforementioned authorities and regulations provided that the recommendations in this report are followed. Assessment of external noise impacts onto the areas within the proposed Hotel itself (also from and into own restaurant and pool deck) have been excluded as the desired acoustic amenity by operator is currently unknown.

2 PROPOSED DEVELOPMENT

2.1 SITE LOCATION AND PROPOSAL

The subject site is located at 106 Jonson Street, Byron Bay. The proposal includes generally constitutes the following:

- Basement car parking with staff amenities;
- Ground level restaurant/lobby lounge bar (with outdoor dining), Hotel and dining BOH, loading, pre-function and conference areas.
- 2 levels of hotel rooms;
- Rooftop pool, pool deck with bar, landscaped area and plant.

The site is bounded by the following uses:

- Approved commercial development to the South (Mercato on Byron);
- Existing commercial property to the North;
- Commercial properties to the East across Jonson Street;
- Railway to the West and residential buildings approximately 50metres to the West.

Figure 1 below outlines the location of the subject site and attended/unattended noise measurement locations.

2.2 SENSITIVE RECEIVERS

Sensitive residential receivers in the vicinity of the site are as follows:

Receiver 1 - Residential dwellings along Butler Street to the West

LEGEND

Site Location	
Potentially Affected Residential Receivers	
Commercial receivers	
Unattended Noise Monitors (2018)	

Figure 1: Site Survey and Sensitive Receiver Locations

3 EXISTING ACOUSTIC ENVIRONMENT

The acoustic environment is categorised by low to moderate background noise levels during the day, evening and night.

Acoustic monitoring was conducted at the closest sensitive residential site to establish the background noise levels which will be used as basis for this assessment.

3.1 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

3.2 BACKGROUND NOISE LEVELS

Background noise levels which will be used as a basis for this assessment are detailed in the following sections.

3.2.1 Measurement Equipment

Unattended noise monitoring was conducting using RION NL-42 noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of the measurement using a Norsonic 4583 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

Attended noise measurements were obtained using a Norsonic 140 Sound Level Analyser, set on A-weighted fast response. The sound level meter was calibrated before and after the measurements using a Norsonic 4583 Sound Level Calibrator. No significant drift was recorded.

3.2.2 Measurement Location

Monitoring was conducted at the site as indicated in Figure 1.

3.2.3 Measurement Period

Monitoring was conducted from 25th September 2018 to 4th October 2018.

3.2.4 Ambient Noise Levels

The background noise levels established from the unattended noise monitoring are detailed in the Table below.

Table 1 – Rating Ambient Noise Levels

Rating Background Noise Level dB(A)$L_{90(period)}$			Equivalent Continuous Sound Pressure Level, dB(A) $L_{eq\ (period)}$		
Daytime	**Evening**	**Night**	**Daytime**	**Evening**	**Night**
43	41	39	51	43	43

Noise measurements were also conducted during the daytime period to ascertain the noise spectrum.

Table 2 – Background Noise Spectrum

Descriptor	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
L_{90}	49	49	46	41	38	39	36	29	20	**43**
L_{eq}	59	59	54	48	46	47	44	38	30	**51**

4 NOISE CRITERIA

Noise emissions from the site have been assessed against the following noise guidelines.

- NSW Liquor and Gaming – Standard Conditions
- Environment Protection Authority (EPA) – Noise Policy for Industry

Noise from the proposal will be assessed as follows and are discussed in the following section.

Table 3 – Noise Emission Requirements

Noise Source	Guideline / Control
Mechanical plant Pool deck noise	EPA Noise Policy for Industry
Restaurant/Bar	NSW Liquor and Gaming

4.1 NOISE POLICY FOR INDUSTRY

The Noise Policy for Industry (NPI) provides guidelines for assessing noise impacts from industrial and commercial developments. The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The NPI has two requirements, both of which are to be complied with, namely an intrusiveness and amenity criterion.

4.1.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor do not exceed the background noise level by more than 5 dB(A).

Rating background noise levels for the area have been established from long term unattended noise monitoring as detailed in Section **Error! Reference source not found.**.

Table 4 – Intrusive Noise Criterion

Receiver Location	Time of Day	Background Noise Level, dB(A) L_{90}	Intrusiveness Criterion, dB(A) $L_{eq\ 15min}$
Along Butler Street	Day	43	48
	Evening	41	46
	Night (up to 12am)	39	44
	Night	39	44

4.1.2 Project Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment. The NpfI sets out acceptable noise levels for various land uses. The categories for land use are rural, suburban, urban and urban/industrial interface.

Pursuant to Section 2.4 of the NPI, 'Suburban' and 'Urban' are defined as areas which have acoustical environments which incorporate the following characteristics.

Suburban – an area that has local traffic with characteristically intermittent traffic flows.

The NPI requires project amenity noise levels to be calculated in the following manner;

$$L_{Aeq,15min} = \text{Recommended Amenity Noise Level} - 5\ dB(A) + 3\ dB(A)$$

The corresponding Amenity noise emission goals are presented below for suburban areas.

Table 5 – NPI Amenity Acceptable Noise Levels

Type of Receiver	Indicative Noise Amenity Area	Time of day	Recommended Acceptable Noise Level dB(A) L_{eq}	Project Noise Level dB(A) L_{eq}
Residence	Urban	Day	55	53
		Evening	45	42
		Night	40	38
Commercial premises	All	When in use	65	63

4.2 NSW LIQUOR AND GAMING NOISE CRITERIA

When assessing noise emissions from licensed premises, noise emissions should comply with the acoustic requirements adopted in the standard conditions of the NSW Liquor and Gaming.

These guidelines relate to noise generated by patrons and by music. The requirements are set out below:

- *"That the L_{10} noise level emitted from the premises shall not exceed 5dB above the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises."*

- *"L_{10} noise level emitted from the premises shall not exceed the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) after midnight when assessed at the boundary of the nearest affected residential premises."*

- *"After midnight, noise emissions from the Place of Pubic Entertainment are to be inaudible within any habitable rooms in nearby residential properties."*

Based on the measured background noise levels and spectrums set out in Section 3, corresponding external noise emission goals are as follows. We note that the spectral noise levels are corrected based on Jonson Street measurements and are strictly indicative. Actual values must be determined by the licensee and the assessment carried out on that basis.

Table 8 – Noise Emission Goals (Patron/Music) to Residences Along Butler Street

Time of Day	Criteria	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Day (7am-6pm)	**43BG+5**	54	54	51	46	43	44	41	34	25	48
Evening (6pm-10pm)	**41BG+5**	52	52	49	44	41	42	39	32	23	46
Night (10pm – 12am)	**39BG+5**	50	50	47	42	39	40	37	30	21	44

5 ASSESSMENT OF NOISE IMPACTS

Noise emissions from the site have been assessed for the following uses:

- Proposed restaurant/bar fronting Jonson Street on the ground floor.
- Rooftop terrace/pool deck fronting Jonson Street;
- Mechanical plant in principle.

5.1 GROUND LEVEL RESTAURANT

The proposal includes a restaurant/bar café tenancy on the Ground floor. Noise emissions from these uses have been assessed in-principle against the entertainment criteria of Liquor and Gaming.

Noise emissions associated with each use have been addressed as follows:

- The restaurants/bar front onto Jonson Street and has provisions for internal seating as well as outdoor dining. In this regard, the entire ground floor façade is assumed open and the basement restaurant is assumed to be fully acoustically sealed.

Noise emissions have been based on noise levels recorded at the Parlour Roaster Lane bar located on the Ground level of the QT Hotel located at 49 Market Street, Sydney. This is indicative and used as a reasonable reference for the purposes of the DA.

ALC note that the Parlour Roaster Lane bar has very little absorptive finishes and his highly reverberant in nature. This will represent the typical worst for a cocktail type bar / lounge and in any event, will be conservative for the operation of a restaurant.

Table 6 – Measured Internal Noise Levels – Parlour Roaster Restaurant / Bar Tenancy

Noise Source	Octave Band Sound Pressure Level, dB								A-wt
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Bar Internal L_{eq}	74	80	79	79	77	72	66	58	81
Bar Internal L_{10}	77	83	82	82	80	75	69	61	84

5.2 ROOFTOP TERRACE/POOL DECK

ALC have used the following assumptions for the prediction of noise associated with patrons using the rooftop terrace/pool deck typically (excluding events which are reviewed separately):

- The terrace will be typically used a relaxation / respite area.
- No music (low level background music acceptable) or entertainment will be provided for patrons in this area typically (except some events as reviewed below).

During normal operations, noise from the terrace on the above basis is expected to be minimal.

We understand that the landscaped meditation area can be used for wedding functions which can also include amplified music. Amplified music can also occur within the landscaped area as well as the rooftop bar area.

Noise emissions associated with the rooftop wedding and bar are predicted to the residential receivers along Butler Street (approx. 130metres away). Predictions associated with the restaurant/bar are compared against the night noise criteria (10pm-12am).

Predicted noise levels are based on the following assumptions:

- 200 people using the outdoor area. It is assumed that average sound power per person is 75db(A)L_{eq} (raised voice) and one in three people are speaking at any one time.

Predicted noise levels are set out below. Sample calculations are presented in appendix 2.

Table 9 – Predicted Noise Level from Rooftop Patrons to Butler Street Residents

	31.5Hz	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**A-Wt.**
Predicted Noise Level – Residential Receiver, 130metres away dB$L_{eq(15min)}$	28	28	36	36	39	39	34	25	13	**43**
Allowable Noise Level (Night time) – 39BG+5	50	50	47	42	39	40	37	30	21	44
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Based on our assessment, compliance with the proposed noise criteria is predicted along Butler Street. We note that the assessment is conservative as does not consider barrier effects offered by the building.

Similar calculations have been predicted to the closest Eastern Side (past Keesing Lane) where closest residential receivers are in excess of 70metres from the site. Allowing 5dBA barrier effects of the buildings, compliance has been predicted there also up to 10pm (noise impact of 42dB(A)L_{10}). We note, however, that these are indicative predictions.

When amplified sound systems are used, these must be limited to allow compliance with the proposed noise limits. Our assessment is based on the following. These are indicative only and would need to be reassessed during detailed design.

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Spectrum of Music, dB (relative to dB(A))	+6.0	+3.5	+3.5	-4.8	-4.5	-4.3	-6.6	-12.8	-21.8

Table 9 – Predicted Amplified Music Noise Level from Rooftop Loudspeakers

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
L_w of each loudspeaker	91.1	88.6	88.6	80.2	80.5	80.7	78.4	72.0	63.2	**85**
Loudspeakers – 2Pc	+3	+3	+3	+3	+3	+3	+3	+3	+3	
Combined	94.1	91.6	91.6	83.2	83.5	83.7	81.4	75.0	66.0	**88**
Distance Reduction (70 metres)	**-44.9**									
Predicted Impact	49	47	47	38	39	39	37	30	21	43
Allowable Noise Level (Up to 12am) – 39BG+5	50	50	47	42	39	40	37	30	21	44
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.3 GROUND LEVEL RESTAURANT/BAR PREDICTIONS

Noise emissions associated with the Ground floor restaurant/bar are predicted to the residential receivers along Butler Street (approx. 130metres away). Predictions associated with the restaurant/bar are compared against the night noise criteria (10pm-12am).

Based on our assessment, compliance with the proposed noise criteria is predicted. We note that the assessment is conservative as does not consider barrier effects offered by the building.

Table 7 – Predicted Noise Level from Restaurant/Bar Operation to Butler Street Residents

Receiver	Predicted Octave Band Sound Pressure Level, dB								A-wt
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Butler Street	27	33	32	32	30	25	19	11	34
Background Noise Level	50	50	47	42	39	40	37	30	44

Similar calculations have been predicted to the closest Eastern Side (past Keesing Lane) where closest residential receivers are in excess of 70metres from the site. Ignoring the barrier effects of the buildings along Jonson Street, compliance has been predicted there also up to 12am (noise impact of 40dB(A)L_{10}). We note, however, that these are indicative predictions.

5.4 MECHANICAL PLANT

Detailed acoustic design of mechanical plant cannot be undertaken at approval stage, as plant selections and locations are not finalised. However, an indicative assessment of primary plant items is presented below.

As part of the development, the following mechanical plant are likely to be included:

- Carpark exhaust and supply fans;
- Miscellaneous ventilation systems;
- Miscellaneous air-conditioning systems; and
- Air-conditioning condensers.

Major mechanical plant items are discussed in the following sections. Notwithstanding, mechanical plant should be assessed as part of the detailed design and construction documentation phases of the project to ensure compliance with the project noise emission requirements.

5.4.1 Carpark Exhaust and Supply

In relation to the supply and exhaust fans we note the following:

- Exhaust and supply fans are generally to be located within plant rooms. Any fans are to be acoustically treated with acoustically lined duct work and acoustic attenuators to achieve the noise emission requirements.

5.4.2 Air-Conditioning

Air-conditioning system selection is currently unknown. Any plant is to be acoustically treated to maintain compliance with the noise emission objectives (e.g. noise barrier).

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed Hotel development at 106 Jonson Street, Byron Bay. The development is known as Essence on Byron.

The operation of the proposal has been considered with regard to potential impacts on surrounding residential receiver locations. Predicted noise levels indicate that each use can comply with the noise emission objectives of NSW Liquor and Gaming and Environment Protection Authority (EPA) Noise Policy for Industry provided that assumptions and recommendations provided in this report are followed and noise emissions are limited or time restrictions applied.

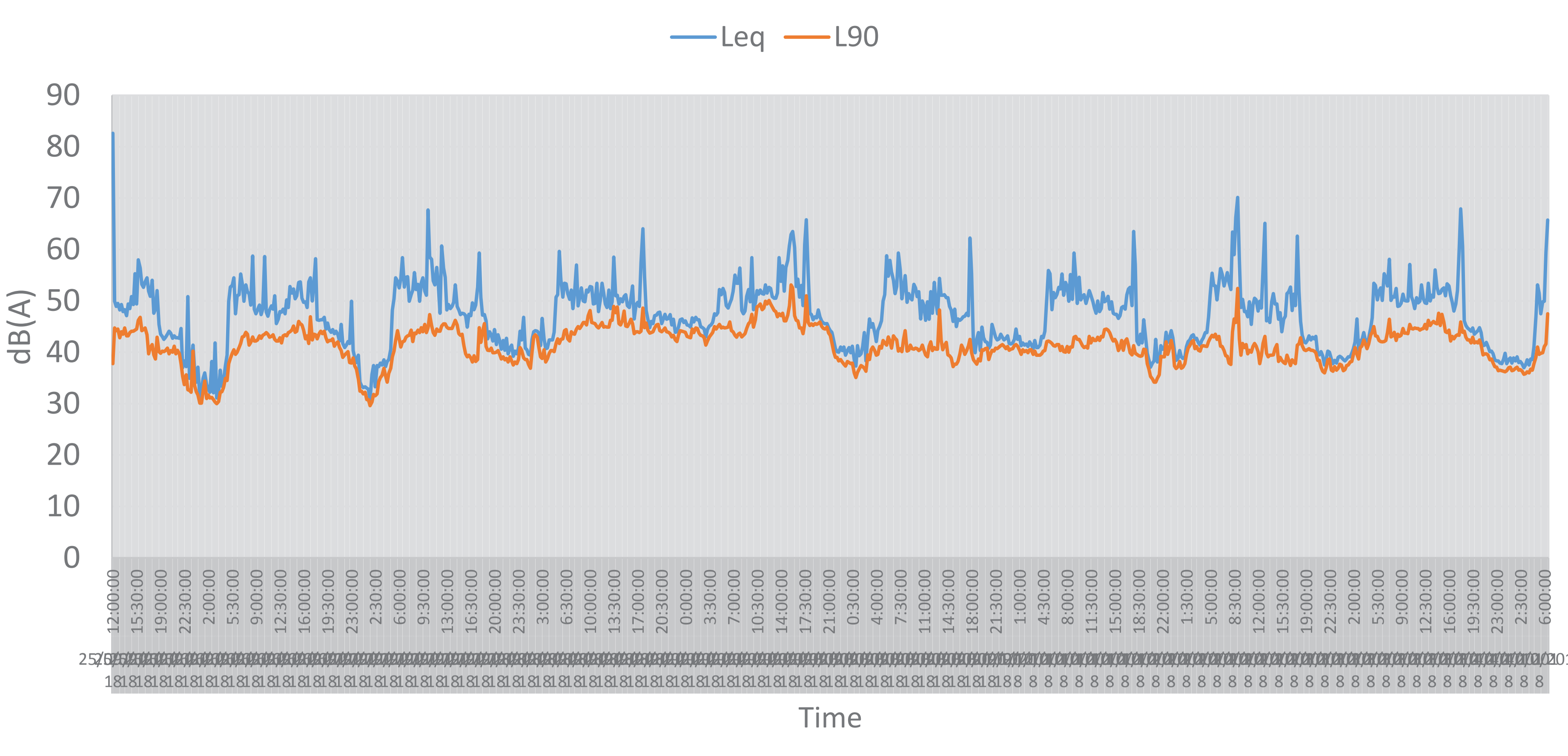
Noise emissions associated with mechanical plant will be addressed as part of the detailed design phase to ensure compliance with the noise emission objectives provided in this report.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Tarmo Saar
Acoustic Logic Consultancy

APPENDIX ONE – UNATTENDED NOISE MONITORING DATA



2019NTH015

DA 10.2018.650.1 Mixed use development, Jonson Street, Byron Bay

ATTACHMENTS TO COUNCIL REPORT

11. STATE AGENCY RESPONSES

4 July 2019

Mr. Van Iersel Rob
Byron Shire Council
PO Box 219
Mullumbimby NSW 2482

Also by email: rvaniersel@byron.nsw.gov.au

Dear Mr Rob,

RE: Development Application No. 10.2018.650.1
PROPOSED DEVELOPMENT: Mixed Use Development for Tourist and Visitor Accommodation, Function Centre and Retail Premises (Shops and Food and Drink Premises) with a Clause 4.6 Variation to Floor Space Ratio and Height Control
Land: Lot 6 DP 619224, Lot 9 DP 617509 – 98-106 Jonson Street Byron Bay

Thank you for your letter dated 26 April 2019 notifying Development Application No. 10.2018.650.1 (DA) on Lot 6 DP 619224 and Lot 9 DP 617509 (Land) and requesting John Holland Rail (JHR) review and comment on the DA.

The DA contains proposals seeking approval for demolition of an existing building and associated car parking on the site and construction of a mixed-use development comprising tourist and visitor accommodation, function centre and retail premises (Proposal).

RailCorp is the owner of the Country Regional Network (CRN) railway lines across NSW. As of 15 January 2012, John Holland Rail (JHR) has been appointed to manage the CRN. As such JHR is responsible for reviewing development applications, planning proposals and policies adjoining the rail corridor to ensure that potential impacts to rail operations (current and future) are considered and addressed.

It is noted that the Land to which the DA relates is immediately adjacent to the non-operational rail corridor of the Casio to Murwillumbah line forming part of the CRN.

Please note that this letter is prepared and provided on the basis of the following authority:

- *State Environmental Planning Policy (SEPP) (Infrastructure) 2007* (the ISEPP); and
- *Development Near Rail Corridors and Busy Roads – Interim Guideline (2008)* (the Guideline) http://www.rms.nsw.gov.au/documents/projects/guideto-infrastructure-development-near-rail-corridors-busy-roads.pdf

TfNSW as agent for RailCorp, and JHR request that should the DA be approved, the consent authority impose the conditions as outlined in **Attachment A.**

Thank you again for requesting RailCorp comment on this proposal.

If you have any further questions, please contact the writer on (02) 9685 5092 at your earliest convenience.

I hope this has been of assistance.

Yours faithfully,

Joanne Cheoung
Commercial Property Analyst
John Holland Rail
Country Regional Network

Attachment A

Proposed Conditions of Consent

Please note: RailCorp is the rail authority for this section of railway line, however, JHR are responsible for the operation of the infrastructure and will take responsible for the review and approval of the following Conditions.

1. Construction and demolition impacts

As the Land is adjacent to the rail corridor, it is vital for JHR to be satisfied that the Proposal involving demolition of an existing building and associated car parking and construction of a three (3)-story building on the Land do not have any adverse impacts on the rail corridor land and the existing rail infrastructure during construction and operation as the rail corridor may become operational in the future.

As such, Council is required to request the applicant to submit to JHR a Risk Assessment/Management Plan and detailed Safe Work Method Statements for its review and comment prior to issue of a Construction Certificate.

2. Excavation in, above, below or adjacent to rail corridors

Clause 86 of the ISEPP stipulates that the consent authority must not grant consent without consulting with the rail authority and obtaining **concurrence** consistent with clauses 86(2) – (5) in the event that the development involves the penetration of ground to a depth of at least 2m below ground level on land within 25m of a rail corridor.

The Statement of Environmental Effects (SEE) states that the site is located within 25m of the rail corridor and it will have construction 2m below ground level for the development, however, the proposed development will not have impact on the rail corridor as the rail line is currently covered by concrete and it has not been operational since April 2014.

Please be advised that the extent of the proposed excavation must be assessed ***now*** in terms of its adverse impact on the rail corridor as the rail corridor may become operational in the future.

As such, council is requested to impose a condition that the applicant provides a geotechnical assessment confirming that the proposed excavation will have no adverse impact on the stability of the rail corridor land and the future rail infrastructure in accordance with Clause 86 of the ISEPP 2007.

3. Cranes

Clause 85 (C) of the ISEPP 2007 states that if the development involves the use of a crane in air space above any rail corridor, the consent authority must take into consideration any response from the rail authority. Furthermore, the Guideline provides that a crane, concrete pump or other equipment (**Equipment**) must not be used in airspace over the rail corridor without approval in writing from the rail authority.

The SEE states that the development complies with Clause 85 (C) as the rail line will not be operational during the construction although the development will require the operation of a crane which will likely swing over the rail corridor for the construction of the proposed development.

Please be advised that the applicant must obtain approval from RailCorp if access to air space over the rail corridor is required, regardless of the current status of the rail corridor being operational or non-operational. In addition, once RailCorp's approval is obtained, the applicant will be required to enter into an appropriate licence with RailCorp on terms suitable to RailCorp in relation thereto. As such, Council is requested to impose a condition that the applicant submit an application to JHR in order for the use of the crane to be permitted in air space over the rail corridor to JHR for its endorsement and for RailCorp's approval/non-approval with conditions. Should the applicant require more information regarding this issue, the applicant can contact JHR's Third Party Works Team via CRN.3rdpartyworks@jhg.com.au.

In addition, cranes or Equipment are required to be used, it is then requested that Council impose a condition that such use of cranes or Equipment must be in accordance with the AS 2550 series of Australian Standards, *Cranes, Hoist and Winches, including AS2550 15-1994 Cranes – Safe Use- Concrete Placing Equipment.*

4. Stormwater management

The Guideline provides that discharge of stormwater from a development during and after construction should be designed to ensure that no adverse effects will be had on the existing watercourse and drain infrastructure system.

The SEE states that stormwater runoff from the roof area of the building into the existing manhole located on the Johnson Street verge, being the legal point of discharge. If so, JHR do not foresee any issues in respect of the proposed stormwater management.

5. Fencing

The SEE does not contain any information regarding boundary fencing along the rail corridor. The security of fencing along the rail corridor is essential to prevent unauthorised entry. Accordingly, Council is requested to impose a condition that the boundary fences along the rail corridor should be installed and remain installed during construction and operation in accordance with JHR's engineering standards which are available at http://jhrcrn.com.au/media/2071/crn-cp-511-v1-1.pdf.

In addition, the applicant is required to submit an application to install the boundary fences to JHR for its endorsement and for RailCorp's approval. Please contact JHR's Third Party Works Team via CRN.3rdpartywork@jhg.com.au for further information.

6. Noise, vibration & air quality

Clause 87 of the ISEPP 2007 provides that if the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures for noise levels will be taken to ensure that the following LAeq levels are not exceeded:

- in any bedroom in the building: 35dB(A) at any time 10 pm to 7 am;

- anywhere else in the building (other than a garage, kitchen, bathroom or hallway):40dB(A) at any time.

It is noted that the three (3)-story hotel development consists of 146 hotel rooms for tourists and visitors.

As such, Council is requested to ensure that the requirements of Clause 87 of the ISEPP 2007 above are met now in the event that the rail corridor becomes operational.

Furthermore, Council is recommended to obtain an acoustic assessment from the applicant confirming that people who will be staying in the hotel rooms would not be subjected to adverse noise, vibration and air quality due to the volume of rail traffic should the rail corridor become operational.

7. Lighting, external finishes and design

The Guideline provides information regarding lighting and external finishes of buildings which may have potential impacts on the rail corridor. In particular, it is requested that Council require the use of red and green lights to be avoided in all signs, lighting building colour schemes on any part of a building which faces the rail corridor in the event that the rail corridor becomes operational.

8. Access to the Land

It is noted that access to the Land is via John Street using the crossover, ramps and driveway shared with the Mercato on Byron shopping centre adjacent to the development land. Council is requested to ensure that access to the rail corridor is strictly prohibited during construction as well as operation unless otherwise approved in writing by RailCorp.

File No: NTH19/00137/01
Your Ref: JBT 116190D x 10.2018.650.1 /#2019/18986

The General Manager
Byron Shire Council
PO Box 219
MULLUMBIMBY NSW 2482

Attention: Mr R G Van Iersel

Dear Sir / Madam,

Jonson Street [MR545]: Development Application 10.2018.650.1 Hotel, Function Centre and Retail Premises, Lot 6 DP619224 & Lot 9 DP617509, 98-106 Jonson Street Byron Bay

I refer to your letter of 17 June 2019 seeking advice from Roads and Maritime Services in relation to the abovementioned development application.

Roles and Responsibilities

The key interests for Roads and Maritime are the safety and efficiency of the road network, traffic management, the integrity of infrastructure and the integration of land use and transport.

Jonson Street is a classified (Regional) road. Byron Shire Council is the roads authority for all public roads (other than freeways or Crown roads) in the local government area pursuant to Section 7 of the *Roads Act 1993* (Roads Act). Council is responsible for setting standards, determining priorities and carrying out works on Local and Regional roads. Roads and Maritime's concurrence is required prior to Council's approval of works on classified (Regional) roads under Section 138 of the *Roads Act 1993.*

In accordance with Clause 101 of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) the Consent Authority is to have consideration for the safety, efficiency and ongoing operation of the classified road as the development has frontage to a classified road. Clause 104 gives Roads and Maritime the opportunity to provide comment on traffic generating developments listed under Schedule 3.

Roads and Maritime Response

Roads and Maritime has reviewed the referred information and provides the following comments to assist the Consent Authority in making a determination;

- Reference is made to Roads and Maritimes response dated 19 June 2019 for DA10.2013.587.5 for "Mecarto on Byron". It suggested further consideration should be given to how the impacts of turning traffic on Jonson Street at Carlyle Street and the "Mecarto on Byron" access would be managed. These comments are also relevant to this proposal.
- Section 2.2 of the Traffic Impact Assessment (TIA) proposes to limit Carlyle Street to left in and out. This will restrict right-turns into and out of Carlyle Street and increase turning traffic at other nearby intersections. The plans included in the application do not demonstrate proposed treatments for the Carlyle Street intersection or the site access to/from Jonson Street.

- It is unclear from the Traffic Impact Assessment and SIDRA modelling if the cumulative impacts of both the “Mecarto on Byron” shopping complex and the proposed “Essence” mixed use development have been considered. Given the developments will share a common access driveway onto Jonson Street, it is recommended that a further assessment of the impacts of left and right-turning traffic at the access to identify the appropriate facilities that might be required to cater for turning traffic. This assessment should be undertaken in accordance with the Austroads Guide to Traffic Management Part 6 and Austroads Guide to Road Design Part 4A.
- The existing “Mecarto on Byron” access only provides one exit lane. The SIDRA modelling indicates there are separate left and right-turning exiting lanes. This needs to be clarified as it could have an impact on queuing and the efficient operation of the access.
- A new driveway to the basement car park is proposed from Jonson Street. Ingress and egress will also be available via the existing shared “Mecarto on Byron” access where all turning options are available. Where possible access should be consolidated to reduce impacts on road safety and efficiency.
- The swept path assessment in Appendix F does not demonstrate the turning paths for all turn movements at the Carlyle Street intersection and for the largest vehicle proposed to enter and leave the site access.
- Council should be satisfied that the growth factor adopted by the TIA to estimate future traffic flows is reflective of expected urban growth in Byron Bay.
- Drawing NRA-84169-DD-SK3000 of the Architectural Plans indicate the exit for all servicing areas will be via the motel port cochere. We recommend further consideration be given to measures to manage conflict between vehicles and pedestrians in this area.
- The existing Jonson Street frontage and the central median are fenced to manage pedestrian movements across Jonson Street. The Architectural Plan (Drawing NRA-84169-DD-SK3000) does not provide a barrier to maintain this arrangement. We recommend further consideration be given to appropriate measures to manage pedestrian behaviour and minimise potential conflicts with vehicular traffic.
- The proposed pedestrian crossing across the driveway within the road reserve is not an appropriate treatment for this situation. Further consideration should be given to an alternative pavement treatment that improves visibility of the footpath to drivers and reflects the right of way for pedestrians moving along the public road.
- Any traffic facility or regulatory control should be referred to Council’s Traffic Committee for consideration and a recommendation prior to approval.

All works on the classified road should be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and Roads and Maritime Supplements.

Advice to the Consent Authority

Upon determination of the application it would be appreciated if Council could forward a copy of the approval for our records. If you have any further enquiries regarding the above comments please do not hesitate to contact Greg Sciffer, Development Assessment Officer on (02) 6640 1362 or via email at: development.northern@rms.nsw.gov.au

Yours faithfully

for Matt Adams
A/Manager Development Assessment Northern

16 July 2019

Natural Resources Access Regulator

Contact: Christopher Jones
Phone:
Email: christopher.jones@nrar.nsw.gov.au

Our ref: IDAS1115160
Our file: V19/871-2#81
Your ref: DA10/2018/650/1

General Manager
Byron Shire Council
PO Box 219
MULLUMBIMBY NSW 2482

Attention: Patrick Pahlow

19 August 2019

Dear Sir/Madam

Re: Integrated Development – for controlled activity described as: Mixed use Development for Tourist & Visitor Accomodation (Hotel 145 Rooms) Function Centre & Retail Premises (Shops & Food & Drink Premises) with clause to Floor Space Ratio & Height Controls
Located at: 98 - 106 Jonson Street BYRON BAY NSW

Natural Resources Access Regulator (formerly the Department of Industry - Water) has reviewed documents for the above development application and considers that, for the purposes of the *Water Management Act 2000* (WM Act), a controlled activity approval is not required and no further assessment by this agency is necessary.

The proposed activity is exempt from section 91E (1) of the WM Act in relation to controlled activities specified in clause 42, and Part 2 of Schedule 4 of the Water Management (General) Regulation 2018 that are carried out in, on or under waterfront land. See attached for details of the exemptions

Should the proposed development be varied in any way that results in development extending onto land that is waterfront land, or encompassing works that are defined as controlled activities, then NRAR should be notified.

Further information on controlled activity approvals under the WM Act can be obtained from NRAR's website: **www.industry.nsw.gov.au/water**. Go to Licensing and trade > Approvals > Controlled activities.

Please direct any questions regarding this correspondence to by email to .

.

Yours Sincerely

Mohammed Ismail

NSW GOVERNMENT

NSW RURAL FIRE SERVICE

Byron Shire Council
PO Box 219
MULLUMBIMBY NSW 2482

Your reference: 10.2018.650.1 (CNR-2648)
Our reference: DA20191211001427-Original-1

ATTENTION: Rob van Iersel

Date: Tuesday 18 February 2020

Dear Sir/Madam,

Integrated Development Application
s100B – SFPP – Other Tourist Accommodation
98 Jonson St Byron Bay NSW 2481 AUS, 9//DP617509, 6//DP619224

I refer to your correspondence dated 12/11/2019 seeking general terms of approval for the above Integrated Development Application.

The New South Wales Rural Fire Service (NSW RFS) has considered the information submitted. General Terms of Approval, under Division 4.8 of the *Environmental Planning and Assessment Act 1979*, and a Bush Fire Safety Authority, under section 100B of the *Rural Fires Act 1997*, are now issued subject to the following conditions:

Construction Standards
The intent of measures is that buildings are designed and constructed to withstand the potential impacts of bush fire attack. To achieve this, the following conditions shall apply:

1.. The accommodation component of the building must comply with Sections 3 and 5 (BAL 12.5) Australian Standard AS3959-2009 Construction of buildings in bush fire-prone areas or NASH Standard (1.7.14 updated) 'National Standard Steel Framed Construction in Bushfire Areas – 2014' as appropriate and section A3.7 Addendum Appendix 3 of Planning for Bush Fire Protection 2006.

Water and Utility Services
The intent of measures is to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building. To achieve this, the following conditions shall apply:

2. Water, electricity and gas are to comply with section 4.2.7 of 'Planning for Bush Fire Protection 2006'.

Landscaping Assessment
The intent of measures is for landscaping. To achieve this, the following conditions shall apply:

Postal address

NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address

NSW Rural Fire Service
4 Murray Rose Ave
SYDNEY OLYMPIC PARK NSW 2127

T (02) 8741 5555
F (02) 8741 5550
www.rfs.nsw.gov.au

3. Landscaping of the site should comply with following principles of Appendix 5 of 'Planning for Bush Fire Protection 2006':

- Suitable impervious areas are provided immediately surrounding the building such as courtyards, paths and driveways.
- Grassed areas, mowed lawns or ground cover plantings are provided in close proximity to the building.
- Planting is limited in the immediate vicinity of the building.
- Planting does not provide a continuous canopy to the building (i.e. trees or shrubs should be isolated or located in small clusters).
- Landscape species are chosen in consideration needs of the estimated size of the plant at maturity.
- Species are avoided that have rough fibrous bark, or which keep/shed bark in long strips or retain dead material in their canopies.
- Smooth bark species of tree are chosen which generally do not carry a fire up the bark into the crown.
- Planting of deciduous species is avoided which may increase fuel at surface/ ground level (i.e. leaf litter).
- Climbing species are avoided to walls and pergolas.
- Combustible materials such as woodchips/mulch and flammable fuel are stored away from the building.
- Combustible structures such as garden sheds, pergolas and materials such as timber garden furniture are located away from the building.
- Low flammability vegetation species are used.

Emergency and Evacuation Planning Assessment
The intent of measures is to provide suitable emergency and evacuation (and relocation) arrangements for occupants of special fire protection purpose developments. To achieve this, the following conditions shall apply:

4. A Bush Fire Emergency Management and Evacuation Plan shall be prepared consistent with the NSW RFS document titled 'Development Planning- A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan' (December 2014).

For any queries regarding this correspondence, please contact Paul Creenaune on 1300 NSW RFS.

Yours sincerely,

Timothy Carroll
Manager Planning & Environment Services
Planning and Environment Services

BUSH FIRE SAFETY AUTHORITY

SFPP – Other Tourist Accommodation
98 Jonson St Byron Bay NSW 2481 AUS, 9//DP617509, 6//DP619224
RFS Reference: DA20191211001427-Original-1
Your Reference: 10.2018.650.1 (CNR-2648)

This Bush Fire Safety Authority is issued on behalf of the Commissioner of the NSW Rural Fire Service under s100b of the Rural Fires Act (1997) subject to the attached General Terms of Approval.

This authority confirms that, subject to the General Terms of Approval being met, the proposed development will meet the NSW Rural Fire Service requirements for Bush Fire Safety under *s100b of the Rural Fires Act 1997.*

Timothy Carroll
Manager Planning & Environment Services
Planning and Environment Services

Tuesday 18 February 2020

Water Regulation Officer
Water Regulatory Operations
Natural Resources Access Regulator

Water Management (General) Regulation 2018

Subdivision 4 – Exemption from requirement for controlled activity approval.

42 Controlled activities-persons other than public authorities
A person (other than a public authority) is exempt from section 91E(1) of the *Water Management Act 2000*, in relation to controlled activities specified in Part 2 of Schedule 4 that are carried out in, on or under waterfront land.

Schedule 4 Exemptions
Part 2 – Controlled activities exemptions

Clause	Details
☐ 18	**Activities under mining, crown lands or western lands legislation** Any activity carried out in accordance with any lease, licence, permit or other right in force under the *Mining Act 1992*, the *Crown Lands Act 1989*, the *Crown Lands (Continued Tenures) Act 1989* or the *Western Lands Act 1901* or a petroleum title in force under the *Petroleum (Onshore) Act 1991*.
☐ 19	**Activities on land of Maritime Authority or Port Corporation** Any activity: (a) carried out in accordance with any lease, licence, permit or other right in force in respect of land under the ownership or control of the Maritime Authority of NSW or a Port Corporation (within the meaning of the *Ports and Maritime Administration Act 1995*), or (b) carried out in accordance with any lease, licence, permit or other right in force in respect of land under the ownership or control of a port operator (within the meaning of the Ports and Maritime Administration Act 1995), but only if the operator, after considering the environmental impact of the activity in accordance with section 5.5 of the Environmental Planning and Assessment Act 1979 (as if the operator were the determining authority under that section), is satisfied that the activity is not likely to significantly affect the environment, or (c) for which the Minister administering that Act is the consent authority under the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*.
☐ 20	**Activities under water supply works approval** Any activity comprising the excavation of the bed of a river, lake or estuary for the purpose of facilitating the use of a water supply work, being an activity that: (a) is detailed in the conditions of the water supply work approval for the water supply work, and (b) is carried out in accordance with those conditions.

Clause	Details
☐ 21	**Activities with respect to domestic and stock rights** Any of the following activities for the purpose of enabling a person to take, or facilitating a person's taking of, water pursuant to section 52 (Domestic and stock rights) of the Act: (a) the removal of alluvial material from the bed of a river to enable or facilitate the taking of water, if: (i) any excavation: (A) is no deeper than 1 metre, and (B) is no wider than 1/3 of the width of the river at that point or 6 metres (whichever is lesser), and (C) is no longer than its width, and (ii) the only alluvial material that is removed is material that has been deposited on the riverbed by the flow of water in the river such as sand, silt or gravel, and (iii) no material is removed within 1 metre of the bank of the river, and (iv) any alluvial material that has been removed is placed in the bed of the river, immediately upstream of the excavation, (b) any controlled activity in, on or under the bank of a river to enable or facilitate the installation of a pipe, if: (i) the pipe is above ground or in a trench that is the minimum size necessary to hold the pipe but is no more than 0.3 metres wide and 0.3 metres deep, and (ii) any material that is removed is used to backfill the trench within 48 hours after its removal, (c) any controlled activity in, on or under waterfront land to enable or facilitate the installation of a water supply work that is a pump, if: (i) the controlled activity is not on the bed or bank of a river, and (ii) any material removed is the minimum amount necessary to establish a suitable pump site but is no more than 1 cubic metre, and (iii) the area of land from which any material is removed is no greater than 4 square metres.
☐ 22	**Activities in accordance with harvestable rights orders** Any activity carried out, in accordance with a harvestable rights order, in connection with the construction or use of a dam on land within the harvestable rights area constituted by the order.
☐ 23	**Activities connected with construction of fencing, crossings or tracks** Any activity carried out in connection with the construction or use of fencing, or of a vehicular crossing or an access track, that does not impound water, being an activity carried out in, on or under waterfront land: (a) relating to a minor stream, and (b) within a rural zone (other than a rural village) under an environmental planning instrument.
☐ 24	**Activities in connection with works under former 1912 Act** (1) Any activity carried out in connection with the construction or use of a work to which Part 2 of the former 1912 Act applies in accordance with a licence issued under that Part in relation to that work, being an activity that: (a) is detailed in the conditions of the licence, and (b) is carried out in accordance with those conditions. (2) Any activity carried out in connection with the construction or use of a controlled work within the meaning of Part 8 of the former 1912 Act in accordance with an approval issued under that Part in relation to that work, being an activity that: (a) is detailed in the conditions of the approval, and (b) is carried out in accordance with those conditions
☐ 25	**Removal of vegetation** Any activity authorised under the Act or any other Act or law comprising nothing more than the removal of vegetation (other than large woody debris), but only if the activity does not include the removal or disturbance of soil or other extractive materials.
☐ 26	**Development at Rouse Hill Regional Centre** The carrying out of development in accordance with section 6 of Part D (Rouse Hill Regional Centre) of The Hills Development Control Plan 2012 on the land to which that section applies (being land bounded by Windsor Road, Commercial Road and Withers Road, Rouse Hill).
☐ 27	**Development on waterfront land at Oran Park or Turner Road** The carrying out of development in accordance with the *Oran Park and Turner Road Waterfront Land Strategy 2009*, as published in the Gazette on 17 July 2009.
☐ 28	**Activities on waterfront land if river is concrete lined or in pipe** Any activity carried out on waterfront land relating to a river where the channel of the river is fully concrete lined or is a fully enclosed pipe channel.

Clause	Details
☐ 29	**Activities with respect to dwellings** (1) Any activity carried out in connection with the erection or demolition of, the making of alterations or additions to or the provision of ancillary facilities for, a dwelling house or dual occupancy building, being activities: (a) that comprise exempt development or that are the subject of a development consent or complying development certificate in force under the *Environmental Planning and Assessment Act 1979*, and (b) that are not carried out on or in: (i) the bed or bank of any river, or (ii) the bed or shore of any lake, or (iii) the bed, or land lying between the bed and the mean high water mark, of any estuary. (2) In this clause: ***development*** has the same meaning as it has in the *Environmental Planning and Assessment Act 1979*. ***dual occupancy building*** means a building containing 2, but no more, dwellings within the meaning of the standard instrument prescribed by the *Standard Instrument (Local Environmental Plans) Order 2006*. ***dwelling house*** has the same meaning as it has in the standard instrument prescribed by the *Standard Instrument (Local Environmental Plans) Order 2006*.
☐ 31	**Controlled activities on certain waterfront land** Any controlled activity that is carried out on waterfront land in relation to a minor stream or third order stream, where the activity is separated from the bed of the minor stream or third order stream by one or more of the following that has been lawfully constructed: (a) a public road, (b) a hard stand space (such as a car park or building), (c) a levee bank, but only if the levee bank is in an urban area, was the subject of a development consent under the *Environmental Planning and Assessment Act 1979* and is located within a designated high risk flood area (within the meaning of clause 45 of the Regulation).
☐ 32	**Pontoons, jetties and moorings** Any activity carried out in connection with the construction of a pontoon, jetty or mooring pole on waterfront land relating to a lake or estuary but only if that activity does not require any of the following: (a) the removal of material from the land, (b) the depositing of material, other than that which is necessary for the construction of the pontoon, jetty or mooring, on the land, (c) works which change the profile of the waterfront land adjoining the lake or estuary.
☐ 33	**Maintenance of existing lawful works** Any activity necessary for the purpose of the preservation, repair or upkeep of any building or structure lawfully constructed on waterfront land (other than an agricultural drain), but does not include additions or enhancements to, or the expansion of, the building or structure.
☐ 34	**Repair and restoration work after storms** The following activities after a storm event: (a) repair work on any building or structure (including any access track, watercourse crossing, water supply works or essential services infrastructure) damaged by the storm, but only if: (i) the work does not involve the replacement of a structural component of any building or structure that could not otherwise be repaired under Part 2 of Schedule 4, and (ii) the work does not include enhancements to, or the expansion of, the building or structure beyond its condition immediately before the storm damage occurred. (b) the removal of detritus (including woody debris) deposited on waterfront land as a result of the storm.
☐ 35	**Compliance with enforcement action** (1) Any activity required to be carried out to comply with any direction, request or order under the Act or any other Act or law, but only if the direction, request or order was made: (a) by a court, or (b) by the Minister or an authorised officer. (2) Any activity that is not otherwise specified in Part 2 of Schedule 4 that is required to be carried out to comply with a direction, request or order made under the Act or any other Act or law (other than a direction, request or order referred to in subclause (1)), but only if the Minister approves the carrying out of the activity without a controlled activity approval.

Clause	Details
☐ 36	**Exempt development, complying development and controlled activities with development consent on certain waterfront land** (1) Any activity on waterfront land adjoining a lake or estuary identified on a map approved by the Minister and published on the Department's website for the purposes of this clause, before the commencement of this Regulation, that is development for which development consent has been granted, or is exempt development or complying development. (2) In this clause, ***complying development***, ***development consent*** and ***exempt development*** have the same meanings as in the *Environmental Planning and Assessment Act 1979*.
☐ 37	**Activities by State owned bodies** Any activity carried out by a body (whether incorporated or unincorporated) established or continued for a public purpose that is wholly owned by the State or a Government agency, but only if: (a) the activity does not cause any change in the course of the river, and (b) the body, after considering the environmental impact of the activity in accordance with section 5.5 of the *Environmental Planning and Assessment Act 1979* (as if the body were the determining authority under that section), is satisfied that the activity is not likely to significantly affect the environment.