



19 March 2018

Paula Kemplay
Redland City Council
PO Box 21
CLEVELAND QLD 4163

Our ref: 41/27018

479242

Your ref:

Dear Paula,

Coochiemudlo Island Former Landfill Proposal for Environmental Assessment Program

1 Introduction

Note: This version of the GHD proposal has commercial information removed to enable consultation with external stakeholders.

GHD Pty Ltd (GHD) is pleased to submit this proposal to Redland City Council (RCC) for an assessment program at the former Coochiemudlo Island landfill. This assessment has been requested in response to a recent review of potential environmental issues adjacent to the former Coochiemudlo Island landfill as raised by Deveco Pty Ltd (Deveco) in September 2017¹. In response to the Deveco 2017 report, RCC wish to gain a better understanding of the potential risk posed to the down gradient Melaleuca Wetland. The adjacent wetland is a potential habitat for the 'vulnerable' wallum sedgefrog and an 'endangered' orchid has also been identified in the area². In order to adequately assess the risk to down-gradient sensitive receptors, GHD propose a staged assessment program to enable an assessment of risk to the Melaleuca Wetland.

GHD's team brings to the project a wealth of experience in the assessment of environmental risk associated with legacy landfill sites. We propose to use a diverse team experienced with contaminated land investigations, hydrogeology and ecology. Works will be overseen by Suitably Qualified Person as defined under the provisions of the Environmental Protection Act 1994.

2 Background

A former (closed) landfill exists at the Coochiemudlo Island Waste Transfer Facility (WTF) located at 43-99 Elizabeth Street, Coochiemudlo Island (herein referred to as the site). The area consists of three allotments (Lot 3 on SP115493, Lot 4 on SP115493 and Lot 83 on SL9191) of which comprise the current Waste Transfer Facility and the Laurie Burns Recreational Reserve.

¹ *Review of Environmental Issues in the Catchment of the Coochiemudlo Island 'Melaleuca Wetland,'* 20 September 2017: Deveco Pty Ltd (herein referred to as the Deveco 2017 Report)

² The Deveco 2017 Report lists fauna *Litoria olongburensis* (Wallum Sedgefrog) as 'vulnerable' and having essential habitat across the Melaleuca Wetland and lists the flora *Phaius australis* (orchid) is an 'endangered' species in this wetland.

Historical investigations at the site include:

- Egis 2002 – Redland Shire Council LRAP study
- Coffeey Geoscience Pty Ltd, *Redland Shire Council: Closed Landfill Scoping Project*, 2004 (only a summary report was provided to GHD)
- GHD Pty Ltd, *Coochiemudlo Island Waste Disposal Facility: Groundwater Monitoring Event*, June 2017
- Deveco Pty Ltd, *Review of Environmental Issues in the Catchment of the Coochiemudlo Island 'Melaleuca Wetland,'* September 2017

The latest report raises the concern of potential impact to down gradient RAMSAR listed Melaleuca Wetland in particular the 'vulnerable' listed Wallum Sedgefrog and the 'endangered' listed orchid *P.australis*.

3 Approach overview

Historical studies have been completed at the former Coochiemudlo Island landfill to characterise potential environmental impact. Egis completed a study in 2002, which included the installation and sampling of four groundwater monitoring wells, and GHD completed a groundwater monitoring event in 2017. Monitoring in 2017 was restricted as samples could only be collected from two of the monitoring bores, and the monitoring network was generally observed to be in a poor condition. Surface water monitoring has not been completed, nor has an assessment of adjacent wetland habitat.

RCC desire to gain an updated understanding of the environmental risk posed by the former landfill and this proposal has been developed to outline a suggested approach, which incorporates the following aspects:

- Collect data to characterise surface water and groundwater quality. The program will incorporate assessment of background water quality as well as water quality down gradient of the site.
- Complete investigations to characterise the receiving environment, including completion of a frog survey.
- Complete an assessment to characterise the potential risk posed by the former landfill on the receiving environment (i.e. the Melaleuca Wetlands)

4 Scope

The proposed scope is broken down in the following sections.

4.1 Collect data to characterise surface water and groundwater quality

4.1.1 Rectification of the existing groundwater monitoring network

Purpose: The purpose of these works are to establish a groundwater monitoring network that will facilitate the collection of representative groundwater samples from locations up- and down-gradient of

the former landfill. The up-gradient locations will provide information on the background water quality, while the down-gradient locations will provide information on potential landfill impact.

Proposed scope:

- Drilling and installation of two new up gradient groundwater wells, to replace GW4, which was previously destroyed or decommissioned. Drilling works will involve the following:
 - Underground services clearance
 - Drilling (to a targeted depth of approximately 15 m, to be confirmed on site during drilling works).
 - Logging of the soil horizon
 - Conversion of the soil bore into a groundwater wells.
- Development of new wells and redevelopment of GW1 and GW2
- Replacement of well caps
- Installation of new well labels and locks.
- An installation report will be prepared and will summarise the works completed above.

Locations are displayed on the attached figure (Attachment B), and additional drilling information is included in Attachment C.

4.1.2 Reconnaissance of 5 surface water sampling locations

Purpose: Previous studies have included groundwater assessment, but to date a surface water monitoring program has not been instigated. Due to concerns regarding potential impact on frog habitat, a surface water monitoring program is required.

It is understood that surface water in the adjacent Melaleuca Wetlands is ephemeral in nature and consequently an adaptive monitoring program is required to so that monitoring can be completed during wet periods.

The purpose of the surface water monitoring program is to collect representative surface water samples from locations not affected by the site (background locations) as well as locations downstream of the site. A preliminary reconnaissance visit is recommended to establish the monitoring network. It is suggested that this task is completed with input from the community.

Scope:

- Reconnaissance of 5 surface water sampling locations consisting of the following layout:
 - Two (2) background locations west to northwest of the landfill
 - Two (2) adjacent to the landfill (directly north or east)
 - One (1) down gradient of the transfer station (directly east within Melaleuca Wetlands)
- Stakeholder engagement and discussion. RCC and GHD considers that there is value in providing an opportunity for engagement with Coochiemudlo Island Coastcare representatives to

allow a sense of input and transparency. GHD recommends the stakeholder engagement be undertaken simultaneously with the surface water reconnaissance to reduce potential disagreement of monitoring locations.

4.1.3 Groundwater and surface water monitoring program

Following the completion of the above works, GHD proposes the following sampling program be undertaken to provide data to support an assessment of groundwater and surface water quality in the vicinity of the site. We also recommend completing a series of 'slug tests' on the groundwater monitoring network to estimate the hydraulic conductivity of the underlying groundwater bearing horizon.

GHD propose the following scope of works:

- Two groundwater monitoring events of the groundwater monitoring network (5 monitoring wells)
 - Collection of 10 primary groundwater samples (two monitoring events) over the course of 3 months.
 - Collection of field monitoring observations and parameters including dissolved oxygen, redox potential, electrical conductivity and pH.
 - Laboratory analysis of the groundwater samples for:
 - Nutrients (including ammonia, nitrate, nitrite, total nitrogen and total phosphorus)
 - Total organic carbon (TOC)
 - Biological oxygen demand (BOD) and chemical oxygen demand (COD)
 - Major anions and cations
 - Metals: aluminium, arsenic, cadmium, chromium, iron, mercury, manganese, nickel, copper, lead, and zinc.
 - Organochlorine and organophosphorus pesticides (OC/OP Pesticides)
 - It is proposed that all groundwater samples collected during the events be subject to enhanced analytical program (ultra-trace method for dissolved metals) to allow for a lower laboratory limit of reporting (LOR).
- Completion of a series of slug test. Slug tests are rising / falling head tests and effective methods for estimating the hydraulic conductivity of groundwater bearing horizons. The scope includes completion of slug tests on three monitoring wells, and assessment of the results to calculate the hydraulic conductivity.
- Two surface water monitoring events at the designated surface water locations (following significant rainfall only) consisting of the following:
 - Collection of 10 primary surface water samples (two monitoring events) over the course of 3 months, provided adequate sampling conditions are encountered (i.e. ponded water available in the wetland area to facilitate sampling).
 - Collection of 10 field monitoring observations and parameters including dissolved oxygen, redox potential, electrical conductivity and pH.

- Laboratory analysis of the surface water samples for identical parameters as per the proposed groundwater analysis including total suspended solids. Like groundwater, it is proposed that all surface water samples collected during the events be subject to enhanced analytical program (ultra-trace methods for dissolved metals) to allow for a lower laboratory LOR.

Surface water monitoring may occur independently of the groundwater monitoring events, as the presence of surface waters may be heavily dependent on the preceding weather. GHD intend surface water sampling to be opportunistic and GHD will liaise with local RCC transfer operators to confirm if sufficient rainfall has occurred to facilitate surface water sample collection.

- Two duplicate samples are proposed to be collected during the monitoring program for QA purposes.
- Results from the monitoring program will be documented in a formal report. Refer to Section 4.3 for further details.

GHD intend to conduct the two groundwater monitoring events and two surface water monitoring events within 3 months of the monitoring network rectification works, with a general allowance of approximately 2 months between monitoring events. The surface water monitoring program will be dependent upon the presence of surface water within the adjacent Melaleuca Wetlands to enable sampling.

4.2 Characterisation of the receiving environment

4.2.1 Introduction and purpose

A review of the location shows there is essential habitat for three wallum frog species:

- wallum sedgefrog *Litoria olongburensis* – vulnerable under the EPBC Act and NC Act
- wallum rocket frog *Litoria freycineti* – vulnerable under the NC Act and
- wallum froglet *Crinia tinnula* – vulnerable under the NC Act

There are no historical records within 1km of that location according to the Wildlife Online database, Biomaps and Atlas of Living Australia databases.

The Regional Ecosystem present (12.2.7) is suitable habitat for these species.

In consideration of the potential significance of the habitat adjacent to the site, ground-truthing is recommended to assess the condition of the habitat in general and surveys undertaken to determine the likelihood of occurrence of those species.

4.2.2 Scope

Survey timing

To maximise the potential for detecting frogs, surveys should be undertaken in late February/early March to coincide with the calling period of the frog species.

Commonwealth survey guidelines recommend surveys for the wallum sedgefrog should be undertaken between October and February. However the species is known to call in March as well.

Within that survey window, survey timing should be flexible, to coincide with optimal weather conditions, undertaking surveys on warm, windless nights within 7 days of heavy rainfall.

Commonwealth survey guidelines recommend also sampling a nearby reference site (where wallum frogs are known to occur), to demonstrate conditions were suitable to detect wallum frogs at the time of survey. Ideally, three separate surveys would be undertaken to maximise the potential for detection, however it is initially recommended that one survey is completed. Further surveys may be required / recommended following the initial survey, however these have not been scoped at this stage.

Methods

Wallum frog surveys typically combine a habitat assessment and targeted survey for frogs and tadpoles.

Habitat assessment

The suitability of habitats for wallum frog species would be assessed, documenting the following characteristics:

- The nature and likely hydroperiod of surface water
- The structural complexity and type of aquatic and riparian vegetation
- The level of weed infestation
- Validation of the Regional Ecosystem vegetation community
- The presence of predatory fish species, particularly the introduced mosquitofish (*Gambusia holbrooki*)
- The presence/absence of indicator species for wallum frog habitat – *Drosera spatulata* (a sundew) and *Tenuibranchiurus glypticus* (swamp crayfish)
- Water quality including pH, conductivity, turbidity and presence of tannin

These would be used to determine their likelihood of occurrence and map the distribution of potential breeding and foraging habitat for wallum frog species.

Targeted surveys

Targeted surveys for wallum frogs would combine:

- Visual and aural searches for frogs in the afternoon and evening. This would involve systematic sampling of transects with spotlights, recording all frogs seen and/or heard calling.
- Call-playback during the afternoon and evening. This would involve broadcasting the calls of each frog species and listening for responding individuals
- Searches for tadpoles. If calling activity was low – searches for tadpoles would be undertaken, sweeping suitable waterbodies with a dip net.

Surveys of the reference site would involve active searches and call-playback for frogs. These would ideally demonstrate that frogs are actively calling at the time of survey and would be undertaken prior to visiting the survey area. This could be relatively quick if frogs are calling or respond quickly to call-playback.

Reporting

Following completion of surveys, a report would be prepared summarising the findings of the assessment.

Information from habitat assessment and surveys would feed into the broader assessment report, which will address potential risk posed by the former landfill on the Melaleuca Wetland.

4.3 Assessment and reporting

A report would be prepared to summarise the works completed and provide an assessment of environmental risk. The reporting will include the following:

- Summary of the monitoring works completed.
- Presentation of laboratory results and field measurements.
- Development of a conceptual site model (CSM) to summarise key aspects of potential contaminant sources, exposure pathways and receptors. The CSM will be presented graphically and supported with text. Results from the habitat survey in Section 4.2 will also be utilised in the development of the CSM.
- Review of receptors and selection of suitable published guidelines.
- Assessment of results, including:
 - Comparison of background to down-gradient / downstream results.
 - Comparison against suitable published guidelines.

Reporting will be completed after two rounds of surface water and groundwater monitoring. If surface water monitoring cannot be completed within the 3 month monitoring window, the report will be prepared on the basis of available information.

5 Program

GHD are currently in a position to commence works quickly, however the timeframe is driven by several factors, including:

- Availability of contractors and truck mounted rig to access drilling locations
- Availability of staff with experience drilling on RCC Sites

In addition to the above, other factors outside of GHD's control (such as weather and tidal cycles) may affect timing. Current GHD commitments and contractor availability indicate a window of opportunity ahead of Easter.

Survey work in the Melaleuca Wetland should be implemented as soon as possible as frog activity will reduce leading into the cooler months.

6 Safety at GHD

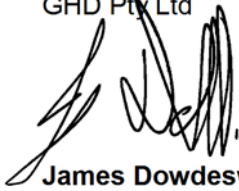
Safety is paramount to GHD, and safety will be managed through the adoption of several processes:

- Preparation of a safety management plan, incorporating a JSEA. The JSEA is a primary tool in the characterisation of risks and establishing the need for mitigation measures and controls.
- Preparation of a safe work method statement (SWMS) for the drilling works
- Continuous gas monitoring while drilling is being completed
- Utilising experienced contractors, who are registered under GHD's Quality Management and Health and Safety Systems.

As drilling will be completed outside of the landfill footprints, GHD understand that a permit to work will not be required.

Please feel free to contact the undersigned if you require any further information in relation to this proposal.

Sincerely
GHD Pty Ltd



James Dowdeswell

Principal Environmental Engineer
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Attachment B – GW Monitoring Location Overview

Melaleuca Wetland



NOTE
 The proposed groundwater well locations are indicative only and may vary depending on site features and conditions.

Legend

- + Groundwater Monitoring Well
- + Proposed Groundwater Monitoring Well
- + Decommissioned Well

Google earth
 Image © 2016 Digital Globe

<p>1:1,000 (at A4)</p> <p>0 10 20 30 40</p> <p>Metres</p> <p>Map Projection: Universal Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 56</p>				<p>Redland City Council Coochiemudlo Island Environmental Assessment</p> <p>Proposed Groundwater Monitoring Well Locations</p>	<p>Job Number Revision Date</p>	<p>41-27018 A 12 Mar 2018</p>
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Figure 1

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 145 Ann Street Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com
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 Data Source: DNRME: cadastre (2018), Google Earth: aerial imagery (Jun 2017, extracted Nov 2017). Created : jvc

Attachment C – Methodology for Drilling Works

The proposed methodology for Stage 1 drilling works is outlined below. Drilling works and methodology are based on that provided in GHD’s document *Placement and Design of Landfill Gas and Groundwater Wells* report (GHD, 2013).

The proposed methodology for Stage 2 monitoring works will follow the sampling and field methodology provided in the following document:

“GHD Report No. 462411 Redland City Council Landfill Environmental Monitoring Program – Environmental Monitoring Program” – dated December 2017. [referred to henceforth as “EMP”].

Permitting	No permitting will be required from the Department of Transport and Main Roads (TMR) nor RCC road corridors as the location of the proposed GW4 is not within a road corridor.
Engage contractors	Contractors will be required for drilling and cable location. Contractors will be briefed regarding the prospective works, and timeframes agreed.
HSE preparation	<p>Several health and safety items will be addressed to manage the safety of the works:</p> <ul style="list-style-type: none"> • GHD will prepare a health and safety plan, including a Job Safety and Environmental Assessment (JSEA) to assess and manage risks associated with site works. • A safe work method statement will be prepared to address drilling work adjacent to a landfill, including the requirement for continuous landfill gas monitoring. • As the proposed drilling locations are outside of the landfill footprints, in accordance with the approach adopted during recent drilling works for Council, GHD understand that we will not be required to operate under the RCC Permit to Work system. • Traffic management. No traffic management will be required.
Service location	<p>Prior to drilling works, services will be identified and locations cleared, using the following methods:</p> <ul style="list-style-type: none"> • A dial before you dig and red-e-map search will be completed for each site • RCC will be asked to provide available information of known services • A professional services locator will be engaged to assist with the identification of services • Drilling locations will be progressed initially using non-destructive methods (hand auguring) for the first 1 m of soil profile if potential services are identified in the drilling locality.
Drilling & installation works	All drilling and installation works will be supervised by a GHD Environmental Scientist / Engineer who will direct the drilling works, log the holes and record installation details.
Surveying (Optional)	Survey of the new well will be required. RCC can arrange to have this surveyed in house, or GHD can arrange for this well to be surveyed by a contractor. Alternatively GHD can use a laser level to calculate the approximate relative level.

Reporting

A drilling installation report will be prepared summarising the works completed. The report will include:

- A summary of the works, locations, drilling methods
- Detailed borehole and installation logs of new groundwater monitoring wells
- GPS locations of all new monitoring infrastructure
- Photographs
- Gas monitoring logs