Intended for

Hunter and Central Coast Development Corporation

Document type

Compliance Report for period 21 August 2019 to 20 August 2020

Date

November, 2020

COMPLIANCE REPORT FOR EPBC 2016/7670 KIWEF AREA 2 CLOSURE WORKS

RAMBOLL Bright ideas. Sustainable change.

COMPLIANCE REPORT FOR EPBC 2016/7670
KIWEF AREA 2 CLOSURE WORKS

Project name	**Compliance Report 2020 for EPBC 2016/7670 – Area 2 Closure Works**
Project no.	**318000841**
Recipient	**Hunter and Central Coast Development Corporation**
Document type	**Report**
Version	**V1**
Date	**9/11/2020**
Prepared by	**Belinda Sinclair, Claire Whitehill**
Checked by	**Shaun Taylor**
Approved by	**Fiona Robinson**
Description	**This compliance report has been prepared by Ramboll Australia Pty Ltd on behalf of the Hunter and Central Coast Development Corporation to demonstrate compliance with EPBC 2016/7670 within the reporting period.**

Document status	Date	Prepared by	Reviewed by	Brief description of changes from previous version
Draft 1	23/10/2020	Belinda Sinclair	Shaun Taylor	N/A
Draft 2	26/10/2020	Belinda Sinclair	Shaun Taylor	Addition of additional outstanding information
Version 1	9/11/2020	Belinda Sinclair	-	Minor editorial corrections

Ramboll Australia Pty Ltd.
ACN 095 437 442
ABN 49 095 437 442

DECLARATION OF ACCURACY

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed	
Full name (please print)	Michael Bardsley
Position (please print)	Environmental Manager
Organisation	Hunter & Central Coast Development Corporation ABN 94 688 782 063
Date	9th November 2020

CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

APPENDICES

Appendix 1
Materials Management Plan (Daracon, 2019)

Appendix 2
Green and Golden Bell Frog Managament Plan (Golder Associates, 2011)

Appendix 3
Construction Environmental Management Framework (Jacobs, 2019)

Appendix 4
Construction Environmental Management Plan (Daracon, 2019)

Appendix 5
Amphibian hygiene checklist and environmental site checks (Daracon, 2020)

1. PURPOSE OF THE REPORT

The Kooragang Island Waste Emplacement Facility (KIWEF) Area 2 Closure Works Project was undertaken by Daracon Contractors Pty Ltd (Daracon) between August 2019 and July 2020. The Hunter and Central Coast Development Corporation (HCCDC) was acting as the agent of the New South Wales (NSW) Government for the closure of the KIWEF, a former landfill site that received waste from the former Broken Hill Proprietary (BHP) Company Limited Mayfield steelworks and associated operations.

Closure of the KIWEF was subdivided into three stages, Areas 1, 2 and 3. Areas 1 and 3 have been completed and Area 2 formed the final stage of the closure works. The closure works consisted of the construction of an engineered cap over the site. **Section 2** provides further detail on the activities completed within the reporting period (between August 2019 and July 2020).

The KIWEF is set within an environmentally sensitive context which required works to:

- comply with regulatory requirements
- avoid direct impacts to Matters of National Environmental Significance (MNES) in particular Green and Golden Bell Frogs (GGBF) but also migratory wading birds
- carefully manage indirect impacts to Matters of National Environmental Significance (MNES) through avoidance of spread of chytrid fungus and predatory aquatic species and through avoiding impacts to water quality of surrounding waterbodies
- manage fill material such that higher risk materials are appropriately isolated from surface waters (Jacobs, 2019).

The purpose of this document is to document compliance with the conditions of the approval issued under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) for the action (EPBC 2016/7670) and to satisfy Condition 15 of that approval, which states:

Annual compliance reporting

15. The approval holder must prepare a compliance report for each 12 month period following the date of the commencement of the proposed action, or as otherwise agreed to in writing by the Minister. The approval holder must:

a) publish each compliance report on the website within 60 business days following the relevant 12 month period;
b) notify the Department by email that a compliance report has been published on the website within five business days of the date of publication;
c) keep all compliance reports publicly available on the website until this approval expires;
d) exclude or redact sensitive ecological data from compliance reports published on the website; and
e) where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within five business days of publication.

Note: The first compliance report may report a period less than 12 months so that it and subsequent compliance reports align with the similar requirement under state approval. Compliance reports may be published on the Department's website.

The action was commenced on 21 August 2019 and works on site were completed within a single reporting period. As such completion of the project works (defined as two years following completion of onsite construction works) will occur in July 2022. **Section 3** provides detail of compliance against each condition of EPBC 2016/7670.

RAMBOLL

Project 318000395
Drawn TO
Approved BS
Date 14/12/2018
Version H

NSW GOVERNMENT Hunter Development Corporation

FIGURE 2-4 Variation Components

EPBC Referral Preliminary Documentation Package
KIWEF Area 2 Closure Works
Hunter Development Corporation

Figure 1-1: The proposed action footprint

2. DESCRIPTION OF ACTIVITIES

The focus of the Area 2 project was to close the former landfill and protect the surrounding environment. This was to be achieved through the reduction of surface water infiltration through buried waste materials via the installation of capping with reduced permeability and a moderation of site surface gradients. The basic principles of the closure works, as identified in the Construction Environmental Management Framework (CEMF), include:

- re-grading of the site to a minimum 1 percent (%) grade to prevent ponding of surface waters
- drainage improvements
- provision of a 500 millimetres (mm) thick, low permeability cap
- rehabilitation using existing topsoil and alternative low nutrient and Chytrid free imported growth medium.

Project works at Area 2 commenced in August 2019 and were completed in July 2020. The completed project works varied from those proposed by HCCDC in early 2018. A fire occurred in the western portion of Kooragang Island, including the KIWEF between January 2019 and April 2019. Prior to the fire, HCCDC had proposed a modified cap in the Low Area (Cells 4, 6 and 8) to comply with the Surrender Notice and to prevent disruption to the GGBF habitat. Following the fire and subsequent requirement for bridging stability works, HCCDC removed the design for the modified cap and proposed a standard cap on the Low Area as per other areas of Area 2.

The nature of the closure works varied in each area, with a summary of works completed to fulfil the Surrender Notice for the closure of Area 2 outlined in **Table 2-1**.

Table 2-1 Summary of Completed Works

Aspect	Area Impacted	Major Components	Current Status
Subgrade preparation	Cells 3 to 7, K3, western half of the Wedge	Cut to fill earthworks to level Area 2, including use of imported material to increase site levels. Materials management in accordance with the Material Management Plan. Containment of contaminated soil (Level 1 and Level 2 as defined in the Materials Management Plan (Coffey, 2019) (**Appendix 1**)) via cut to fill.	Level 2 is covered by a minimum of 500mm of Level 1 material from the underside of the cap, with the exception of bonded asbestos containing material (ACM) fragments in the Wedge area. Location of Level 2 material encountered during subgrade preparation have been surveyed.
Capping with on-site and imported cap material	Standard cap: Cells 3 to 7, K3, K7, western half of the Wedge Augmented Cap: Pond 5	Capping material was sourced from on-site and from multiple off-site sources. Completion of demonstration cap for the three main sources. Completion of capping over Area 2, excluding the eastern portion of the Wedge. This area was demonstrated to be sufficiently capped with in-situ material.	Capping extends over the portion of Area 2 required to be capped under the Surrender Notice. The cap is an average of 564 mm thick and has a permeability of less than 1 x 10^{-7} metres per second (m/s). The permeability of the augmented cap over Pond 5 is less than 1 x 10^{-8} m/s. The cap is graded at >1% and is free draining.
Completion of cap at asbestos trench in K7	Asbestos trench in K7	Identification of the location of a trench containing asbestos and completion of cap placement over the top to ensure minimum cap thickness was met.	The cap thickness over asbestos trench is a minimum of 3.5 m.
Demonstration of sufficient in-situ cap at the Wedge	Eastern half of the Wedge	Testing of the thickness and permeability of in-situ material placed over this portion of Area 2 during construction of the Newcastle Coal Infrastructure Group (NCIG) rail flyover in 2015.	The eastern portion of the Wedge has been demonstrated to be sufficiently capped with in-situ material.
Regrading and depth adjustment works to complete in-situ cap at Cell 1 and Cell 2	Cell 1 and Cell 2	Testing of the thickness and permeability of in-situ material placed over this portion of Area 2 during construction of the NCIG rail flyover in 2015. Where thickness was less than 500 mm, regrade and depth adjustment was completed.	Capping extends over Cell 1 and Cell 2 and meets the required thickness of 500 mm and permeability of less than 1 x 10^{-7} m/s.
Placement of topsoil	Cells 1 to 7, K3, K7, western half of the Wedge	Site-won and imported topsoil was placed over the completed cap to prevent deterioration of the cap surface.	An average thickness of 95 mm of topsoil extends over capped areas of Area 2.
Drainage	Cells 1 to 7, K3, western half of the Wedge	Construction of three sediment basins in the Low Area, with an outlet structure on western boundary associated with the northern-most sediment basin. Construction of associated inflow drains across the cap.	The completed sediment basins include a 50 mm thick coal washery reject (CWR) blinding layer, linear low-density polyethylene (LLDPE) geomembrane underlain and overlain by Bidim geotextile and overlain by a 100 mm CWR layer. The edges of the basins have been lined with rock to prevent erosion. Spillway structures have been constructed with gabion baskets. Inflow drains have been constructed in a similar manner to the sediment basins.

3. APPROVAL CONDITIONS COMPLIANCE TABLE

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
PART A - CONDITIONS SPECIFIC TO THE ACTION			
1.	The action must only be undertaken within the footprint.	Compliant	Survey of the site against the approved action footprint (refer **Figure 1-1**) was completed and plotted. Erosion and sediment control fences as well as GGBF exclusion fencing were established around work areas to manage environmental controls as well as define the extent of works. Security fencing also surrounded much of the site.
2.	The person taking the action must implement the Green and Golden Bell Frog Management Plan to avoid and mitigate impacts on the Green and Golden Bell Frog (Litoria aurea) (GGBF) population.	Compliant	The requirements of the GGBF Management Plan (Golder Associates, 2011) (**Appendix 2**) were incorporated into both the Construction Environmental Management Framework (CEMF) (Jacobs, 2019) (**Appendix 3**) and the Construction Environmental Management Plan (CEMP) (Daracon, 2020) (**Appendix 4**). These management plans were implemented throughout the undertaking of the action. Compliance with these management plans was checked monthly by the Environmental Manager Representative.
3.	GGBF monitoring must be undertaken in accordance with the Green and Golden Bell Frog Management Plan within the KIWEF Site, including the temporary basins, aligned with NCIG monitoring program.	Compliant	Annual monitoring of GGBF was undertaken by the University of Newcastle during spring/summer/autumn of 2019/20 (the 2019/20 season).
4.	GGBF monitoring data must be analysed following each round of monitoring to identify any changes to the GGBF population, as compared to the baseline data described in the Green and Golden Bell Frog Management Plan. Should a decline in population be attributed to the action, response measures must be developed and implemented in accordance with the Green and Golden Bell Frog Management Plan.	Compliant	Data collected during the annual monitoring of GGBF by the University of Newcastle was analysed after each round. The population size for the 2019/20 season is estimated at 3,000 which is similar to the calculations from the 2017/18 season, potentially indicating a stabilisation of the population after a long gradual increase. No decline in population attributable to the Area 2 closure works was identified during the 2019/20 season. Further assessment of the population against baseline data will be undertaken in 2020/21 season and subsequent seasons to monitor potential impacts of the action.
5.	The person taking the action must revegetate the area marked in yellow and identified as 'Area 2 Closure works' on Map 2 at Attachment A to restore Green and Golden Bell Frog habitat in accordance with the Revegetation Management Plan.	Compliant	The areas shown as Area 2 Closure Works on Map 2 at Attachment A is successfully vegetated in accordance with the Revegetation Management Plan, as shown in the following photographs.

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
			 The Wedge (Lot 7)  Area 2 (Cells 1-8 and K3 West)

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
6.	The person taking the action must undertake water quality monitoring for groundwater and surface water at the KIWEF Site in accordance with the Water Quality Management Plan.	Compliant	Annual groundwater monitoring was undertaken between 9 June 2020 and 7 July 2020. Surface Water data was collected in November 2019 and May 2020. Surface water quality monitoring was undertaken throughout the construction phase to assess the potential impact to surface water receiving bodies from construction activities. The surface water monitoring included three sediment basins (SB) connected in sequence, with sampling occurring only in the third basin (SB1). Four water receiving bodies were also monitored, including Deep Pond (DP1), the discharge point for SB1, Deep Pond South (DPS), Blue Billed Duck Pond (BBDP) and the BHP Wetland (BHPW). Three additional ponds were added to the original sampling schedule in April 2020 as a result of the construction of a temporary discharge point to the north required to manage a predicted storm event. These North Pond locations have been designated K106A, K106B and Pond 4. An additional surface water body was added to the monitoring round of surface water sampling in May 2020 lying to the south west of the main site in the Peninsula stockpile area designated PSW.
7.	At the completion of the project works, the approval holder must ensure:		
i.	no increased distribution of Gambusia holbrooki due to the project works, within the area identified as 'Potential GGBF foraging or breeding habitat' as identified on Map 2 at Attachment A, and	Compliant	Annual monitoring of GGBF was undertaken by the University of Newcastle during the 2019/20 season. The monitoring included a presence/absence assessment of Gambusia. The Green and Golden Bell Frog (Litoria aurea) Research Program on Kooragang Island: Annual Report (2019-2020) (University of Newcastle, 2020) notes that as of March 2020, only seven wetlands are believed to contain *Gambusia*, compared with 13 in March 2019, 16 in March 2018, and 24 in February 2017. These wetlands are located in the Industrial Zone and NCIG Compensatory Habitat Environmental Monitoring Program (CHEMP) wetlands. Gambusia distribution will continue to be monitored in the 2020/21 season. Further, the newly constructed ponds onsite are reported to be Gambusia free and are expected to remain so as they are hydraulically isolated (upgradient) from the surrounding pond networks.

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
ii.	no net loss of GGBF foraging or breeding habitat as an impact of the project works.	Compliant	The closure works area has been revegetated in accordance with the Revegetation Management Plan. The following photograph demonstrates the establishment of aquatic vegetation within the constructed sediment basins. 
8	The approval holder must implement the KIWEF Site EMP.	Compliant	Daracon managed the site in accordance with the CEMP which was prepared based on the construction management requirements in the CEMF. HCCDC was responsible for some monitoring elements of the CEMF not directly related to the construction activities such as groundwater monitoring, surface water hydrosalinity monitoring and GGBF surveys. These are further discussed in the comments relating to condition 3 and condition 6.

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
PART B - STANDARD ADMINISTRATIVE CONDITIONS			
	Notification of date of commencement of the proposed action		
9.	The approval holder must notify the Department in writing of the date of commencement of the action within 10 business days after the date of commencement of the action.	Compliant	Formal notification to the Department of Agriculture, Water and the Environment (DAWE) (previously the Department of Energy and Environment) was issued on 4 September 2019, confirming earthworks had commenced on 21 August 2019.
10.	If the commencement of the action does not occur within 5 years from the date of this approval, then the approval holder must not commence the action without the prior written agreement of the Minister.	Compliant	Works commenced within five years of the approval being issued.
	Compliance records		

	The approval holder must maintain accurate and complete compliance records.	Compliant	A formal reporting procedure was implemented for the closure works which included:
			• daily checks of:
			  ○ frog fencing
			  ○ hygiene station/s
			  ○ wheel wash
			  ○ weather
			• weekly environmental site checks of:
			  ○ erosion and sediment controls
			  ○ sediment ponds
			  ○ waste management
			  ○ other general environmental controls
			Records have been maintained by Daracon. Blank templates for these reports are provided in **Appendix 5**.
			
			Reporting and analysis of groundwater, surface water and GGBF monitoring has been maintained by HCCDC.

	If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request.	Not triggered	No request has been made by the Department for compliance records to be provided.

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
	Note: Compliance records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, and or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the Department's website or through the general media.		
	Preparation and publication of plans		
13.	The approval holder must:		
a.	publish all plans associated with the action on the approval holder's website within 30 business days of the date of approval of the action;	Compliant	Commonwealth and State approval documents/plans were uploaded to the HCCDC website: https://www.hccdc.nsw.gov.au/kooragang-island-waste-emplacement-facility
b.	exclude or redact sensitive ecological data from plans published on the website or provided to a member of the public; and	Not triggered	No sensitive ecological data was required to be redacted from the documents.
c.	keep plans published on the website until the end date of this approval.	Compliant	HCCDC will continue to maintain the project plans on the website until completion of the closure works and the approval is transferred to Port of Newcastle. Port of Newcastle will then be responsible for uploading project plans on their website when approval transfers.
14.	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under a plan, is prepared in accordance with the Department's Guidelines for biological survey and mapped data (2018) and submitted electronically to the Department in accordance with the requirements of the plan.	Compliant	University survey data is to be maintained and provided to the Department at the completion of the action. Data will be collected and provided in accordance with the Department's Guideline.
	Annual compliance reporting		
15.	The approval holder must prepare a compliance report for each 12 month period following the date of the commencement of the proposed action, or as otherwise agreed to in writing by the Minister. The approval holder must:	Compliant	This report addresses this condition.

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
a.	publish each compliance report on the website within 60 business days following the relevant 12 month period;	Not triggered	This report is required to be published by HCCDC on the project website by 13 November 2020.
b.	notify the Department by email that a compliance report has been published on the website within five business days of the date of publication;	Not triggered	Notification to the Department is required by 21 November 2020.
c.	keep all compliance reports publicly available on the website until this approval expires;	Compliant	HCCDC will maintain a copy of this report on its website until the site and Commonwealth Approval are transferred to the Port of Newcastle. Port of Newcastle will be responsible for uploading project plans on their website when approval transfers.
d.	exclude or redact sensitive ecological data from compliance reports published on the website; and	Not triggered	No sensitive ecological data was required to be redacted from the documents.
e.	where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within five business days of publication.	Not triggered	No sensitive ecological data was required to be redacted from the documents.
	Note: The first compliance report may report a period less than 12 months so that it and subsequent compliance reports align with the similar requirement under state approval. Compliance reports may be published on the Department's website.		
	Reporting non-compliance		
16.	The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:	Compliant	'Incident' is defined as any event which has the potential to, or does, impact on protected matter(s). Due to the potential for harm to juvenile GGBFs as a result of a mass migration identified on 7 April 2020, HCCDC reported the incident to the Department via email on 8 April 2020 noting both the relevant condition and providing a description of the potential impact to protected matters (being the GGBF). Works on the site ceased and management of the incident commenced.
a.	the condition which is or may be in breach; and		
b.	a short description of the incident and/or non-compliance.		
17.	The approval holder must provide to the Department the details of any incident or noncompliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after	Compliant	HCCDC maintained regular contact with the Department during the event, which lasted over multiple weeks. A full report was provided on the Juvenile GGBF Dispersion Event, including ongoing management activities on 1 June 2020 following agreement with the Department that the event had concluded.

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
	becoming aware of the incident or non-compliance, specifying:		
a.	any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;		The Incident Report provided a complete description of the corrective actions undertaken to manage the significant Juvenile GGBF Dispersion Event.
b.	the potential impacts of the incident or non-compliance; and		The Incident Report described the condition of the juvenile GGBFs being relocated from site and why particular management decisions were made. Actions undertaken were specifically designed to facilitate the safe removal of the juvenile GGBF undertaking a mass migration.
c.	the method and timing of any remedial action that will be undertaken by the approval holder.		The nature of the event was to minimise to the greatest extent possible impacts to the juvenile GGBFs dispersing throughout the site. The University of Newcastle frog specialists and the site ecologists from Eco Logical Australia provided advice on measures to minimise further juvenile GGBFs entering the site. All actions were reported in the Incident Report.
	Independent audit		
18.	The approval holder must ensure that independent audits of compliance with the conditions are conducted:		
i.	Following the completion of onsite construction works and prior to the completion of the project works period;	Not triggered	An Independent Audit of records will be undertaken prior to completion of the project approval (before the transfer of the Approval) 10 July 2022.
ii.	Within a 12month period from the completion of the action;	Not triggered	Port of Newcastle to undertake Independent Audit at the completion of the project action (post-transfer of the Approval) 31 December 2030.
iii.	or as requested in writing by the Minister.	Not triggered	No independent audit has been requested.
19.	For each independent audit, the approval holder must:	Not triggered	
a.	provide the name and qualifications of the independent auditor and the draft audit criteria to the Department;		
b.	only commence the independent audit once the audit criteria have been approved in writing by the Department; and		

Condition No.	Approval Condition	Is the project compliant with this condition?	Comment and supporting documentation
c.	submit an audit report to the Department within the timeframe specified in the approved audit criteria.		
20.	The approval holder must publish the audit report on the website within 10 business days of receiving the Department's approval of the audit report and keep the audit report published on the website until the end date of this approval.	Not triggered	
	Completion of the action		
21.	Within 30 days after the completion of the action, the approval holder must notify the Department in writing and provide completion data.	Not triggered	Port of Newcastle will notify the Department of the completion of the action in 2030 following completion of the monitoring required under the Green and Golden Bell Frog Management Plan (**Appendix 2**).

4. CONCLUSION

This report has been prepared to assess compliance with the conditions of the approval issued under the EPBC Act for the action (EPBC 2016/7670) and to satisfy Condition 15 of that approval. The undertaking of the action during the reporting period has been assessed to be compliant with the conditions of EPBC 2016/7670. No non-compliance issues were identified.

Onsite construction works were completed in July 2020. As such completion of the project works (defined as two years following completion of onsite construction works) will occur in July 2022.

APPENDIX 1
MATERIALS MANAGEMENT PLAN (DARACON, 2019)

Materials Management Plan (MMP)

Project Name	Kooragang Island Waste Emplacement Facility Stage 5 (Area 2)
Job No.	1634
Client	Hunter & Central Coast Development Corporation
Contract No.	HCCDC18/04

Rev	Date	Prepared By	Reviewed By Project Manager		Authorised By Construction Manager	
0		Lyndsey Terry	Name	Sign	Name	Sign
			C. Africa			

MATERIALS MANAGEMENT PLAN

TABLE OF CONTENTS

Page No.

MATERIALS MANAGEMENT PLAN

1.0 INTRODUCTION

1.1 Title

KIWE Facility Stage 5 (Area 2) – Materials Management Plan (MMP)

1.2 Client

Hunter & Central Coast Development Corporation (HCCDC)

1.3 Specifications

Conduct of the project requires adherence to the requirements of:

- The conditions of contract GC21;
- Kooragang Island Waste Emplacement Facility – Contract Documents
- Daracon Group's Environmental Management System

1.4 Definitions

Principal's Authorised Person (PAP) – The PAP for this project is Public Works Advisory.

Principal's Auditor – Principals third party consultant engaged directly by the principal to endorse the adequacy of the Cap Validation Report

2.0 ISSUE LIST AND AMENDMENT AUTHORITY

2.1 Issue

This MMP is to be issued to the following personnel.

Document No.	Holder	Position	Issue Date	Entered By:
1	HCCDC	Client	06.08.19	CA
2	Public Works Advisory	Principal's Authorised Person (PAP)	06.08.19	CA
3	Daracon	Principal Contractor	06.08.19	CA

Last update:

2.2 Document control

The MMP is a controlled document and shall be managed in accordance with Daracon's Document Data Control System P107. Each person receiving a controlled copy is responsible for keeping the Plan in good order and incorporating changes as they are distributed.

2.3 Review

The MMP shall be reviewed at an interval not exceeding 3 months. Within two weeks of any review of this plan it will be resubmitted to the HCCDC and their PAP. If there is any determination from either party with regards to the plan, the plan is to be revised and resubmitted to HCCDC within two weeks.

2.4 Amendment Approval Process

The MAMP may require amendment during the term of the project to cater for changing circumstances. Revisions of the document shall be issued by the Project Manager following review and consultation with relevant stakeholders.

3.0 MANAGEMENT RESPONSIBILITY

3.1 Accountabilities

Tasks may be delegated to suitably qualified personnel but the responsibility and authority shall remain with the nominated personnel who shall provide an adequate system of review. Any change in delegation shall be notified to the client.

3.1.1 Project Manager

The Project Manager reports to the Construction Manager within Hunter Civil.

The Project Manager is responsible for construction management including community consultation and shall establish and maintain Daracon's management policies for this project and shall be responsible for their ongoing effectiveness.

The Project Manager will be responsible for programming, costs, quality, safety, industrial relations, client satisfaction, subcontractors and supplier selection and for reviewing the effectiveness of the Management System.

3.1.2 Project Engineer

The Project Engineer is responsible for assisting the Project Manager in construction management including community consultation and shall establish and maintain Daracon's management policies for this project and shall be responsible for their ongoing effectiveness

The Project Engineer will assist the Project Manager with programming, costs, quality, safety, industrial relations, client satisfaction, subcontractors and supplier selection and for reviewing the effectiveness of the Management System.

3.1.3 Site Engineer

The Site Engineer is responsible to the Quality Systems Manager and Project Engineer for effective operation of the Project Management System including maintenance of the system documentation as required by ISO 9001 and ISO 14001.

The Site Engineer is responsible for maintaining a non-conformance reporting system. Authority is usually delegated to the Project Engineer/Site Engineer from the Project Manager to restrict work until a satisfactory solution has been implemented.

3.1.4 Project Supervisor

The Project Supervisor is responsible to the Project Manager for the day to day co-ordination and site control of direct labour, plant, subcontractors and suppliers for construction works. Management of these tasks includes control of all community, safety, environmental and quality aspects that may apply at the time.

3.1.5 Subcontractors

The Project Manager shall appoint subcontractors. They shall operate according to the provisions of the client's specification and Daracon's Management System
Each Subcontractor shall be given all relevant sections of the Project Management Plans that they shall incorporate into their own system and present for review to the Project Manager.

4.0 EARTHWORKS SEQUENCING

4.1 General Sequencing

The general sequence for the KIWEF Area 2 Stage 5 earthworks operations is as follows:

- Establish Erosion and Sediment controls including green and gold bell frog fencing,
- Clearing and grubbing of existing vegetation on site
- Strip topsoil and stockpile
- Win material to use as sealing layer/ capping, sort and stockpile and undertake other required work to allow material to be re-used for capping
- Source, import and place imported capping (sealing layer) material as required in accordance with the specification to complete the required capping
- Excavation, earth movement and regrading to sub-grade level
- Classification and stockpiling of excavated material
- Compaction and/or treatment of the sub-grade and removal of unsuitable material
- Excavate for, supply, bed, lay, and backfill for new drainage structures (such as drains and liners, drop structures, sediment basins and the like)
- Carry out proof roll for subgrade…
- Excavate cut areas to subgrade level (material classification and treatment per contract documents)
- Place fill from onsite sources (cut to fill)
- Import/cart materials to fills
- Capping Demonstration/ Capping Demonstration Pad
- Source capping material from Borrow Areas or stockpiles
- Import, place, trim and compact capping material
- Place revegetation layer from topsoil stockpiles

5.0 EARTHWORKS ENABLING WORKS

A number of activities are required to be completed as a priority immediately upon site establishment, so as to open up areas for bulk earthworks activity. These works include, but are not limited to;

- Establishment of environmental controls and installation of frog fences
- Location and treatment of existing services,
- Testing & Validation of suitable material within BHP Borrow Pit,

6.0 VEGETATION CLEARING AND TOPSOIL MANAGEMENT

6.1 Vegetation Clearing

The KIWEF site requires minimal vegetation clearing to be completed. Where vegetation clearing works are required to be undertaken, an excavator with a mulcher will be used The mulch will be stockpiled onsite in an area agreed with the Principle's Authorised Person for re-use at a later stage.

6.2 Topsoil Removal

Topsoil removal is required in a majority of the areas of the KIWEF site. The areas where topsoil removal is not required includes K7, K3 BOS, Pond 5, the Low Area and the Peninsula stockpile.

Any topsoil that is generated will be blended with mulch under the supervision of the geotechnical consultant and used as the revegetation layer for the cap.

6.3 Topsoil Stockpiling

The contract documents require that topsoil be blended with available mulch and reused on site within the revegetation layer above the sealing layer.

6.4 Topsoil Reuse

Topsoil won on site will be reused as a revegetation layer above the sealing layer.

7.0 UNSUITABLE MANAGEMENT

7.1 Unsuitable Material Removal

In the event that material that is excavated and is demonstrated by the Geotechnical Consultant as unsuitable for use as cap, sealing layer, fill or topsoil in accordance with the specification will be notified to the Principal and a determination sought. The excavated material is to be disposed of in accordance with the specifications by incorporation into the landform where appropriate under the supervision of the Geotechnical Engineer. Any material that can't be incorporated into the landform will be stockpiled at a location nominated by the Principal.
Removal will be carried out using excavators to excavate and load, with road trucks to cart or off road the material to stockpile or spoil.

7.2 Temporary Stockpiling

If required, temporary stockpiles will be placed in areas clear of watercourses in locations approved by the Principal's Authorised Person. Stockpile locations will have environmental controls in place in accordance with the IPMP.
Long term stockpiles will be maintained to prevent dust generation

7.3 Contaminated Soils

The management of all material excavated during the Landfill closure works is to be governed by a decision matrix with the main objective of the matrix to develop the appropriate guidelines for the classification, movement and reuse of re-useable and contaminated materials onsite.

All contaminated material encountered during the landfill closure works will be assessed and categorised under the following three levels:

Level 1 Unrestricted on Site Re-use	**Level 2** Restricted on Site Re-use	**Level 3** EPA Notification Obligation

The categorising of materials can be achieved by imposing common distinguishing visual and olfactory characteristics, analysis of PAH concentrations and use of instrumentation (PID) to determine the default category as identified below:

Chemical Group	Distinguishing Characteristics	Preliminary Assessment Method	Default Material Category
PAH (Polycyclic Aromatic Hydrocarbons)	Dark brown to black in colour. Mild hydrocarbon odour	Analytical, visual and olfactory assessment	Level 1
Metals	Iron staining. Light grey/green/black. Granular appearance. Possibly associated with ash, coke, slag gravel and clinker in the soil	Visual and instrumentation assessment	Level 1
VOC's (Volatile Organic Hydrocarbons)	Strong hydrocarbon smell	Visual, olfactory and instrumentation assessment	Level 2
Ammonia/cyanide	Ammonia odours	Olfactory and instrumentation assessment	Level 2
Asbestos	Fibrous texture. Grey, white, blue and green	Visual assessment	Level 2
PCB (Polychlorinated Byphenols)	Dark brown to black in colour. Mild phenolic odour	Visual and instrumentation assessment	Level 2
SPH (Separate phase Hydrocarbons)	Immiscible liquid phase hydrocarbon existing in soil that can flow	Visual and instrumentation assessment	Level 3

Level 1 Materials:

There is no specific management required for Level 1 material on the site and Level 1 material has an unrestricted onsite re-use classification.

Level 2 Materials:

Level 2 materials have a restricted re-use onsite and will be placed in the areas where as a minimum it would be 500mm below the underside of capping undertaken as part of the landform closure works. The treatment of Level 2 material may also involve the following:

- Leave in place and incorporate into the earthworks in area's of fill where the minimum separation to underside of capping is achieved,
- Relocate to a nominated Level 2 emplacement area,
- Stockpiled and relocated to a nominated Level 2 emplacement area,
- Stockpiled and disposed at a registered licensed facility

All of the above options for Level 2 material shall be agreed with the Principal.

Level 3 Materials:

Level 3 material will be primarily delineated by means of the initial visual and olfactory field assessment by the Environmental (Geochemical) consultant and confirmed by further sampling and testing.
Encountering Level 3 material requires immediate EPA and Principal notification.

If suspected Level 3 materials are encountered, the management and ultimate fate of any Level 3 material will require careful planning as directed by the Principal in consultation with all the stakeholders including the EPA, Daracon in consultation with the Geochemical consultant and the auditor.

7.4 Material Excavation and Fill on Site

There is an estimated total of 54,336m3 of material to be cut and filled on the site. Cut to Fill operations will be undertaken using 30 and 40 tonne articulated dump trucks and 30-45T Excavators. Compaction and placement will be carried out using a combination of suitably sized dozers (typically D6 – D8 range), 27t pad drum rollers, 825 compactors and a 140H Grader to trim.

On and off road Watercarts will be present at all times to assist with any necessary conditioning and for dust suppression. Daracon has access to and will provide the appropriate plant and equipment to work and protect soft or wet foundations. Shallow and soft foundation areas will be assessed on a case by case basis and in consultation with HCCDC the most appropriate measures will be adopted.

It is important that the onsite cut/fill is maximised to reduce the need for imported material. The cut/fill balance will be managed in conjunction with the Principal's Authorised Person and the Design Engineers.

Excavation works will be carried out using various sized excavators and on/off road trucks depending on the stockpiling location. Construction will be carried out in accordance with the Work Procedures and ITPs detailed in the Project Integrated Management Plan.

7.5 Temporary Stockpiles

Temporary stockpiles will be placed in areas clear of watercourses in locations approved by the PAP. Stockpile locations will have environmental controls in place in accordance with the Environmental Management Plan. Long term stockpiles will be maintained to prevent dust generation. Where possible and approved then stockpiles may be placed near the base of the fills to allow to topsoiling of batters at a later date.

7.6 Traffic Safety

The safety of traffic on the site is of paramount importance and is an integral part of the Earthworks operations. Traffic onsite will be managed in accordance with the Vehicle Movement Plan.

8.0 CAPPING DEMONSTRATION

8.1 Capping Demonstration Pads

Prior to commencement of the placement of the sealing layer, Capping demonstration pads will be constructed for the following respective materials to confirm that the work method statement will result in a capping layer with the required characteristics as per the technical specifications:

a) Capping demonstration pad using material from the BHP borrow pit,
b) Capping demonstration pad using material from the peninsula,
c) Capping demonstration pad using material imported from Summerhill stockpile,
d) Capping demonstration pad using material imported from an alternative approved source,

An area of approximately 200m2 will be utilised as the Capping demonstration pads shall be completed to reflect actual construction areas. The following method will be utilised:

1. The first 250mm layer of material will be imported either from an onsite stockpile location or offsite using appropriate trucks and spread, moisture conditioned and compacted to the density nominated in the specifications. It is expected that approximately 8-10 passes with an 825 Compactor or suitably sized pad foot roller will be required however this will be identified and confirmed during the trial works,
2. The second layer will only be placed when the compaction and moisture conditions of the first are certified by lab testing.
3. The second layer will be placed per step 1.
4. The top surface of the capping will be proof rolled with a smooth drum roller, loaded dump truck or watercart to the satisfaction of the PAP/Geotechnical Engineer.
5. The pad will be trimmed using a Grader to the required tolerance per the specification (+/- 50mm) when compaction conformance is achieved.
6. 5 samples of the compacted pad will be taken and returned to the Geotech NATA registered laboratory and tested for:
    - Standard Compaction and optimum Moisture Content,
    - Permeability targeting a density ratio of 98% and Optimum Moisture Content,
    - Grading,
    - Atterberg Limits,
    - Shrink/Swell test,
    - SPOCAS,
7. A report detailing the results of the trial will be submitted to the PAP for approval and review.
8. Upon approval of the trial being successful full scale placement will occur in accordance with the established procedure (i.e. number of passes, moisture condition and handling) and the Project Management Plan and ITPs.

Based on Daracon's experience completing previous remediation stages, there is opportunity methodology learning's from previous stages of works that can be utilised for the mains works package.

Pond 5 is nominated for the proposed locations for the capping trial area and is shown in Appendix A

9.0 IMPORTED EARTHWORKS MATERIALS

9.1 Imported Fill Supply and Placement

The primary source for general fill for the project is Summerhill however HCCDC has established alternative sources of General fill from other projects. The project requires approximately 55,000m3 of imported general fill material, to be delivered to site following adherences to all testing and certificate requirements outlined in the specification. The imported fill material will be transported to site using conventional truck and dogs. Material will be placed using suitably sized dozer (D6/D8) and a padfoot roller. An off road watercart will be used to condition material. The expected supply rate for General Fill material from Summerhill is in the order of 2,500t per day.

Alternative other sources for imported fill meeting the requirements of the contract documents and approved by the Principal may be used to supplement the Summerhill material supply or replace entirely. For placement and compaction of standard general fill material, it is expected that and dozer and padfoot combination will be utilised.

To control offsite material tracking onto public roads a wheel wash will be installed at the exit point (near the front gates). A gate keeper will be utilised to inspect all tyres before tracking out onto public roads.

9.1.1. General Fill Supply Responsibilities

In conjunction with the supplier, Daracon will ensure the following items are adhered to;

1. Heavy vehicle route management, including the approvals to haul to the site, and obtain any temporary haulage licenses and signage that may be required with RMS if they are operating on State Roads over a threshold that require such a License,

2. Hours of Operation limits

3. The requirements for imported General Fill for the KIWEF site include that it must be demonstrated to be Virgin Excavated Natural Material (VENM) Excavated Natural Material (ENM), Coal Washery Reject (CWR). Fill materials will not be imported to site unless complying source test results endorsed by the Supplier's Geotechnical Consultant are provided to the Principal Contractor in advance.

9.1.2. Programming

Daracon will liaise with the supplier/s for delivery of material as required. Daracon will coordinate between the available suppliers to ensure necessary Bulk Fill quantities are received on site in order to maintain the program.

9.1.3. Material Tracking

Daracon will establish an internal material supply tracking system that will be used to generate monthly report data identifying the following:

- Quantity (tonnes) of material supplied to the site by each individual source per day.

9.1.4. Truck Load Inspections

Daracon will inspect loads as they are being unloaded to verify that the material is free of unexpected deleterious or unexpected obvious signs of gross contamination.

9.2 Imported Capping Material Supply and Placement

To satisfy the project requirements for the capping layer, a permeability of less than 10^{-7}m/s is required for the majority of the site with an area around pond 5 requiring a permeability of less than 10^{-8}m/s.

The capping layer material must be placed in accordance with the work method statement (WMS) and must have the following properties:

- Be either CWR, VENM, ENM or otherwise EPA approved waste exempt material,
- Comply with all physical specifications outlined in the technical specification,
- Satisfy the surrender notice and all other consent conditions for the site,
- Permeability as referenced above,
- Be a minimum of 500mm thick with a tolerance of -50mm from the design on the base of the subgrade and +50mm from the design top of the cap,
- Have a CBR > 3%,
- Be constructed to be free draining and avoid surface water ponding,
- Be resistant to erosion to limit the degradation of the surface,
- Have a low dusting potential to limit dust problems during windy weather or site activities,
- Have low shrinkage potential to limit the formation of shrinkage cracks that would reduce the integrity of the capping layer,
- Shall not be classified as saline (sodic) or alkaline (Sodic) soils or treated appropriately,
- Shall not be significantly dispersive,
- Shall not be acid producing,
- Be compatible with environmental objectives as outlined in the contract documents,
- Satisfy all other requirements of the contract documents,

Capping material for the KIWEF site will be sourced predominately from Summerhill Waste Management Centre. The amount of capping material required for completion of the works is 113,575m3. To meet the overall program, capping is required to be imported at a rate of 1100m3/day. Capping placement will commence immediately following the completion of any bulk earthwork within the specific identified area's onsite.

The material will be tested in accordance with the testing requirements and frequency set out the technical specification.

The placement of capping material will be completed using a suitably sized dozer D6/D8 and pad foot roller (20t plus) combination. The 500mm capping material will be compacted and tested in 250mm layers in accordance with the testing requirements and frequency set out the technical specification. A detailed capping work method statement will be provided as per the requirements of the Technical Specification, prior to commencement of capping works

10.0 OTHER DETAILS

10.1 Management of Wet Weather

Wet weather on a construction site is an inevitable occurrence that cannot be prevented however its impact can be minimized by adopting best practice construction techniques.

Daracon will only open up sections of formation that can be continuously worked until completion – no areas will be started and left unattended for long periods of time. Appropriate plant and equipment can be sourced from Daracon's fleet that allows a number of different fronts to operate at full production at the same time.

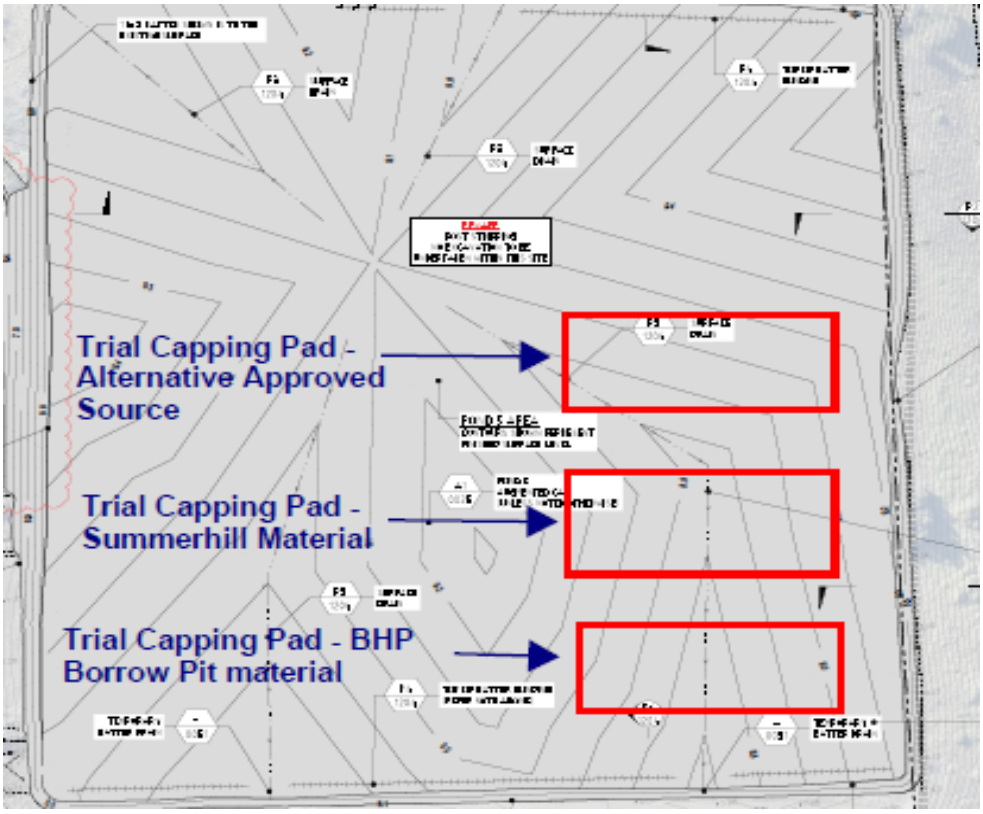
We will adopt construction techniques such as rolling off the fill embankment with a smooth drum roller if weather is imminent to reduce erosion impact and creating diversion drains that control runoff into suitable sediment controls. Appropriate installation of silt fences, sediment basins and other controls will be utilised as advised by the CPESC that we have engaged.

10.2 Earthworks Compaction Testing

Compaction testing will be in accordance with project Technical Specification and Daracon's Intergrated Project Management Plan. Compaction testing will be carried out on a lot bases and the relevant ITP will be used. A NATA registered test facility and testers will be used for the earthworks conformity testing. Level 1 Geotechnical supervision will be provided in accordance with the specification.

11.0 APPENDICIES

11.1 Appendix A – Trial Capping Demonstration Pad Locations – Pond 5



APPENDIX 2
GREEN AND GOLDEN BELL FROG MANAGAMENT PLAN (GOLDER ASSOCIATES, 2011)

19 April 2011

GREEN AND GOLDEN BELL FROG MANAGEMENT PLAN

Kooragang Island Waste Emplacement Facility Closure Works

Submitted to:
Hunter Development Corporation
Suite B, Level 5
PricewaterhouseCoopers Centre
26 Honeysuckle Drive
Newcastle, New South Wales 2300

REPORT

Report Number. 117623029-001-R-Rev0

Golder Associates

Executive Summary

The Kooragang Island Waste Emplacement Facility (KIWEF) is located on land owned by the New South Wales (NSW) State Property Authority, which is managed under delegated-authority by the Newcastle Port Corporation (NPC).

The KIWEF contains various wastes from the former BHP steelworks at Mayfield. Hunter Development Corporation (HDC) is in the process of closing the KIWEF via implementing certain landfill closure works, which include land-forming of waste emplacement cells and construction of a capping layer over much of the KIWEF site.

Historically, HDC was the holder of an Environment Protection Licence (EPL) over the site for the former BHP Solid Waste facility (refer to Figure 1). That EPL has now been surrendered, subject to the implementation of landfill closure works required by the NSW Office of Environment and Heritage (OEH) (formerly the NSW Department of Environment, Climate Change and Water (DECCW)). HDC, as the Agents for the Crown, are undertaking those necessary landfill closure works, on lands administered by NPC, which encompass the KIWEF (Figure 1).

The KIWEF site supports known populations and habitat of the Green and Golden Bell Frog (*Litoria aurea*). A flora and fauna impact assessment (GHD, 2010a) of the proposed landfill closure works concluded that the works are "*designed to minimise the direct and indirect impacts on biodiversity of the locality, especially in relation to the Green and Gold Bell Frog... The Proposal also addresses the risks posed from the prior disposal of BHP waste on the site*" and is unlikely to result in "*long-term decrease in the size of a population, reduce the area of occupancy of species, fragment an existing population, adversely affect habitat critical to the survival of a species, disrupt the breeding cycle of a population, modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a species is likely to decline, result in invasive species that are harmful to an endangered species becoming established in the endangered habitat, or interfere with the recovery of any threatened species*".

Overall, the flora and fauna impact assessment (GHD, 2010a) reported that the proposed capping strategy is unlikely to impact significantly on Green and Golden Bell Frogs, provided the works are managed through an appropriate environmental management plan.

In order to assist in minimising impacts of the landfill closure works, HDC engaged Golder Associates Pty Ltd (Golder) to develop this Green and Golden Bell Frog Management Plan (the GGBF Management Plan). HDC intend to incorporate this GGBF Management Plan into the detailed design documentation currently being developed for the landfill closure works. An Action Plan has been developed by Golder in conjunction with this GBBF Management Plan and is reported to HDC separately (Golder, 2011).

The Green and Golden Bell Frog is listed as 'endangered' under the NSW *Threatened Species Conservation Act 1995*, and 'vulnerable' under the federal *Environmental Protection and Biodiversity Conservation Act 1999*. Historically, this species was widespread across much of the Hunter Valley; however, it is now believed to be restricted to four key populations, including a large population on Kooragang Island (including the KIWEF site).

The Green and Golden Bell Frog is a relatively large species and is usually green, most often with irregular large gold spots and/or stripes. The Green and Golden Bell Frog can be regarded as somewhat of a habitat generalist, dispersing widely and maturing early. It is known to inhabit marshes, dams and stream sides and appears to prefer those water bodies where Bulrushes (*Typha* spp.) or Spikerushes (*Eleocharis* spp.) grow (NPWS, 1999). Green and Golden Bell Frogs are also known to inhabit highly disturbed sites (NPWS, 1999), such as the KIWEF site. The Green and Golden Bell Frog is known to travel significant distances across often seemingly inhospitable habitat. Distances of up to 1.5 km day/night are not unknown, particularly associated with significant rain events.

Frog Chytrid Fungus (FCF) has been identified as a key threatening process, at both the state and national level, for the Green and Golden Bell Frog (DSEWPC, 2009). FCF is widespread on Kooragang Island and Hexham Swamp, the other key Green and Golden Bell Frog population in the Newcastle area (DECC, 2007).

Section 3 of this document details the management procedures to be implemented, including identification and delineation of disturbance areas, pre-work surveys, identification of relocation areas, relocation procedures and rehabilitation of disturbed habitat, environmental induction training and site hygiene management for Chytrid fungus.

Section 4 of this document outlines the proposed monitoring programme for Green and Golden Bell Frogs at the KIWEF site. The monitoring programme includes annual review of publicly available baseline and ongoing data from other surveys including frog populations (such as that being undertaken by NCIG across the KIWEF site). An Annual Environmental Monitoring Report (AEMR) discussing the results of analysis of monitoring data will be presented to OEH.

Section 5 of this document identifies specific management and mitigation measures for disturbed areas and triggers for the development of response criteria in the unlikely event that the landfill closure works have an impact on the Green and Golden Bell Frogs. If the results of the monitoring programme indicate a decline in Green and Golden Bell Frog numbers across the site, which cannot be attributed to natural population fluctuations and variability, and is potentially a direct result of the landfill closure works, specific response criteria will be developed by HDC in consultation with the OEH.

Section 6 of this document outlines proposed review and reporting actions. HDC will report to OEH annually for 5 years following completion of the landfill closure works, unless analysis shows that Green and Golden Bell Frog populations are being impacted, then further reporting will be undertaken until a time agreed with OEH.

In accordance with the *Approval of Surrender of Licence Number 6437*, the Director-General will be notified of any incident with actual or potential significant off-site impacts on people or the biophysical environment, as soon as practicable after the occurrence of the incident. The Director-General will be provided with written details of the incident within seven days of the date on which the incident occurred.

The AEMR will be distributed to relevant government agencies and stakeholders, and copies provided to other interested parties, if requested.

In accordance with the *Approval of Surrender of Licence Number 6437*, this Management Plan will be made available on the HDC website.

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

The Kooragang Island Waste Emplacement Facility (KIWEF) is located on land owned by the New South Wales (NSW) State Property Authority, which is managed under delegated-authority by the Newcastle Port Corporation (NPC).

The KIWEF contains various wastes from the former BHP steelworks at Mayfield. Hunter Development Corporation (HDC) is in the process of closing the KIWEF via implementing certain landfill closure works, which include land-forming of waste emplacement cells and construction of a capping layer over much of the KIWEF site.

Historically, HDC was the holder of an Environment Protection Licence (EPL) over the site for the former BHP Solid Waste facility (refer to Figure 1). That EPL has now been surrendered, subject to the implementation of landfill closure works required by the NSW Office of Environment and Heritage (OEH) (formerly the NSW Department of Environment, Climate Change and Water (DECCW)). HDC, as the Agents for the Crown, are undertaking those necessary landfill closure works, on lands administered by NPC, which encompass the KIWEF (Figure 1).

The KIWEF site supports known populations and habitat of the Green and Golden Bell Frog (*Litoria aurea*). A flora and fauna impact assessment (GHD, 2010a) of the proposed landfill closure works concluded that the works are "*designed to minimise the direct and indirect impacts on biodiversity of the locality, especially in relation to the Green and Gold Bell Frog... The Proposal also addresses the risks posed from the prior disposal of BHP waste on the site*" and is unlikely to result in "*long-term decrease in the size of a population, reduce the area of occupancy of species, fragment an existing population, adversely affect habitat critical to the survival of a species, disrupt the breeding cycle of a population, modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that a species is likely to decline, result in invasive species that are harmful to an endangered species becoming established in the endangered habitat, or interfere with the recovery of any threatened species*".

Overall, the flora and fauna impact assessment (GHD, 2010a) reported that the proposed capping strategy is unlikely to impact significantly on Green and Golden Bell Frogs, provided the works are managed through an appropriate environmental management plan.

In order to assist in minimising impacts of the landfill closure works, HDC engaged Golder Associates Pty Ltd (Golder) to develop this Green and Golden Bell Frog management plan (the GGBF Management Plan) to support the landfill closure works. HDC intend to incorporate this GGBF Management Plan into the detailed design documentation currently being developed by HDC for the landfill closure works.

This GGBF Management Plan has been prepared in accordance with HDC's Request for Tender No. 141 ("Green & Golden Bell Frog Management Plan and Action Plan for K26/32 Ponds: KIWEF"), dated February 2011, and Golder's responding proposal, dated 28 February 2011 as accepted via a letter from HDC emailed to Golder on 16 March 2011. This Management Plan has been prepared via review of documentation provided by HDC to Golder on 22 March 2011, a visual site visit by Golder personnel and written commentary from HDC.

An Action Plan for the K26/K32 Ponds has been developed by Golder in conjunction with this GBBF Management Plan and is reported to HDC in a separate document (Golder, 2011).

1.2 A SUMMARY OF WORKS COMPLETED TO DATE

A range of studies have been completed by others in relation to the Green and Golden Bell Frogs on the KIWEF site since its hand over to the Crown in 2002. The most recent relevant studies are listed in the following. It is noted that other previous studies are summarised in these works, and, therefore, are not identified here.

- Revised Capping Strategy, Flora and Fauna Impact Assessment, Rev 3 (GHD, 2010a).
- March 2011 Green and Golden Bell Frog (Litoria aurea) Survey at the Kooragang Island Waste Emplacement Facility (Umwelt, 2011).
- Revised Final Landform and Capping Strategy, Rev 4, (GHD, 2010b).

The key findings of those reports, as relevant to the ongoing management of Green and Golden Bell Frogs on the KIWEF site, are presented below.

1.2.1 Flora and Fauna Impact Assessment

The flora and fauna impact assessment of the revised capping strategy was undertaken as part of the EPL surrender, which the then DECCW required to identify any impacts resulting from the implementation of the final capping strategy on Green and Golden Bell Frogs (and other threatened species). The assessment was also required to identify associated mitigation measures for those species and their habitats.

Key Findings

The key findings of the flora and fauna impact assessment (GHD, 2010a) comprised the following:

- The assessment identified areas of known and potential Green and Golden Bell Frog Habitat (as indicated on Figure 1), and determined the presence, relative abundance and distribution of Green and Golden Bell Frogs on the KIWEF site, and the adjacent Ash Island. A summary of the locations and numbers of Green and Golden Bell Frogs recorded on the KIWEF site is presented in Figure 1. During the assessment (that is February and March 2009), 59 Green and Golden Bell Frogs were recorded from the KIWEF and surrounding area; 38 individuals were recorded on the KIWEF site.
- Two important factors to note, as identified in the report, are:
  - The Green and Golden Bell Frog's ongoing survival on Kooragang Island, and the KIWEF site, may be related to the protection that the brackish wetland habitat provides from the Chytrid fungus (Stockwell, pers. comm., in GHD, 2010a).
  - The terrestrial habitats and ephemeral water bodies supported on the KIWEF site and the larger Kooragang Island may provide important movement corridor refuges for Green and Golden Bell Frogs (Hamer *et al.*, 2008, in GHD, 2010a).
- Potential changes to water quality, especially salinity, may adversely affect the Green and Golden Bell Frogs on the KIWEF site.
- The *in situ* contaminated materials present across the KIWEF site will be addressed by the capping strategy. There is, therefore, the potential for water quality in, and adjacent to, the capped location to remain similar or improve.
- The capping strategy was designed to minimise changes to hydrology. As noted, however, the construction of the NCIG rail loop has impacted on the known Green and Golden Bell Frog habitat supported in the K26 and K32 cells, and potentially already altered the hydrology of these ponds.
- Where the proposed capping strategy would impact on streamside vegetation and banks, and, hence, potential Green and Golden Bell Frog habitat, that vegetation would be reinstated immediately following capping works to a state as close as possible to the original.
- Plague Minnow (*Gambusia holbrooki*), a known predator of Green and Golden Bell Frog tadpoles, was recorded in ponds across the KIWEF site.
- The assessment considered that the capping strategy would result in minimal fragmentation or isolation of currently interconnecting areas of Green and Golden Bell Frog habitat. The capping strategy would

leave areas of appropriate habitat in areas within the KIWEF site and the adjacent Hunter Estuary National Park.

- That vegetation that may be cleared or capped is considered unlikely to constitute key foraging habitat for Green and Golden Bell Frogs.
- The potential cumulative impacts on Green and Golden Bell frogs and their habitat across the local area from other proposals, is unknown; particularly impacts on potential movement between populations north and south. Furthermore, inference is made that competition for resources, required by the species, may have potentially increased because of the translocation of individuals into suitable areas on the KIWEF site from areas impacted by other proposals. However, the proposed "*capping strategy aims to avoid increasing these pressures while dealing with the potentially harmful pollutants on site*" and "*is unlikely to add to these previous impacts or add to cumulative adverse impacts on threatened species at the KIWEF site*".
- Overall, the assessment reports that the proposed capping strategy is unlikely to impact significantly on Green and Golden Bell Frogs, provided the works are managed through an appropriate environmental management plan. Those assessments of significance were undertaken in accordance with the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Environmental Planning and Assessment Act 1979* (EPA Act).

Mitigation Measures

The following mitigation measures were recommended in the flora and fauna impact assessment:

- A 30 m buffer zone is proposed around fresh and brackish water wetlands, ponds, and identified areas of Green and Golden Bell Frog habitat.
- If it is identified that works will occur in Green and Golden Bell Frog habitat (such as the fringing habitat near Deep Pond), one week prior to those works commencing, a pre-clearance survey is required to be conducted by a qualified ecologist. In the event that any Green and Golden Bell Frogs are identified, they will be relocated (using appropriate amphibian hygiene protocols).
- Once works are complete, the restoration and rehabilitation of that habitat should be undertaken.
- Control of noxious weeds on the site should be undertaken limiting the use of herbicides, which may be detrimental to Green and Golden Bell Frogs.
- Maintenance of the current hydrological and water chemistry regimes; in particular, low levels of salinity in the brackish wetlands, which may protect amphibian species from the Chytrid fungus. The maintenance of runoff volumes into these areas may help conserve appropriate salinity levels.
- Similarly, general erosion and sediment control should be implemented to limit the transport of other contaminants across the KIWEF site.
- Capping and grading activities should be conducted outside of the Green and Golden Bell Frog's core breeding period (that is, September to March). If works need to be undertaken during this time, they should be limited to areas outside of recognised breeding habitat. For the purposes of this GGBF Management Plan, breeding habitat is defined as areas within or immediately adjacent to emergent, aquatic macrophytes.
- Standing water should not be transferred between waterbodies, to prevent the spread and establishment of the Plague Minnow.
- Suitable hygiene protocols must be developed and adhered to for all plant and personnel entering the KIWEF site to avoid the spread of Chytrid fungus.

- Compensatory habitat for the Green and Golden Bell Frog may be considered as part of the capping strategy. For example, the capping works may facilitate rehabilitation of suitable Green and Golden Bell Frog habitat. However, HDC has indicated that it is not intending to create artificial habitat, interfere with existing habitat, nor are seeking to modify frog population numbers or habitat.

- Ongoing, long-term monitoring of the Green and Golden Bell Frog population across the entire KIWEF site, and adjacent areas, such as the NCIG facility, should be undertaken seasonally. This data will help identify if any adverse impacts have affected the Green and Golden Bell Frog population and habitat across Kooragang Island.

1.2.2 March 2011 Survey

The March 2011 survey of GGBF (Umwelt, 2011) targeted the rail loop area, including K26 and K32 Ponds (as well as K24 and K31 Ponds). Overall, this survey was suitable for its purpose. However, the following comments are made in relation to the survey scope and its findings. Those comments were used to assist in the development of the Action Plan for the K26/K32 Ponds (Golder, 2011).

- No detailed surface water quality data have been collected and analysed for the standing water in the Ponds.

- It is known that some contaminants are detrimental to frog embryos and development, as well as known to lead to malformations in frogs for example, Abbasi and Soni, 1984; Anon., 1999, Arrieta *et al.*, 2004, Guillermo *et al.*, 2000; Marquis *et al.*, 2006; Rice *et al.*, 2002; Stabenau *et al.*, 2006; Wang and Jia, 2008). Some surface water chemistry data are available (see NCIG, 2008, in GHD, 2010b) that indicate values exceeding ANZECC trigger values for aquatic ecosystems; however, these are limited. In the absence of detailed water chemistry data, there is no baseline to compare for the long-term monitoring of the water quality, correlated with the frog populations. This represents a significant data gap.

- Data on the periodicity of the standing water in the cells has not been collected. Such data would assist in the understanding of the impacts of changes in local hydrology, such as may have occurred during construction of the NCIG rail loop.

- The mere presence of calling males may not be a useful indicator of successful breeding in the ponds. This, to some extent, has been alluded to in both the GHD (2010) and the Umwelt (2011) studies in that no tadpoles were recorded in the cells during either of those studies.

- The presence of juveniles may be a valid indicator of a sustainable population as this species is known to emigrate over large distances. Therefore, it would be useful to confirm that there has been effective breeding over one or more seasons, with tadpoles that survive to adulthood.

- The baseline comparison that the Umwelt (2011) report makes with the GHD (2010) results, in particular, that "There is no substantial change in the numbers recorded from 2009 to 2011." (page 8) needs to be further qualified. A stable number of frogs each year over a relatively short time frame could result from a variety of factors (such as low mortality or in-migration) and is not necessarily confirmation of sustainable breeding.

To meet HDC's requirements regarding management of contamination and frog habitat at the Ponds it is recommended that these data gaps are addressed by HDC.

1.2.3 Capping Strategy

The objectives of the capping strategy were to "*reduce risks to the environment associated with migration of contaminated groundwater and to prevent the risk of biological harm associated with contaminated soil and groundwater*" (GHD, 2010b). This objective had the associated objectives of preserving and maintaining habitat for shorebirds and other threatened species, and endangered ecological communities.

The strategy assessed the KIWEF based on sub-areas, with each sub-area assessed for the requirement for capping, and the effects that capping may have on the ecology. The locations of those sub-areas are presented on Figure 1. In terms of impacts to ecology, in particular the ecology of the Green and Golden Bell Frog, the following sub-areas were important:

- K1 – This sub-area presents a low risk to the surrounding environment from contamination. Capping of this area would have a significant impact on the ecology of the area.
- K2 – This sub-area presents a low to moderate risk to the surrounding environment from contamination. Capping of this area could impact on Green and Golden Bell Frog habitat.
- K3 – This sub-area presents a low to moderate risk to the surrounding environment from contamination. Capping of the fringing areas of this sub-area may have an impact on Green and Golden Bell Frog habitat. Therefore, capping is suggested only up to within 30 m of that habitat, with the exception of the area located near K3/1W.
- K4 (deep pond) – Contamination in this sub-area presents a low risk to the environment. However, filling and capping of this sub-area will have a significant impact on Green and Golden Bell Frog habitat, and the overall ecology of the area.
- K6 – This sub-area presents a low risk from contamination. However, capping of this sub-area will have a significant impact on the ecology of the area.
- K7 – The sub-area presents a low to moderate risk to the environment from contamination. Capping of the edges of the site will significantly impact on Green and Golden Bell Frog habitat.
- K26/K32 cells – These cells present a high risk to the environment. However, they also support Green and Golden Bell Frog habitat. Capping is not recommended, but rather a monitoring and risk assessment be completed. Details of recommended actions for the K26/K32 Ponds are presented in an Action Plan (Golder, 2011).

Based on the above assessment, a capping strategy was developed that minimised the impacts to Green and Golden Bell Frog habitat. A brief summary of the other sub-areas, suggested for capping, is provided below.

- K5 (excluding pond 5) – This sub-area presents a low to moderate risk to the environment from contamination. There is no significant Green and Golden Bell Frog habitat in this area; therefore, capping is an option.
- Pond 5 – Migration of contaminants from this sub-area may impact the estuarine aquifer. This sub-area does not support significant Green and Golden Bell Frog habitat. Therefore, capping is an option.
- K10 (excluding K26/K32) – The sub-area presents a low to moderate risk to the environment from contamination. The BOS area presents a moderate risk to the environment. Capping is suggested for this area.

1.3 Other Relevant Management Plans and Guidelines

This GGBF Management Plan should be read and in conjunction with the following management plans and guidelines, which are relevant to the Green and Golden Bell Frog population on Kooragang Island and the KIWEF:

- *Coal Export Terminal Green and Golden Bell Frog Management Plan* (Newcastle Coal Infrastructure Group (NCIG) (Document No. GGBFMP-R01-E.DOC, 2007)) (the NCIG management plan)
- *Draft Management Plan for the Green and Golden Bell Frog Key Population in the Lower Hunter* (Department of Environment and Climate Change (DECC) (NSW) 2007) (the Lower Hunter management plan)
- *Significant impact guidelines for the vulnerable Green and Golden Bell Frog (*Litoria aurea*)* (Department of Sustainability, Environment, Water, Populations and Communities (DSEWPC), Nationally threatened species and ecological communities; Background paper to the EPBC Act policy statement 3.19, 2009)
- *Best practice guidelines: Green and Golden Bell Frog habitat* (DECC, 2008)
- *Protecting and restoring Green and Golden Bell Frog habitat* (DECC, 2008)
- *Draft Recovery Plan for the Green and Golden Bell Frog (*Litoria aurea*)*. (DECC, 2005)
- *Threatened Species Management Information Circular No.6, Hygiene Protocol for the Control of Disease in Frogs* (NPWS, 2001) (the hygiene protocol) (Appendix A).

1.4 Project Approval

This GGBF Management Plan has been developed in order to partly address the KIWEF site's *Approval of Surrender of Licence Number 6437*, dated 8 December 2010, Condition 5.b), which requires the following:

b) The licensee shall prepare and submit a Green and Golden Bell Frog Management Plan to the EPA for approval by 13 April 2011. The Plan shall encompass the entire premises occupied by the licensee and include, but not be limited to:

i) Management measures to be undertaken to minimise the spread of the amphibian Chytrid fungus including:

> *(i) the training of project personnel in site hygiene management; and*
>
> *(ii) site hygiene procedures for project personal, mobile plant and equipment, in accordance with the NPWS Hygiene Protocol for the Control of Disease in Frogs 2001; and*

ii) Measures to maintain, restore and enhance Green and Golden Bell Frog habitat, including movement corridors across the site.

Additionally, obligations exist under the DSEWPC's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as to the protection of this nationally threatened species. These obligations are detailed in the EPBC Act policy statement 3.19 (see above for reference), as well as the significant impact criteria set out in the NSW *Threatened Species Conservation Act 1995* (TSC Act).

1.5 Objectives of this Plan

In relation to Green and Golden Bell Frogs on the KIWEF site, one of the overall aims of the KIWEF landfill closure works is to manage those works in a manner that does not impact threatened species and their habitat, and to restore small areas of temporary disturbance to their original (or better) condition. To that end, the objectives of this GGBF Management Plan are:

1) To maintain the existing Green and Golden Bell Frog populations supported on the KIWEF site.

2) To reduce the spread of the amphibian Chytrid fungus (*Batrachochytrium dendrobatidis*).

3) To protect the existing Green and Golden Bell Frog habitat on the KIWEF site.

4) To increase connectivity between the existing areas of Green and Golden Bell Frog habitat on the KIWEF site.

5) To restore Green and Golden Bell Frog habitat that may be disturbed during the landfill closure works to a condition as-good or better than prior to the works.

Hence, this GGBF Management Plan aims to assist HDC in the implementation of appropriate environmental management measures during the KIWEF closure works.

1.6 Scope and Use of this Plan

The scope of this GGBF Management Plan covers that area known as the KIWEF (Figure 1), before, during and after landfill closure works.

This GGBF Management Plan has been prepared in accordance with the relevant state guidelines as identified in Section 1.3.

This GGBF Management Plan will be reviewed and updated by those responsible for undertaking the detailed design and associated documentation to ensure that it is current at the time that the landfill closure works are tendered. Once tendered, the Contractor will incorporate the revised GGBF Management Plan into their Environmental Management Plans (EMP). Where there is any conflict between the provisions of this GGBF Management Plan and Contractors' obligations under their respective contracts, including the various statutory requirements (that is, licences, permits, project approval conditions and relevant laws), the contract and statutory requirements are to take precedence. In the case of any real or perceived ambiguity between elements of this GGBF Management Plan and the above statutory requirements, the Contractor shall first gain clarification from HDC, prior to implementing that element of this GGBF Management Plan over which the ambiguity is identified.

It is intended that this GGBF Management Plan should complement those studies identified in Section 1.2. To that end, this management plan should be supplemented by publicly available monitoring results collected by others for projects on Kooragang Island. For example, it is understood that the NCIG plan requires monitoring to occur on an annual basis until 2020, as outlined in the EPBC Act Particular Matter conditions for that project. The NCIG monitoring data will be useful input into management of Green and Golden Bell Frogs on the KIWEF site.

1.7 Structure of this Plan

The structure of this GGBF Management Plan is provided below. This structure has been adopted to address the requirements as specified in the HDC brief (document number HDC141), and be in accordance with required guidelines.

- Section 2: Provides a profile of the Green and Golden Bell Frog, including its key identifying features in the field, similar species on the KIWEF site, general ecology relevant to the KIWEF site, its conservation status and distribution on the KIWEF site.
- Section 3: Details the management procedures to be implemented, including identification and delineation of disturbance areas, pre-work surveys, identification of relocation areas, relocation procedures and rehabilitation of disturbed habitat, environmental induction training and site hygiene management for Chytrid fungus.
- Section 4: Outlines the monitoring programme for the KIWEF site.
- Section 5: Response criteria and mitigation measures, including comparison with previous data collected at the site, and procedures to be followed if a decline in the Green and Golden Bell Frog population is detected.

- Section 6: Lists the reporting and review requirements of this management plan.
- Section 7: Lists references cited in this Green and Golden Bell Frog Management Plan and other supporting information.

GREEN AND GOLDEN BELL FROG MANAGEMENT PLAN

HUNTER DEVELOPMENT CORPORATION

SITE LOCATION

LEGEND

- Kooragang Island Waste Emplacement Facility License Area
- Known and Potential Habitat Areas (GHD, 2010)
- Capping Extent Landfill Closure Works
- HDC Closure Area 2010

NOTES

Imagery provided by The Hunter Development Corporation 16/03/2011
Data digitised from Land & Property Management Authority
Request for Tender - RFT No. HDC141, February 2011
Appendix A - Site and Access Map

0 40 80 160 240 320 400 metres

SCALE (at A3) 1:10,000

Coordinate System: GDA 1994 MGA Zone 56

PROJECT: 117623029
DATE: 18/04/2011
DRAWN: AJW
CHECKED: TC

FIGURE 1

Golder Associates

Information contained on this drawing is the copyright of Golder Associates Pty. Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates Pty. Ltd.

File Location: J:\GIS\Jobs\117623029_HDC_Frog Management Plan\Workspaces\117623029_F004.mxd

2.0 SPECIES PROFILE – GREEN AND GOLDEN BELL FROG (*LITORIA AUREA*)

2.1 Conservation Status

2.1.1 Listing

The Green and Golden Bell Frog's conservation status is listed as follows:

- **Endangered** under the NSW *Threatened Species Conservation Act 1995*
- **Vulnerable** under the federal *Environmental Protection and Biodiversity Conservation Act 1999*.

2.1.2 Known Populations

The Green and Golden Bell Frog is estimated to have disappeared from 90% of its former range within NSW over the last 30 years (Pyke and White, 1996; DECC, 2007), although populations in Victoria are believed to be secure (Gillespie, 1996).

There are about 45 known populations of Green and Golden Bell Frog within NSW (DECC, 2007). Of these, only a few occur in conservation reserves; Kooragang Island Nature Reserve supports the closest protected population to the KIWEF site (DECC, 2007). Historically, this species was widespread across much of the Hunter Valley; however, it is now believed to be restricted to four key populations:

- a large population on Kooragang Island (including the KIWEF site)
- small, isolated populations at Sandgate on the margins of Hexham Swamp
- a meta-population in the Gillieston Heights/East Maitland, Ravensdale areas (also including Wentworth Swamp)
- a meta-population in the Ravensworth/Liddell/Bayswater area.

2.1.3 Management and Recovery Plans

To "ensure that the Lower Hunter population is successfully managed and monitored such that the species continues to persist in the Lower Hunter and that 'measures' of the two populations' viability are maintained or improved over time", the following key documents are important:

- *Draft Management Plan for the Green and Golden Bell Frog Key Population in the Lower Hunter* (Department of Environment and Climate Change (DECC) (NSW) 2007) (the Lower Hunter management plan)
- *Draft Recovery Plan for the Green and Golden Bell Frog (*Litoria aurea*)*(DECC, 2005).

2.2 Key Distinguishing Features

The following provides some key diagnostic features that are important for quick and easy field-identification of this species.

2.2.1 Adult Frogs

- Relatively large, muscular species with robust body form and smooth skin compared to other species known to inhabit the KIWEF site (Barker *et al.*, 1995).
- The background colouration is usually green, most often with irregular large spots and/or stripes of gold (Barker *et al.*, 1995), refer to Figure 2. It should be noted that adults can vary considerably in pattern; however, the background colouration will always be green.

- Males vary in size from 60 to 70 mm (snout to vent length (SVL)); females vary from 65 to 110 m SVL (Tyler and Knight, 2009). Typically, most individuals being in the range of 60 to 80 mm SVL (DEC, 2005).
- A white or cream stripe extends from above the nostril, over the eye and ear (tympanum) and continues as a fold down the side (Robinson, 1998). There is usually a darker stripe below the white stripe, and another pale stripe from below the eye, extending to the base of the forearm (Robinson, 1998).
- The groin area, and behind the thighs, is usually pale blue or bluish-green, particularly in breeding males (Tyler and Knight, 2009). Mature males may also have a yellowish darkening of the throat area (DEC, 2005).
- The tympanum is usually brown (Tyler and Knight, 2009).
- The belly is usually creamish-white (DEC, 2005); the lower sides of the body are adorned with raised glandular, creamish-coloured spots of irregular size.
- The eye has a horizontally elliptical pupil and a golden yellow iris. The toes are three-quarters to nearly fully webbed (Robinson, 1998).

Figure 2: Adult Green and Golden Bell Frog (Litoria aurea)
(Source: A. White (2007), as in the NCIG plan)

2.2.2 Tadpoles

- Relatively large, reaching 65 to 100 mm at limb bud development stage (DEC, 2005). May be confused with other large-bodied tadpoles of species in the KIWEF site; for example, Peron's Tree Frog (*Litoria peronii*).
- Deep bodied and possess long tails with a high fin that extends almost half way along the body (refer to Figure 3).
- Although not typically used in field identification given the need for a microscope, the mouthparts consist of two upper and three lower labial rows (Anstis, 2002).

Figure 3: Tadpole Green and Golden Bell Frog (Litoria aurea)
(Source: A. White (2007), as in the NCIG plan)

2.2.3 Similar Species within the KIWEF Area

The Green and Golden Bell Frog should not be confused with any other species in the KIWEF area, given its very distinctive features and large size, wart-free skin, expanded finger and toe pads, and lack of spotting or marbling on the hind side of the thigh (Robinson, 1998).

Nevertheless, to the untrained eye, metamorphosing individuals may be confused with the adults and metamorphs of the following species that are known to occur on the KIWEF site:

- Eastern Dwarf Tree Frog (*Litoria fallax*)

  This species is also green, but lacks any of the golden markings on the back and presents with a plain, single colour.

- Peron's Tree Frog (*Litoria peronii*)

  Adults have bright yellow with black mottling on armpits, groin, and backs of thighs. The back texture is rough, and often is covered with faint, emerald spots, giving its other common name, the Emerald-spotted Treefrog.

- Broad-palmed Rocket Frog (*Litoria latopalmata*)

This species ranges from light to dark brown on its back, sometimes with darker blotches. The backs of the thighs are yellow and dark brown.

- Spotted Marsh Frog (*Limnodynastes tasmaniensis*)

  Adults usually have large regularly-shaped olive green blotches on the back and sometimes have a yellow, red, or orange mid-dorsal stripe. The background colouration is not green.

2.3 Aspects of Ecology Important for Management

2.3.1 Preferred Habitat

The Green and Golden Bell Frog can be regarded as somewhat of a habitat generalist, dispersing widely and maturing early. It is known to inhabit marshes, dams and stream sides and appears to prefer those water bodies where Bulrushes (*Typha* spp.) or Spikerushes (*Eleocharis* spp.) grow (NPWS, 1999). In the Lower Hunter region, such plant species as Salt Marsh Rush (*Juncus kraussi*), Coast Club Rush (*Schoenoplectus subulatus*), and Salt Couch (*Sporobolus virginicus*) are indicators of habitat suitability for Green and Golden Bell Frogs (DECC, 2007). Such habitat is typically unshaded, free of Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites (NPWS, 1999).

Green and Golden Bell Frogs are also known to inhabit highly disturbed sites (NPWS, 1999), such as the KIWEF site.

Typically, Green and Golden Bell Frogs will require habitat for breeding, foraging, shelter, movement and over wintering. All such habitat types occur across the KIWEF site, and have been incorporated under the banner of known and potential Green and Golden Bell Frog habitat by GHD (2010a). These habitat areas are indicated on Figure 1.

2.3.2 Habits

The Green and Golden Bell Frog is frequently active during the day, although it is known to forage at night on insects, as well as other frogs (Cogger, 2000; Barker *et al*., 1995; NPWS, 1999). Tadpoles are known to feed on algae and other vegetative matter (NPWS, 1999; Anstis, 2002).

The Green and Golden Bell Frog exhibits strong migration tendencies, and is known to travel significant distances across often seemingly inhospitable habitat (DECC, 2007). Distances of up to 1.5 km in a single day/night are not unknown (Wellington, 1998; Pyke and White, 2001; DECC, 2007). It should be noted that such movements most often occurred during or immediately after significant rain events.

2.3.3 Breeding

The Green and Golden Bell Frog usually breeds in summer when conditions are warm and wet, typically after rain (Cogger, 2000; Barker, *et al*., 1995). The core breeding period for this species is generally accepted to be between September and February (DECC, 2007), provided sufficient rainfall occurs during this time.

Males call while floating in water and females produce a floating raft of eggs, which gradually settle to the bottom (NPWS, 1999).

Tadpoles take around six weeks to develop depending on environmental conditions (for example, temperature) (Pyke and White, 1996; NPWS, 1999).

Adult male Green and Golden Bell Frogs may only live for around two years in a hostile environment but, typically, life expectancy is likely to vary markedly according to the quality of the habitat (Goldingay and Newell, 2005).

2.3.4 Threats

Frog Chytrid Fungus (FCF) has been identified as a key threatening process, at both the state and national level, for the Green and Golden Bell Frog (DSEWPC, 2009). FCF is widespread on Kooragang Island and Hexham Swamp, the other key Green and Golden Bell Frog population in the Newcastle area (DECC, 2007).

Recent evidence suggests that occasional exposure to saline influences and/or certain contaminants may be attenuating the effects of the FCF (DECC, 2007). Such saline and polluted conditions occur on the KIWEF site. Hypotheses supporting this scenario are presently being tested by M. Stockwell and M. Mahoney from the University of Newcastle (NCIG, 2007).

3.0 MANAGEMENT PROCEDURES

3.1 Identification and Delineation of Disturbance Areas

Known and potential Green and Golden Bell Frog habitat is located across the KIWEF site and surrounds. GHD (2010a) identified and mapped that habitat (as identified in Figure 5.5 of their report), which is presented in Figure 1 of this GGBF Management Plan. Prior to capping works commencing, this habitat will be clearly identified on the ground (with appropriate signage), and the locations of it communicated to personnel undertaking works on the site. This communication will be undertaken as part of the site induction (refer to section 3.3), and will include obligations of personnel to maintain and protect that habitat.

Ponds P and Q (that is, cells K26 and K32) will be subject to a separate Action Plan (Golder, 2011) due to their significance as habitat and the presence of contaminated soil and groundwater.

3.2 Identification of Areas of Disturbance to Habitat

As part of the capping strategy, a small proportion of the known and potential Green and Golden Bell Frog habitat may be disturbed. This habitat area comprises the fringing habitat adjacent to Deep Pond, that is the area located near K3/1W and the BOS area (Figure 1).

The frogs will be relocated within the KIWEF during the capping works.

3.3 Environment Induction and Training

All HDC personnel, contractors and sub-contractors will undergo environmental induction and training before commencing work on-site. As it pertains to the Green and Golden Bell Frog, information addressed during this training will include (NCIG, 2007):

- Green and Golden Bell Frog profile and identification (Section 2).
- Identification of Green and Golden Bell Frog habitat areas. Project personnel will be prohibited from entering Green and Golden Bell Frog habitat areas located outside defined works areas.
- Site hygiene management in accordance with the Hygiene Protocol (Section 3.4).
- Procedures to be followed in the event Green and Golden Bell Frogs are found (Section 3.6).

3.4 Site Hygiene Management

The proposed hygiene management protocol described below largely follows that prepared by NCIG (2007), which has been accepted by OEH.

FCF (refer to section 2.3.4) has the potential to adversely affect Green and Golden Bell Frogs. It is known to occur on Kooragang Island, and potentially on the KIWEF site. Infection occurs through waterborne zoospores released from an infected amphibian in water (NPWS, 2001) and the fungus infects both frogs and tadpoles (Berger *et al.*, 1999). Therefore, the spread of FCF can occur via the movement of water around the site and/or soil attached to equipment (both plant and personal protective equipment).

Typical clinical signs of frogs infected with FCF (after Berger *et al.*, 1999) include:

- lethargy
- loss of appetite
- skin discoloration
- presence of excessive sloughed skin
- sitting unprotected during the day with hind legs held loosely to the body.

3.4.1 Hygiene Training

To reduce the likelihood of spreading FCF, all HDC employees and contractors involved in activities in areas of known habitat for the Green and Golden Bell Frog (and other amphibian species) will be trained in site hygiene management in accordance with the hygiene protocol (Appendix A). This will be part of the environmental induction and training (Section 3.3).

3.4.2 Inspection and Disinfection of Mobile Plant

Any mobile plant entering and leaving the KIWEF site during the closure and capping activities will be routinely disinfected at a designated wash bay.

Similarly, personal protective equipment (PPE) of HDC employees and contractors entering and leaving the site will be disinfected as a matter of routine, following the methods outlined in the Hygiene Protocol (Appendix A).

Inspection and disinfection of mobile plant, and affected PPE, will be undertaken at a designated, concrete-bunded disinfection area at the entrance of the KIWEF site. The location of this area, and the disinfection procedure, will be incorporated into the site induction and training programme (refer to Section 3.3).

3.5 Pre-works Surveys for Disturbance Areas

Pre-works surveys will include targeted active searches of potential Green and Golden Bell Frog habitat located within proposed disturbance areas. These surveys will be undertaken by a suitably qualified and licensed ecologist.

The pre-works surveys (and, if applicable, relocation activities) will be conducted to minimise disruption to breeding activities and the need to relocate tadpoles or metamorphs, where practicable. All these activities will be conducted in accordance with the relevant measures outlined in the hygiene protocol (Section 3.4).

Habitat resources typically associated with the lifecycle components of the Green and Golden Bell Frog (for example, ponded areas, rocks, logs, tussock forming vegetation and other cover) will be searched during a diurnal visual inspection.

Following the diurnal habitat searches, a nocturnal habitat search may be conducted to assess nocturnal usage (that is, breeding/calling) in the habitat supported in the disturbance area, if the surveys are conducted during the core breeding season. The nocturnal habitat searches may include:

- searching of habitat features, which were searched during the day
- spotlighting
- call play-back.

In the event that any Green and Golden Bell Frogs are observed during the diurnal or nocturnal searches, the relocation procedures outlined in Section 3.6 will be initiated prior to the commencement of disturbance works. In some cases a frog-proof fence may be used to protect the frogs in-situ or to exclude frogs from the surveyed area.

The results of the pre-works surveys will be recorded and reported in the Annual Environmental Management Report (AEMR) (Section 6).

3.6 Green and Golden Bell Frog Relocation Procedures

The proposed relocation procedure described below largely follows that proposed by NCIG (2007), which has been accepted by OEH.

3.6.1 Relocation Procedure during Pre-works Surveys

In the event a Green and Golden Bell Frog is identified within the disturbance areas during pre-works surveys, the following relocation procedure will be initiated:

a) The ecologist undertaking the pre-clearance survey will capture the frog.

b) If the frog appears to be healthy:

    a. A suitable release location in the immediate vicinity of the disturbance area, yet outside of potential areas of disturbance, will be identified by the ecologist.

    b. The frog will be released into the relocation area. Any frog to be relocated will be held in a cool, dark, moist place until nightfall. Where practicable, relocation will be timed to coincide with periods of recent rainfall to optimise chances of survival of the frog.

c) If the frog appears to be sick, or is dead:

    a. the procedures outlined in Section 3.6.3 will be followed.

Relocation of Green and Golden Bell Frogs during pre-works surveys will be conducted in accordance with the relevant measures outlined in the hygiene protocol (Section 3.4).

Details of Green and Golden Bell Frogs that are relocated (that is, lifecycle stage and sex of individual [if possible], location where found and location of release) conducted during pre-works surveys will be recorded and reported in the AEMR (Section 6).

3.6.2 Relocation Procedure Outside of Pre-works Surveys

In the event a frog is observed within the KIWEF site outside of the designated pre-works surveys (for example, within an area already disturbed), and is thought to be a Green and Golden Bell Frog, the following relocation procedure will be initiated if the frog is likely to be harmed by the capping works:

a) The observer will notify the HDC's Environmental Representative, or suitably-qualified ecologist, of the frog's location.

b) The Environmental Representative, or suitably-qualified ecologist, will determine whether the frog is likely to be harmed by works.

c) If the frog is likely to be harmed by works, a suitably-qualified ecologist, will capture the frog.

d) If the frog appears to be healthy:

    a. A suitable release location (that is, one of the potential relocation areas identified on Figure 1) will be identified by the ecologist.

    b. The frog will be released into the relocation area. Any frog to be relocated will be held in a cool, dark, moist place until nightfall. Where practicable, relocation will be timed to coincide with periods of recent rainfall to optimise chances of survival of the frog.

e) If the frog appears to be sick, or is dead:

    a. the procedures outlined in Section 3.6.3 will be followed.

Relocation of Green and Golden Bell Frogs outside pre-works surveys will be conducted in accordance with the relevant measures outlined in the hygiene protocol (Section 3.4).

Details of Green and Golden Bell Frogs that are relocated (that is, lifecycle stage and sex of individual [if possible], location where found and location of release) during pre-work surveys will be recorded and reported in the AEMR (Section 6).

3.6.3 Procedures for Handling Sick or Dead Green and Golden Bell Frogs

Table 1 presents the range of symptoms that may be exhibited by sick or dying frogs, while Table 2 provides diagnostic behaviour tests, which can be used to determine if a frog is sick (for example, infected with FCF) (after NCIG, 2007).

Table 1: Symptoms of sick and dying frogs

Appearance	Behaviour
■ Darker or blotchy upper (dorsal) surface ■ Swollen hind limbs ■ Very thin or emaciated ■ Reddish/pink-tinged lower (ventral) surface and/or legs and/or webbing or toes ■ Skin lesions (sores, lumps) ■ Infected eyes ■ Obvious asymmetric appearance	■ Lethargic limb movements, especially hind limbs ■ Abnormal behaviour (e.g. a nocturnal burrowing frog sitting in the open during the day and making no vigorous attempt to escape when approached) ■ Little or no movement when touched

Source: after NPWS (2001)

Table 2: Diagnostic behaviour tests – sick frogs will fail one or more of the following tests

Test	Healthy	Sick
■ Gently touch with finger	■ Frog will blink.	■ Frog will not blink.
■ Turn frog on its back	■ Frog will flip back over.	■ Frog will remain on its back.
■ Hold frog gently by its mouth	■ Frog will use its forelimbs to try to remove grip	■ No response from frog

Source: after NPWS (2001)

In the event that a Green and Golden Bell Frog appears to be sick, or is dead, the following procedures will be followed (after NPWS, 2001):

- Disposable gloves will be worn when handling all frogs, as well as sick or dead frogs.
- To prevent cross-contamination, new gloves and a clean plastic bag will be used for each frog specimen.
- Frogs exhibiting one or more of the symptoms for sick frogs listed in Table 1 or 2, and considered unlikely to survive transportation will be euthanised[1].
- Sick frogs likely to survive transportation will be placed into either a moistened cloth bag with some damp leaf litter, or into a partially-inflated, clean plastic bag with damp leaf litter. All frogs will be kept separate during transportation.
- Dead frogs will be kept cool and preserved as soon as possible. The belly of the frog will be cut open and the specimen placed in preservative (approximately 10 times the volume of the specimen). Specimens will be preserved in either 65% ethanol or 10% buffered formalin.
- The recipient of the sick or dead frog will be contacted to confirm the appropriate procedure prior to transport[2].

[1] Terminally ill frogs will be placed into a container with the bottom covered with 3% chloral hydrate (NPWS, 2001).

- Containers will be labelled with the following details: date, location and species (if known).
- Standardised collection form will be filled out and a copy sent with the specimen (in Appendix A).
- Individual containers will be used for each specimen.

Details of sick or dead Green and Golden Bell Frogs found at the KIWEF site will be recorded and reported in the AEMR (Section 6).

[2] A list of potential sick and dead frog recipients is provided in Attachment 4 (NPWS, 2001), including Associate Professor Michael Mahony of the School of Biological Sciences, University of Newcastle.

4.0 GREEN AND GOLDEN BELL FROG MONITORING PROGRAMME

Baseline monitoring of the Green and Golden Bell Frog has been undertaken by GHD (2010 and Umwelt (2011).

NCIG has also implemented a monitoring programme that collects data that includes the Green and Golden Bell Frog populations on the KIWEF site.

The NCIG monitoring will be conducted annually until 2020 and then three-yearly till 2030. On the basis that the NCIG monitoring programme continues to be implemented, HDC do not propose to undertake any further monitoring, other than that specified in the Action Plan for the K26/K32 Ponds (Golder, 2011).

HDC propose to annually review the NCIG data to ensure that it meets HDC's requirements. The overall objective of HDC's review of the Green and Golden Bell Frog monitoring programme is to monitor the dynamics of the Green and Golden Bell Frog populations supported within known and potential habitat areas within the KIWEF site. The intention of the review programme will be to ascertain if the landfill closure works have an effect on the population.

Monitoring parameters that will be used for comparison will include, yet not be limited to:

a) Green and Golden Bell Frog presence/absence, distribution, habitat utilisation, behaviour and abnormalities.

b) observations of other frog species distribution, relative abundance and abnormalities.

c) habitat condition.

d) date

e) time of day

f) rainfall (mm)

g) site location (GPS co-ordinates and map location)

h) survey method utilised

i) sampling effort

j) habitats surveyed

k) weather conditions (including temperature)

l) number of observers

m) photographs taken

HDC will report to OEH annually for 5 years following the completion of the landfill closure works, unless analysis shows that Green and Golden Bell Frog populations are being impacted, then further reporting will be undertaken until a date agreed with OEH.

Monitoring and research to understand better the extent and dynamics of Green and Golden Bell Frog populations is a proposed action of the Draft Recovery Plan (DECC, 2005). This action has been adopted as a strategy to achieve the objectives of the Lower Hunter Management Plan. The results of this monitoring programme would contribute to this action/strategy.

The results of the monitoring programme will be recorded and reported in the AEMR (Section 6).

5.0 RESPONSE CRITERIA AND SPECIFIC MITIGATION AND MANAGEMENT MEASURES

The following proposed mitigation measures have been developed based on a review of information provided by GHD (2010a) and a review of site conditions.

5.1 Management of All Disturbance Areas

The following mitigation measures will be implemented to manage areas proposed for disturbance.

- The boundaries of all Green and Golden Bell Frog habitat will be clearly identified on the ground.
- Appropriate erosion and sediment control structures will be installed at least 30 metres upslope of all such habitat areas. These erosion and sediment control structures will be regularly inspected and maintained, particularly after significant rainfall events.
- All plant entering and leaving the KIWEF site will be, as a matter of routine, disinfected via a wash bay. The location and procedures involved at this wash bay will form part of the site induction and training (see Section 3.3). Records will be kept.
- Similarly, all HDC employees and contractors involved in activities in areas of known habitat for the Green and Golden Bell Frog (and other amphibian species) will be trained in site hygiene management in accordance with the hygiene protocol (Appendix A). This will be part of the environmental induction and training (Section 3.3). Records will be kept.
- All PPE in contact with soil, particularly boots, of HDC employees and contractors entering and leaving the site will be disinfected as a matter of routine, following the methods outlined in the Hygiene Protocol (Appendix A).
- All disinfection processes will be monitored and controlled at the KIWEF site's entry and exit point. The location of these disinfection bays, and the obligations of disinfection, will be communicated during the site induction and training (Section 3.3).
- All water required for dust suppression will be drawn from ponds established for the purpose. No water for dust suppression will be drawn from current ponds on the site. The establishment of dedicated dust suppression ponds will be undertaken to prevent the potential spread of Plague Minnow into ponds currently free of this species. The location and procedure for those dedicated dust suppression ponds will be communicated during the site induction and training (Section 3.3).
- Stormwater diversion measures, if required, will be put in place to maintain the current hydrological regime for the site.
- If practicable, the capping and grading activities will be scheduled to occur outside of the core Green and Golden Bell Frog breeding period (that is, September to March), especially in areas adjacent to known and potential breeding habitat.

5.2 Specific Management Measures for Disturbed Areas

The following mitigation measures will be implemented to manage areas proposed for disturbance. It should be noted that these measures do not negate the need for the measures outlined in Section 5.1.

- The disturbance area will be clearly delineated on the site plan and on the ground. The boundaries of the area and its location will be made known to all personnel involved during the site induction (refer to Section 3.3).
- One week prior to works commencing in the disturbance area, a pre-works survey will be conducted by a qualified ecologist (refer to Section 3.5 for a suggested survey protocol).

- In the event that any Green and Golden Bell Frogs are identified in the area, they will be relocated (using appropriate amphibian hygiene protocols) to known and suitable Green and Golden Bell Frog habitat areas immediately adjacent to the disturbance footprint (refer to Section 3.6 for appropriate relocation procedures).
- The works will be scheduled to occur outside of the core breeding period for Green and Golden Bell Frogs, that is, September to March.
- An on-site, suitably-qualified ecologist will be available during all clearing and capping works undertaken in the habitat areas to be disturbed. This person will be available to relocate Green and Golden Bell Frogs that may be found in the disturbance footprint during capping activities.
- In an attempt to limit the potential for Green and Golden Bell Frogs to enter the disturbance footprint, and if practicable, a frog-proof barrier will be erected around the disturbance footprint.
- Appropriate erosion and sediment control measures will be put in place around the disturbance area, prior to any works commencing, to prevent sediment from moving into adjacent habitat.
- Once works are complete, the restoration and rehabilitation of that habitat will be undertaken in accordance with a rehabilitation and revegetation plan.

5.3 Measures to Enhance Restore and Maintain Habitat

It is noted that the proposed capping works have been designed to minimise impacts on Green and Golden Bell Frog Habitat and will impact upon only two small areas.

It is anticipated that the mitigation measures presented in Sections 5.1 and 5.2 will assist in the management of the Green and Golden Bell Frogs, and their habitat on the KIWEF site, during and immediately following the landfill closure work, and the associated activities. In addition to those, the following mitigation measures have been developed to assist, where practicable, in the enhancement, restoration and maintenance of Green and Golden Bell Frog habitat following the completion of the landfill closure works.

- The capping strategy has been designed to limit and ultimately reduce the exposure of potential Green and Golden Bell Frog habitat, and the wider ecosystems of Kooragang Island, to soil and groundwater contaminants.
- As part of the rehabilitation and revegetation plan for the KIWEF site, open stormwater infrastructure across the KIWEF site may be planted with species known to be favoured by Green and Golden Bell Frogs. This revegetation and rehabilitation strategy will include a 2 metre wide buffer on either side of the stormwater drains. The intention of these areas is to provide movement corridors for Green and Golden Bell Frogs across the site.
- The capped areas will ideally be designed to shed water to table drains, which, in a similar manner to other stormwater infrastructure, will be vegetated with species known to be favourable to Green and Golden Bell Frogs.
- Drainage culverts will, where practicable, be vegetated and lined with rocks and objects that may provide temporary frog refuge, in the event that a frog seeks to traverse the future capped area of KIWEF.
- The drainage culverts in the NCIG rail loop may provide additional areas that can be rehabilitated to facilitate the migration and dispersal of the Green and Golden Bell Frog (Connell Hatch, 2008, in GHD, 2010b).

5.4 Response Criteria

5.4.1 General Site Environmental Management

As part of the overall environmental management plan for the site, during the landfill closure works, the HDC's environmental representative will conduct weekly inspections of all the management measures identified in Sections 5.1, 5.2 and 5.3. The results of these inspections will be recorded and a summary provided in the AEMR.

Should non-conformances be identified, HDC's environmental representative will contact the Site Foreman within 24 hours and request a remediation action. The Site Foreman will have 48 hours to correct the non-conformance.

5.4.2 Population Monitoring

If the results of the monitoring programme indicate a decline in Green and Golden Bell Frog numbers across the site, which cannot be attributed to natural population fluctuations and variability, and is potentially a direct result of the landfill closure works, specific response criteria will be developed by HDC, in consultation with the OEH. The aim of these response criteria will be to determine whether declining populations (if evident from the monitoring programme [Section 4]) are directly attributable to the capping project.

6.0 REPORTING AND REVIEW

In accordance with the *Approval of Surrender of Licence Number 6437*, the Director-General will be notified of any incident with actual or potential significant off-site impacts on people or the biophysical environment, as soon as practicable after the occurrence of the incident. The Director-General will be provided with written details of the incident within seven days of the date on which the incident occurred.

HDC will prepare an Annual Environmental Management Report (AEMR) that:

a) Reviews the performance of the capping project against this management plan.

b) Provides an overview of environmental management actions and summarises monitoring results over the 12 month reporting period.

c) Continues on an annual basis for a minimum of five years following completion of the Landfill Closure Works.

d) Will be phased out on presentation of adequate information to establish that the Landfill Closure Works have had no measurable impacts to Green and Golden Bell Frog populations on the KIWEF site. In the unlikely event that changes in the Green and Golden Bell Frog population are observed, which appear to be attributable to the Landfill Closure Works, extended review will be undertaken. This may involve a more detailed monitoring and investigation programme to address the potential cause of the decline in those areas. The programme will aim to identify direct evidence indicating that the Landfill Closure Works contributed to the decline. The details of that programme will be developed through discussion with OEH.

The AEMR will be distributed to relevant government agencies and stakeholders, and copies provided to other interested parties, if requested.

In accordance with the *Approval of Surrender of Licence Number 6437*, this management plan will be made available on the HDC website.

7.0 REFERENCES

Abbasi, SA. and Soni, R (1984). Teratogenic effects of chromium (vi) in environment as evidenced by the impact on larvae of amphibian *Rana Tigrina*: implications in the environmental management of chromium. *International Journal of Environmental Studies* 23(2): 131-137.

Anonymous (1999). Effects of sublethal lead exposure on the behaviours of Green Frog (*Rana clamitans*), Bullfrog (*Rana catesbiana*) and American Toad (*Bufo americanus*) tadpoles. *Marine and Freshwater Behaviour and Physiology* 32(1): 1-16.

Anstis, M (2002). *Tadpoles of South-eastern Australia*, New Holland, Sydney.

Arrieta, MA, Bruzzone, L, Apartin, C, Rosenberg, CE, Fink, NE and Saliban, A (2004). Biosensors of inorganic lead exposure and effect in an adult amphibian. *Archives of Environmental Contamination and Toxicology* 46(2): 224-230.

Barker, J, Grigg, GC and Tyler, MJ (1995) *A field guide to Australian Frogs*. Surrey Beatty and Sons, Chipping Norton.

Berger, L, Speare, R and Hyatt, A (1999) Chytrid fungi and amphibian declines: overview, implications and future directions. In *'Declines and Disappearances of Australian Frogs'*. (Ed. A. Campbell.) pp. 23-33. Environment Australia, Canberra.

Cogger, HG (2000) *Reptiles and Amphibians of Australia*. Reed New Holland. Australia.

Department of Environment and Conservation (2005) *Draft Recovery Plan for the Green and Golden Bell Frog (*Litoria aurea*).* Hurstville, NSW.

Department of Environment and Climate Change (2007) *Draft Management Plan for the Green and Golden Bell Frog Key Population in the Lower Hunter*. Sydney, NSW.

Department of Sustainability, Environment, Water, Populations and Communities (2009) *Significant impact guidelines for the vulnerable Green and Golden Bell Frog (*Litoria aurea*)*, Nationally threatened species and ecological communities; Background paper to the EPBC Act policy statement 3.19.

GHD (2010a). *Revised Capping Strategy, Flora and Fauna Impact Assessment*, Revision 3

GHD (2010b). *Revised Final Landform and Capping Strategy*, Revision 4

Goldingay, R.L. and Newell, D.A. (2005) Aspects of the Population Ecology of the Green and Golden Bell Frog Litoria aurea at the Northern End of its Range. Australian Zoologist 33: 49-59.

Marquis, O, Millery, A, Guittonneau, S and Miaud, C (2006). Toxicity of PAHs and jelly protection of eggs in the Common frog Rana temporaria. *Amphibia-Reptilia*: 27(3): 472-475.

Newcastle Coal Infrastructure Group (2007) *Coal Export Terminal Green and Golden Bell Frog Management Plan,* (Document No. GGBFMP-R01-E.DOC)

National Parks and Wildlife Service (1999) *Threatened Species Information, Green and Golden Bell Frog* Litoria aurea (Lesson, 1829).

National Parks and Wildlife Service (2001) *Threatened Species Management Information Circular No. 6 - Hygiene Protocol for the Control of Disease in Frogs*.

Pyke, GH and White, AW (1996) Habitat Requirements for the Green and Golden Bell Frog *Litoria aurea* (Anura: Hylidae). *Australian Zoologist* 30: 224-232.

Robinson, M. (1998) *A Field Guide to Frogs of Australia*. Reed New Holland, Australia.

Tyler, MJ and Knight, F (2009) *Field Guide to the Frogs of Australia*, CSIRO Publishing, Australia.

Wellington, R (1998) *An outline of the currently known state-wide conservation situation of the Green and Golden Bell Frog* Litoria aurea: *Discussion and Overview*. Unpublished Report to the GGBF Recovery Team.

Umwelt (Australia) Pty Limited (2011) *March 2011 Green and Golden Bell Frog (*Litoria aurea*) Survey at the Kooragang Island Waste Emplacement Facility*, prepared for HDC.

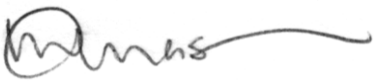
Rice, TM, Oris, JT and Taylor, DH (2002). Effects of growth and changes in organ distribution of Bullfrog larvae exposed to lead throughout metamorphosis. *Bulletin of Environmental Contamination and Toxicology*, 68: 8-17.

Stabenau, E, *et al.* (2006). Uptake and Elimination of Naphthalene from Liver, Lung, and Muscle Tissue in the Leopard frog (*Rana pipiens*). *Journal of Environmental Science and Health, Part A: Toxic/Hazardous Substances & Environmental Engineering* 41(8): 1449-1461.

Wang, MZ. and Jia XY (2008) Low levels of lead exposure induce oxidative damage and DNA damage in the testes of the frog *Rana nigromaculata*. *Ecotoxicology*: 1-6.

Report Signature Page

GOLDER ASSOCIATES PTY LTD



Mervyn Mason
Senior Ecologist

MCM/TC/mcm

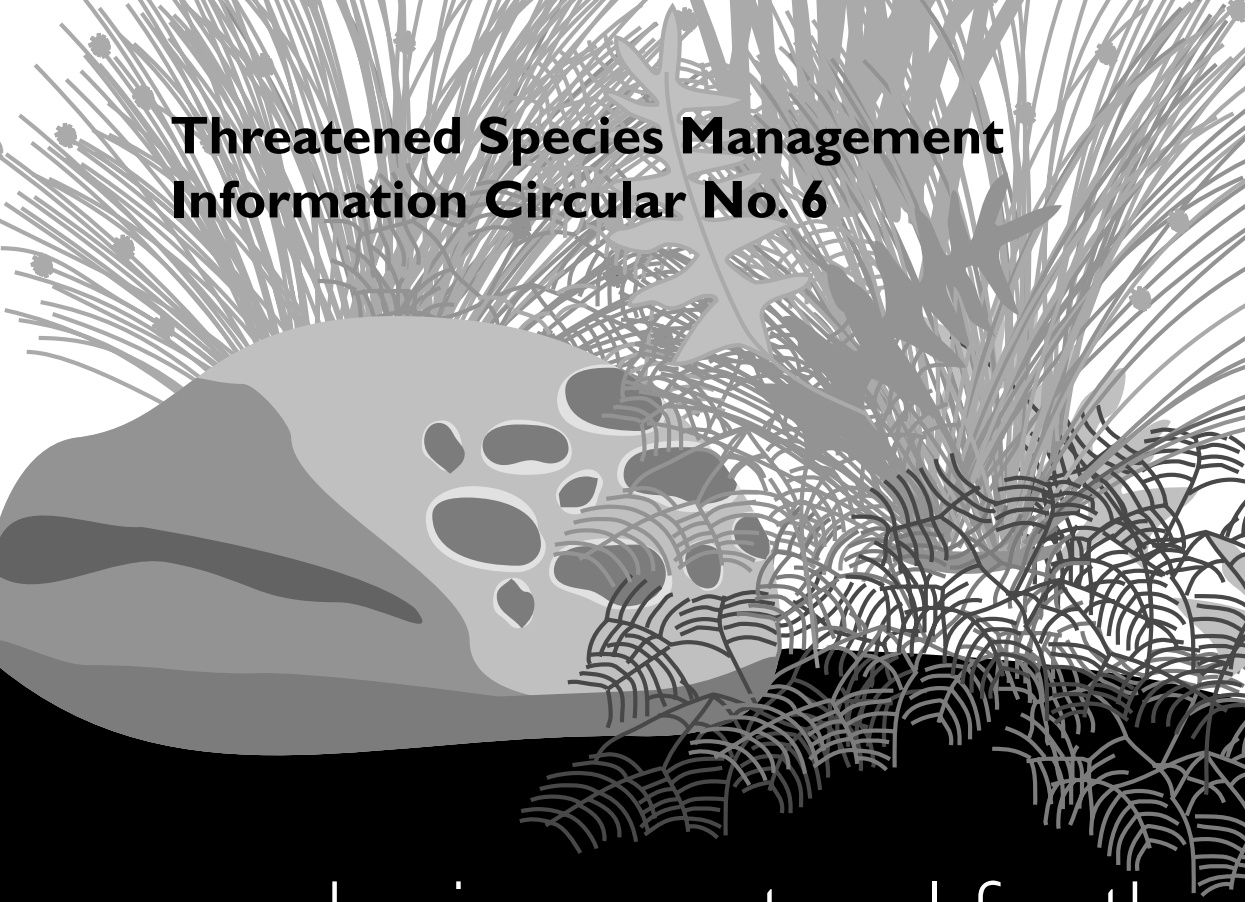
A.B.N. 64 006 107 857

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

j:\env\2011\117623029_hdc_frog management plan\reports\117623029-001-r-rev0.docx

APPENDIX A

Hygiene Protocol for the Control of Disease in Frogs



Threatened Species Management Information Circular No. 6

hygiene protocol for the control of disease in frogs

April 2008

Department of **Environment & Climate Change** NSW

© Department of Environment and Climate Change (NSW), 2008.

* The National Parks and Wildlife Service is part of the Department of Environment and Climate Change

This work is copyright. However, material presented in this protocol may be copied for personal use or utilised for management and educational purposes, providing that any extracts are fully acknowledged. Apart from this and any other use as permitted under the Copyright Act 1968, no part may be reproduced without prior written permission from DECC.

Department of Environment and Climate Change (NSW)
59-61 Goulburn Street
(PO Box A290)
Sydney South 1232

Phone: (02) 9995 5000 (switchboard)
Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks information and publications requests)
Fax: (02) 9995 5999
TTY: (02) 9211 47 23
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

This document can be sourced from the DECC website:
www.environment.nsw.gov.au/resources/nature/hypfrog.pdf

This document should be cited as:
Department of Environment and Climate Change (NSW) 2008.
Hygiene protocol for the control of disease in frogs.
Information Circular Number 6. DECC (NSW), Sydney South.

ISBN 0 7313 6372 8
DECC 2008/199

Acknowledgments

NSW National Parks and Wildlife Service Declining Frog Working Group who recommended the preparation and provided input into the development of this strategy.

Ross Wellington and Ron Haering (both DECC) the authors of this document.

Thanks to Jack Baker, Lee Berger, Mark Endersby, Jeff Hardy, Frances Hulst, Alex Hyatt, Keith McDougall, Diana Mendez, Deborah Pergolotti, Graham Pyke, Marjo Rauhala, Julie Ravallion, Karrie Rose, Lothar Voigt and Arthur White for their advice and/or technical review.

This hygiene protocol is an adaptation of the Declining Amphibian Population Task Force (DAPTF) Fieldwork Code of Practice and the recommendations of Speare et al. (1999) and has drawn on recommendations from earlier guidelines prepared by Environment ACT.

Foundation for National Parks and Wildlife funded the printing of this protocol.

hygiene protocol for the control of disease in frogs

1 introduction

This information circular outlines measures to:

- Prevent or reduce disease causing pathogens being transferred within and between wild populations of frogs.
- Ensure captive frogs are not infected prior to release.
- Deal safely with unintentionally transported frogs.
- Assist with the proper identification and management of sick and dead frogs in the wild.

1.1 Who should read this document?

This protocol is intended for use by all researchers, wildlife consultants, fauna surveyors and students undertaking frog field-work. In addition, the protocol should be read by Department of Environment and Climate Change (DECC) personnel, frog keepers, wildlife rescue and carer organisations, herpetological/frog interest groups/ societies, fauna park/zoo operators/workers and other individuals who regularly deal with or are likely to encounter frogs.

This protocol outlines the expectations of the DECC regarding precautionary procedures to be employed when working with frog populations. The intention is to promote implementation of hygiene procedures by all individuals working with frogs. New licences and licence renewals will be conditional upon incorporation of the protocol. The DECC recognises that some variation from the protocol may be appropriate for particular research and frog handling activities. Such variation proposals should accompany any licence application or renewal to the DECC.

1.2 Background

1.2.1 Amphibian Chytrid Fungus

The apparent decline of frogs, including extinctions of species and local populations, has attracted increased international and national concern. Many potential causes for frog declines have been proposed (eg see Pechmann et al., 1991; Ferrero and Bergin, 1993; Pechmann and Wilbur, 1994; Pounds and Crump, 1994; Pounds et al., 1997). However, the patterns of decline at many locations suggest that epidemic disease maybe the cause (Richards et al., 1993; Laurance et al., 1996; Alford and Richards, 1997). Recent research has implicated a water-borne fungal pathogen *Batrachochytrium dendrobatidis* as the likely specific causative agent in many of these declines both in Australia and elsewhere (Berger et al., 1998; 1999). This agent is commonly known as the amphibian or frog chytrid fungus and is responsible for the disease Chytridiomycosis (Berger et al., 1999).

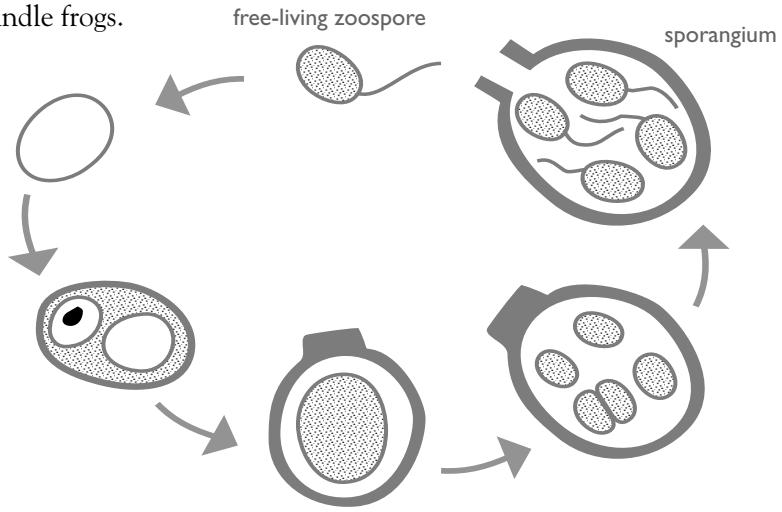
B. dendrobatidis is a form of fungus belonging to the phylum Chytridiomycota. Most species within this phylum occur as free-living saprophytic fungi in water and soil and have been found in almost every type of environment including deserts, artic tundra and rainforest and are considered important primary biodegraders (Powell 1993). *B. dendrobatidis* is a unique parasitic form of Chytridiomycete fungi, in that it invades the skin of amphibians, including tadpoles, often causing sporadic deaths with up to 100% mortality in some populations. Chytridiomycosis has been detected in over 40 species of native amphibian in Australia (Mahony and Workman 2000). However, it is not currently known whether the fungus is endemic or exotic to Australia.

The infective stage of *B. dendrobatidis* is the zoospore and transmission requires water (Berger et al.,1999). Zoospores released from an infected amphibian can potentially infect other amphibians in the same water. More research is needed on the dynamics of infection in the wild. *B. dendrobatidis* is known to be susceptible to seasonal temperature changes, dehydration, salinity, water pH, light, nutrition and dissolved oxygen (Berger et al., 1999).

1.3 Objectives

The objectives of the hygiene protocol are to:

- Recommend best-practice procedures for DECC personnel, researchers, consultants and other frog enthusiasts or individuals who handle frogs.
- Suggest workable strategies for those regularly working in the field with frogs or conducting fieldwork activities in wetlands and other aquatic environments where there is the potential for spreading pathogens such as the frog chytrid fungus.
- Provide background information and guidance to people who provide advice or supervise frog related activities.
- Provide standard licence conditions for workers engaged in frog related activities.
- Inform Animal Care and Ethics Committees (ACEC) for their consideration when granting research approvals.



Life cycle of frog chytrid fungus from infective free-living zoospore stage to sporangium (adapted from L. Berger).

2 site hygiene management

A checklist of risk management procedures and recommended standard hygiene kit is provided in Appendix 1. Please note Footnote 1 on page 4.

Individuals studying frogs often travel and collect samples of frogs from multiple sites. Some frog populations can be particularly sensitive to the introduction of infectious pathogens such as the frog chytrid fungus. Also, the arrangement of populations in the landscape may make frogs particularly vulnerable to transmission of infectious pathogens. Therefore, it is important that frog workers recognise the boundaries between sites and undertake measures which reduce the likelihood of spreading infection.

Where critically endangered species or populations of particular risk are known to occur, this protocol should be applied over very short distances ie a single site may need to be subdivided and treated as separate sites.

When planning to survey multiple sites, always start at a site where frog chytrid fungus is not known to be present before entering other infected areas.

2.1 Defining a site

Defining the boundary of a site maybe problematic. In some places, the boundary between sites will be obvious but in others, less so. Undertaking work at a number of sites or conducting routine monitoring at a series of sites within walking distance creates obvious difficulties with boundary definitions. It is likely that defining the boundary between sites will differ among localities. It may be that a natural or constructed feature forms a logical indicator of a site boundary eg a road/track, a large body of water such as a river or the sea, a marked habitat change or a catchment boundary.

As a guiding principle, each individual waterbody should be considered a separate site.

When working along a river or stream or around a wetland or a series of interconnecting ponds it is reasonable, in most instances, to treat such examples as a single site for the purposes of this protocol. Such a case would occur in areas where frogs are known to have free interchange between ponds.

Where a stream consists of a series of distinctive tributaries or sub-catchments or where there is an obvious break or division then they should be treated as separate sites, particularly if there is no known interchange of frogs between sites.

2.2 On-site hygiene

When travelling from site to site it is recommended that the following hygiene precautions be undertaken to minimise the transfer of disease from footwear, equipment and/or vehicles.

Footwear

Footwear must be thoroughly cleaned and disinfected at the commencement of fieldwork and between each sampling site.

This can be achieved by initially scraping boots clear of mud and standing the soles in a disinfecting solution. The remainder of the boot should be rinsed or sprayed with a disinfecting solution that contains *benzalkonium chloride* as the active ingredient. Disinfecting solutions should be prevented from entering any water bodies.

Rubber boots such as 'gum boots' or 'Wellingtons' are recommended because of the ease with which they can be cleaned and disinfected.

Several changes of footwear bagged between sites might be a practical alternative to cleaning.

Equipment

Equipment such as nets, balances, callipers, bags, scalpels, headlamps, torches, wetsuits and waders etc that are used at one site must be cleaned and disinfected before re-use at another site.

Disposable items should be used where possible. Non-disposable equipment should be used only once during a particular field exercise and disinfected later or disinfected at the site between uses using procedures outlined in 2.4 below.

Vehicles

Where necessary, vehicle tyres should be sprayed/flushed with a disinfecting solution in high-risk areas.

Transmission of disease from vehicles is unlikely to be a problem. However, if a vehicle is used to traverse a known frog site, which could result in mud and water being transferred to other bodies of water or frog sites, then wheels and tyres should undergo cleaning and disinfection. This should be carried out at a safe distance from water bodies, so that the disinfecting solution can infiltrate soil rather than run-off into a nearby water body.

Spraying with 'toilet duck' (active ingredient *benzalkonium chloride*) is recommended to disinfect car wheels and tyres.

Cleaning of footwear before getting back into the car will prevent the transfer of pathogens from/to vehicle floor and control pedals.

2.3 Handling of frogs in the field

The spread of pathogenic organisms, such as the frog chytrid fungus, may occur as a result of handling frogs.

Frogs should only be handled when necessary.

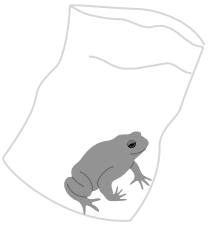
Where handling of frogs is necessary the risk of pathogen transfer should be minimised as follows:

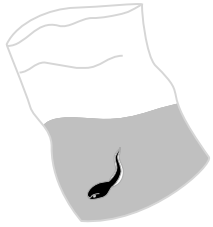
- Hands should be either cleaned and disinfected between samples or a new pair of disposable gloves used for each sample[1]. This may be achieved by commencing with a work area that has a dish containing a disinfecting solution and paper towels.
- A 'one bag – one frog' approach to frog handling should be used especially where several people are working together with one person processing frogs and others doing the collecting. Bags should not be reused.
- A 'one bag – one sample' approach to tadpole sampling should be used. Bags should not be reused.

Researchers who use toe clipping or Passive Integrated Transponder (PIT) tagging are likely to increase the risk of transmitting disease between frogs due to the possibility of directly introducing pathogens into the frogs' system. This can be minimised by using:

- Disposable sterile instruments
- Instruments disinfected previously and used once
- Instruments disinfected in between each frog

Disinfecting solutions containing *benzalkonium chloride* are readily available from local supermarkets. Some brands include Toilet Duck, Sanpic, New Clenz and Pine Clean.





[1] As a principle, this protocol assumes that not all frogs in an infected pond will be contaminated by the frog chytrid fungus. The infective load of a body of water may not be high enough to cause cross contamination of individual frogs in the same pond. Therefore care should be taken to use separate gloves and bags and clean hands for each sample, to avoid transmission of high infective loads between individuals.

Open wounds from toe clipping and PIT tagging should be sealed with a cyanoacrylate compound such as *Vetbond*© to reduce the likelihood of entry of pathogens. The DECC ACEC further recommends the application of topical anaesthetic *Xylocaine*© cream and *Betadine*© disinfectant (1% solution) before and after any surgical procedure. This should then be followed by the wound sealant.

All used disinfecting solutions, gloves and other disposable items should be stored in a sharps or other waste container and disposed or sterilised appropriately at the completion of fieldwork. Disinfecting solutions must not come into contact with frogs or be permitted to contaminate any water bodies

2.4 Disinfection Methods

Disinfecting agents for hands and equipment must be effective against bacteria and both the vegetative and spore stages of fungi. The following agents are recommended:

- Chloramine and Chlorhexidine based products such as *Halamid*©, *Halasept*© or *Hexifoam*© are effective against both bacteria and fungi. These products are suitable for use on hands, footwear, instruments and other equipment. The manufacturers instructions should be followed when preparing these solutions.
- Bleach and alcohol (ethanol or methanol), diluted to appropriate concentrations can be effective against bacteria and fungi. However, these substances may be less practical because of their corrosive and hazardous nature.

  When using methanol either:

  - immerse in 70% methanol for 30 minutes or
  - dip in 100% methanol then flame for 10 seconds or boil in water for 10 minutes

Fresh bleach (5% concentration) may be also effective against other frog pathogens such as Rana Virus.

Some equipment not easily disinfected in these ways can be effectively cleaned using medical standard 70% isopropyl alcohol wipes – *Isowipes*©.

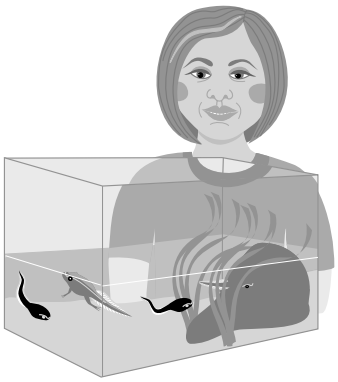
3 captive frog hygiene management

3.1 Housing frogs and tadpoles

Frogs and tadpoles should only be removed from a site when absolutely necessary.

When it is necessary for frogs or tadpoles to be collected and held for a period of time, the following measures should be undertaken:

- Animals obtained at different sites should be kept isolated from each other and from other captive animals.
- Aquaria set up to hold frogs should not share water, equipment or any filtration system. Splashes of water from adjacent enclosures or drops of water on nets may transfer pathogens between enclosures.
- Prior to housing frogs or tadpoles, ensure that tanks, aquaria and any associated equipment are disinfected.
- Tanks and equipment should be cleaned, disinfected and dried immediately after frogs/tadpoles are removed.



Careful maintenance of your enclosures will ensure a safe and hygienic environment for captive frogs and tadpoles.

When contemplating a release of captive bred tadpoles for conservation purposes a Translocation Proposal should be submitted to the DECC and pathological screening for disease should be undertaken (see also DECC Translocation Policy). Tadpoles can be tested by randomly removing 10 individuals at 6 weeks and again at 2 weeks before anticipated release. Testing could be undertaken by the pathology section at Taronga Zoo, Newcastle University, CSIRO Australian Animal Health Laboratories at Geelong and James Cook University at Townsville. Such an arrangement would need to be negotiated by contacting one of these institutions well before the anticipated release date. (see Appendix 2 for contact details)

DECC have licenced NSW Schools to allow students and/or teachers to remove tadpoles for classroom life cycle studies. They are authorised to remove individuals from only one location, each school also requires endorsement from Department of Education and Training Animal Care and Ethics Committee and comply with this protocol.

Tadpoles collected for these purposes are to be obtained from the local area of the school and are not to be obtained from DECC Reserves. As soon as tadpoles have transformed, froglets must be returned to the exact point of capture. Tadpoles from different locations are not to be mixed.

Antifungal cleansing treatments to clear tadpoles of the frog chytrid fungus are currently being trialed. In the future, such a treatment may be an added procedure required prior to froglet releases.

Detailed information on safely maintaining frogs in captivity is provided in Voigt (2001).

3.2 Tadpole treatment

In most instances:

Release to the wild of tadpoles held or bred in captivity should be avoided.

3.3 Frog treatment

The rigour with which frogs must be treated to ensure pathogens are not introduced to native populations means that any proposal for the removal of adult frogs (particularly threatened species) from wild populations should be given careful consideration.

When it is essential for frogs to be removed from the wild, the following should apply.

Individuals to be released should be quarantined for a period of 2 months and monitored for any signs of illness or disease.

Frogs must not be released if any evidence of illness or infection is detected. If illness is suspected, further advice must be sought from a designated frog recipient (Appendix 2) as soon as possible to determine the nature of the problem. Chytridiomycosis can be diagnosed in live frogs by microscopical examination of preserved toe clips or from shedding skin samples. Research is still in progress on the development of a simple technique for the detection of Chytridiomycosis and a treatment for infected frogs.

Current methods which may be used include:

- A technique for the treatment of potentially infected frogs is to place the frogs individually in a 1mg/L benzalkonium chloride solution for 1 hour on days 1, 3, 5, 9, 11 and 13 of the treatment period. Frogs are then isolated/quarantined for two months. This and other possible treatments are documented in Berger and Speare (1998)
- *Betadine*© and *Bactone*© treatments have also been used on adult frogs with some success (M. Mahony, Newcastle University pers. comm.)
- *Itraconazole*© is an expensive drug which has been used successfully (Lee Berger CSIRO Australian Animal Health Laboratory pers. comm.). Information on this method is available on the Website http://www.jcu.edu.au/school/PHTM/frogs/adms/attach6.pdf.

Frogs undergoing treatment should be housed individually and kept separate from non-infected individuals.

3.4 Displaced frogs

Displaced frogs are those native frog species and introduced Cane Toads (Bufo marinus) which have been unintentionally transported around the country with fresh produce, transported produce and landscaping supplies. Procedures to be undertaken when encountering introduced/displaced native frog species (as well as Cane Toads) are as follows.

3.4.1 Banana box frogs

'Banana Box' frog is the term used to describe several native frog species (usually Litoria gracilenta, L. infrafrenata, L. bicolor and L. caerulea) commonly transported in fruit and vegetable shipments and landscaping supplies. In the past, well meaning individuals have attempted to return these frogs to their place of origin but this is usually impossible to do accurately. There is risk of spread of disease if these frogs are transferred from place to place.

It is strongly recommended that:

Displaced Banana Box frogs should be treated as if they are infected and should not to be freighted anywhere for release to the wild unless specifically approved by DECC.

When encountering a displaced frog:

- Contact a licensed wildlife carer organisation to collect the animal. The frog should then undergo a quarantine period of 2 months along with an approved disinfection treatment.
- Post-quarantine, the frog (if one of the species identified above) may be transferred to a licensed frog keeper. All other species require the permission from DECC Wildlife Licensing and Management Unit (WLMU) prior to transfer. Licensed carer groups are to record and receipt frogs obtained and disposed of in this way.
- Licensed Frog Keepers are to list these frogs in their annual licence returns to DECC.

Frogs held by licensed frog keepers are not to be released to the wild except with specific DECC approval.

Displaced frogs may be made available to recognised institutions for research projects, display purposes or perhaps offered to the Australian Museum as scientific specimens once approval has been provided by the DECC WLMU.

Frogs are often unintentionally transported with fresh produce and landscaping supplies. They are collectively known as 'banana box' or displaced frogs.

3.4.2 Cane toads

Cane toads are known carriers of the Frog chytrid fungus and should not be knowingly transported or released to the wild.

If a cane toad is discovered outside of its normal range, it should be humanely euthanased in accordance with the recommended NSW Animal Welfare Advisory Council procedure (see Appendix 3). Care should be taken to avoid euthanasia of native species due to mistaken identity.

3.4.3 Local frog species

Frogs encountered on roads, around dwellings and gardens or in swimming pools should not be considered as displaced frogs.

Frogs encountered in these situations should be assisted off roads, away from dwellings, or out of swimming pools preferably to the nearest area of vegetation or suitable habitat.

Incidences of frogs spawning or tadpoles appearing in swimming pools should be referred to a wildlife carer/rescue organisation for assistance (see Appendix 4).

Contact the Frogwatch Helpline if you are unsure whether a frog is a local species or displaced.

An NPWS information brochure titled 'Cane Toads in NSW' provides further information on cane toads and assistance with identification of some of the commonly misidentified native species. This information is also available on the DECC website.

4 sick or dead frogs

Unless an obvious cause of illness or death is evident (eg predation or road mortality): Sick or dead frogs encountered in the wild should be collected and disposed of in accordance with the procedures described in section 4.2 below.

4.1 Symptoms of sick and dying frogs

Sick and dying frogs exhibit a range of symptoms characteristic of chytrid infection. Symptoms may be expressed in the external appearance or behaviour of the animal. A summary of these symptoms are described below. More detailed information can be found in Berger et al., (1999) or at the James Cook University Amphibian Disease website at: http://www/jcu.edu.au/school/phtm/PHTM/frogs/ampdis.htm.

Appearance (one or more symptoms)

- darker or blotchy upper (dorsal) surface
- reddish/pink-tinged lower (ventral) surface and/or legs and/or webbing or toes
- swollen hind limbs
- very thin or emaciated
- skin lesions (sores, lumps)
- infected eyes
- obvious asymmetric appearance

Behaviour (one or more symptoms)

- lethargic limb movements, especially hind limbs
- abnormal behaviour (eg a nocturnal, burrowing or arboreal frog sitting in the open during the day and making no vigorous attempt to escape when approached)
- little or no movement when touched

Great barred frog (*Mixophyes fasciolatus*) with severe Chytrid infection — note lethargic attitude and sloughing skin. Photo: L. Berger

Diagnostic behaviour tests

Sick frogs will fail one or more of the following tests:

test	healthy	sick
Gently touch with finger	Frog will blink	Frog will not blink above the eye
Turn frog on its back	Frog will flip back over	Frog will remain on its back
Hold frog gently by its mouth	Frog will use its forelimbs to try to remove grip	No response from frog

4.2 What to do with sick or dead frogs

A procedure for the preparation and transport of a sick or dead frog is given below[2]. Adherence to this procedure will ensure the animal is maintained in a suitable condition for pathological examination and assist the DECC and researchers to determine the extent of the disease and the number of species affected.

- Disposable gloves should be worn when handling sick or dead frogs. Avoid handling food and touching your mouth or eyes as this could transfer pathogens and toxic skin secretions from some frog species.
- New gloves and a clean plastic bag should be used for each frog specimen to prevent cross-contamination. When gloves are unavailable, use an implement to transfer the frog to a container rather than using bare hands.
- If the frog is dead, keep the specimen cool and preserve as soon as possible (as frogs decompose quickly after death making examination difficult). Specimens can be fixed/preserved in 70% ethanol or 10% buffered formalin.

Cut open the belly and place the frog in about 10 times its own volume of preservative. Alternatively, specimens can be frozen (although this makes tissues unsuitable for some tests). If numerous frogs are collected, some should be preserved and some should be frozen. Portions of a dead frog can be sent for analysis eg a preserved foot, leg or a portion of abdominal skin.

- The container should be labelled showing at least the species, date and location. A standardised collection form is provided in Appendix 5.
- If the frog is alive but unlikely to survive transportation (death appears imminent), euthanase the frog (see Appendix 3) and place the specimen in a freezer. Once frozen, the specimen is ready for shipment to the address provided below.
- If the frog is alive and likely to survive transportation, place the frog into either a moistened cloth bag with some damp leaf litter or into a plastic bag with damp leaf litter and partially inflated before sealing. Remember to keep all frogs separated during transportation.
- Preserved samples can be sent in jars or wrapped in wet cloth, sealed in bags and placed inside a padded box.
- Send frozen samples in an esky with dry ice (available from BOC/CIG Gas outlets).
- Place live or frozen specimens into a small styrafoam esky (available from K-Mart/Big W for approximately $2.50).
- Seal esky with packaging tape and address to one of the laboratories listed in Appendix 4.
- Send the package by courier.

Further information on sick and dying frogs is available on the Amphibian Disease Home Page at http://www.jcu.edu.au/dept/PHTM/frogs/ampidis.htm — in particular refer to *'What to do with dead or ill frogs'*.

[2] The measures described below are standard procedures and may vary slightly depending on the distance and time required to reach the intended recipient. Contact the intended recipient of the sick or dead frog prior to sending to confirm the appropriate procedure.

5 references

Alford, R.A. and Richards, S.J. (1997) Lack of evidence for epidemic disease as an agent in the catastrophic decline of Australian rainforest frogs. *Conserv. Biol. 11*: 1026-1029.

Berger, L., Speare, R. (1998) Chytridiomycosis - a new disease of amphibians. *ANZCCART News 11(4)*: 1-3.

Berger, L., Speare, R., Daszac, P., Green, D.E., Cunningham, A.A., Goggin, C.L., Slocombe, R., Ragan, M.A., Hyatt, A.D., McDonald, K.R., Hines, H.B., Lips, K.R., Marantelli, G. and Parkes, H. (1998) Chytridiomycosis causes amphibian mortality associated with population declines in the rainforests of Australia and Central America. *Proc. Nat. Acad. Sci. 95:* 9031-9036.

Berger, L., Speare, R. and Hyatt, A. (1999) Chytrid fungi and amphibian declines: Overview, implications and future directions. In: Campbell, A. (Editor) Declines and disappearances of Australian frogs. Biodiversity Group, Environment Australia.

Environment ACT (1999) Guidelines for minimising introduction and spread of frog pathogens. Environment ACT. Canberra.

Ferrero, T.J. and Bergin, S. (1993) Review of environmental factors influencing the declines of Australian frogs. In: Lunney, D. and Ayers, D. (Editors) Herpetology in Australia: a diverse discipline. Trans. R. Zool. Soc. Mosman.

Laurance, W.F., McDonald, K.R. and Speare, R. (1996) Epidemic disease and catastrophic decline of Australian rainforest frogs. *Conserv. Biol. 77:* 203-212.

Mahony, M. and Werkman, H. (2000) The distribution and prevalence of Chytrid fungus in frog populations in eastern New South Wales and developing a means to identify presence or absence of Chytrid fungus in the field. Unpublished report to NSW National Parks and Wildlife Service.

National Parks and Wildlife Service (2000) Helping frogs survive- A guide for frog enthusiasts. (Prepared by Voight, L., Haering, R., and Wellington, R). NPWS Hurstville. NSW.

Pechmann, J.H.K. and Wilbur, H.M. (1994) Putting declining amphibian populations into perspective: natural fluctuations and human impacts. *Herpetologica 50:* 64-84.

Pechmann, J.H.K., Scott, D.E., Semlitsch, R.D., Caldwell, J.P., Vitt, L.J. and Gibson, J.W. (1991) Declining amphibian populations: the problem of separating human impacts from natural fluctuations. *Science 253:* 892-895.

Pounds, J.A. and Crump, M.L. (1994) Amphibian declines and climate disturbance: the case for the golden toad and harlequin frog. *Conserv. Biol. 8:* 72-85.

Pounds, J.A., Fogden, M.P.L., Savage, J.M. and Gorman, G.C. (1997) Test of null models for amphibian declines on a tropical mountain. *Conserv. Biol. 11:* 1307-1322.

Powell, M.J. (1993) Looking at mycology with a Janus face: A glimpse of chytridiomycetes active in the environment. *Mycologia 85:* 1-20.

Richards, S.J., McDonald, K.R. and Alford, R.A. (1993) Declines in populations of Australia's endemic tropical rainforest frogs. *Pacific Conserv. Biol. 1*: 66-77.

Speare, R., Berger, L. and Hines, H. (1999) How to reduce the risk of you transmitting an infectious agent between frogs and between sites. Amphibian Diseases Home Page 22/1/99, (http://www.jcu.edu.au/dept/PHTM/frogs/ampdis.htm.).

Voight, L. (2001) Frogfacts No. 8. Frog hygiene for captive frogs (draft publication). FATS. Group. Sydney.

appendix 1

hygiene protocol checklist and field kit

The following checklist and field kit are designed to assist with minimising the risk of transferring pathogens between frogs.

Have you considered the following questions before handling frogs in the field:

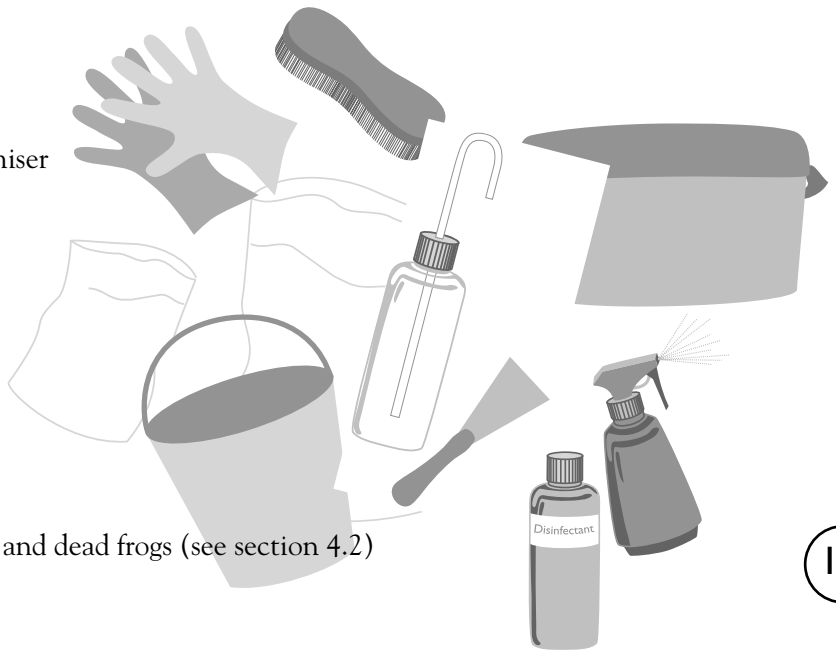
- Has your proposed field trip been sufficiently well planned to consider hygiene issues?
- Have you taken into account boundaries between sites (particularly where endangered species or populations at risk are known to occur)?
- Have footwear disinfection procedures been considered and a strategy adopted?
- Have you planned the equipment you will be using and developed a disinfection strategy?
- Are you are planning to visit sites where vehicle disinfection will be needed (consider both vehicle wheels/tyres and control pedals) and if so, do you have a plan to deal with vehicle disinfection?
- Have handling procedures been planned to minimise the risk of frog to frog pathogen transmission?
- Do you have a planned disinfection procedure to deal with equipment, apparel and direct contact with frogs?

If you answered NO to any of these questions please re-read the relevant section of the DECC Hygiene Protocol for the Control of Disease in Frogs and apply a suitable strategy.

Field hygiene kit

When planning to survey frogs in the field a portable field hygiene kit should be assembled to assist with implementing this protocol. Recommended contents of a field hygiene kit would include:

- Small styrofoam eski
- Disposable gloves
- Disinfectant spray bottle (atomiser spray) and/or wash bottle
- Disinfecting solutions
- Wash bottle
- Scraper or scrubbing brush
- Small bucket
- Plastic bags large and small
- Container for waste disposal
- Materials for dealing with sick and dead frogs (see section 4.2)



appendix 2

designated sick and dead frog recipients

Always contact the relevant specialist prior to sending a sick or dead frog. In some cases, only wild frogs will be assessed for disease. Analysis may also attract a small fee per sample.

Contact one of the following specialists to arrange receipt and analyse sick and dead frogs. Make contact prior to dispatching package:

Karrie Rose
Australian Registry if Wildlife Health
Taronga Conservation Society, Australia
PO Box 20
MOSMAN NSW 2088

Phone: 02 9978 4749
Fax: 02 9978 4516
Krose@zoo.nsw.gov.au

Diana Mendez or
Rick Speare
School of Public Health,
Tropical Medicine and
Rehabilitation Sciences
James Cook University
Douglas Campus
TOWNSVILLE QLD 4811

Phone: 07 4796 1735
Fax: 07 4796 1767
Diana.Mendez@jcu.edu.au
Richard.Speare@jcu.edu.au

Michael Mahony
School of Biological Sciences
University of Newcastle
CALLAGHAN NSW 2308

Phone: 02 4921 6014
Fax: 02 4921 6923
bimjm@cc.newcastle.edu.au

For information on frog keeping licences and approvals to move some species of displaced frog contact:

Co-ordinator, Wildlife Licensing
Wildlife Licensing and Management Unit
DECC
PO Box 1967
Hurstville NSW 1481
Ph 02 9585 6481
Fax 02 9585 6401
wildlife.licensing@environment.nsw.gov.au

For information on the possible identity of displaced frogs contact:

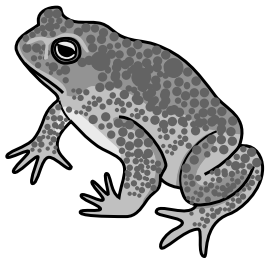
Frog and Tadpole Society (FATS)
Frogwatch Helpline

Ph: 0419 249 728

appendix 3

NSW Animal Welfare Advisory Council methodology

The NSW Animal Welfare Advisory Council procedure for humanely euthanasing cane toads or terminally ill frogs is stated as follows:



- Using gloves, or some other implement, place cane toad or terminally ill frog into a plastic bag.
- Cool in the refrigerator to 4°C.
- Crush cranium with a swift blow using a blunt instrument.

Note: Before killing any frog presumed to be a cane toad, ensure that it has been correctly identified and if outside the normal range for cane toads in NSW (north coast) that local DECC regional office is informed.

appendix 4

licensed wildlife carer and rescue organisations

Following is a list of wildlife rehabilitation groups licensed by Department of Environment and Climate Change (NSW):

Northern NSW

Australian Seabird Rescue
For Australian Wildlife Needing Aid (FAWNA)
Friends of the Koala
Friends of Waterways (Gunnedah)
Great Lakes Wildlife Rescue
Koala Preservation Society of NSW
Northern Rivers Wildlife Carers
Northern Tablelands Wildlife Carers
Tweed Valley Wildlife Carers
Seaworld Australia
WIRES branches in Northern NSW

Southern NSW

Looking After Our Kosciuszko Orphans (LAOKO)
Native Animal Network Association
Native Animal Rescue Group
Wildcare Queanbeyan
WIRES branches in Southern NSW

Sydney, Hunter and Illawarra

Hunter Koala Preservation Society
Ku-ring-gai Bat Colony Committee
Kangaroo Protection Co-operative
Native Animal Trust Fund
Organisation for the Rescue and Research of Cetaceans (ORRCA)
Sydney Metropolitan Wildlife Services
Wildlife Aid
Wildlife Animal Rescue and Care (Wildlife ARC)
Waterfall Springs Wildlife Park
Oceanworld
Wildlife Care Centre, John Moroney Correctional Centre
Koalas in Care
WIRES branches around Sydney, Hunter and Illawarra

Western NSW

Rescue and Rehabilitation of Australian Native Animals (RRANA)
RSPCA Australian Capital Territory Inc.
Wildlife Carers Network (Central West)
WIRES branches in Western NSW
Cudgegong Wildlife Carers

[4] Note: some of these organisations may not care for frogs.

appendix 5 — sick or dead frog collection form

Sender details:

name: address: postcode:

phone: (w) (h) fax: email:

Collector details: (where different to sender)

name: address: postcode:

phone: (w) (h) fax: email:

Specimen details:

record no: no. of specimens: species name: date collected:
day/month/year

time collected: sex: status at time of collection: date sent:
male/female healthy(H)/ sick(S)/ dead(D) day/month/year

location: map grid reference:
(easting) (northing)

reason for collection:

Batch details for multiple species collection:

species	no.	locality	(AMG)	date	sex	status (H/S/D)

habitat type: vegetation type: micro habitat:
eg creek, swamp, forest eg rainforest, sedgeland eg creek bank, under log, amongst emergent vegetation, on ground in the open

unusual behaviour of sick frogs:
eg lethargic, convulsions, sitting in the open during the day, showing little or no movement when touched.

dead frogs appearance:
eg thin, reddening of skin on belly and/or toes, red spots, sore, lumps or discolouration on skin

deformed frogs: dead/sick tadpoles:
eg limb(s) missing, abnormal shape or length eg numbers/behaviour

unusual appearance of egg masses: recent use of agricultural chemicals in area:
eg grey or white eggs eg pesticides, herbicides, fertilisers

other potential causes of sickness/mortality/comments/additional information:

NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

General inquiries: PO Box A290 South Sydney 1232
Phone: 9995 5000 or 1300 361967
Fax: 02 9995 5999 **Web site:** www.environment.nsw.gov.au

Department of **Environment & Climate Change** NSW

© April 2008. Design and illustration by Site Specific Pty Ltd.
Printed on recycled paper.

APPENDIX B

Limitations

LIMITATIONS

This Document has been provided by Golder Associates Pty Ltd ("Golder") subject to the following limitations:

This Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.

Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Golder's opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Golder to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.

Golder may have retained subconsultants affiliated with Golder to provide Services for the benefit of Golder. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any direct legal recourse to, and waives any claim, demand, or cause of action against, Golder's affiliated companies, and their employees, officers and directors.

This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Document.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Pty Ltd
124 Pacific Highway
St. Leonards, New South Wales 2065
Australia
T: +61 2 9478 3900

Golder Associates

APPENDIX 3
CONSTRUCTION ENVIRONMENTAL MANAGEMENT FRAMEWORK (JACOBS, 2019)

Kooragang Island Waste Emplacement Facility Area 2 Closure

Hunter and Central Coast Development Corporation

Construction Environmental Management Framework

IA192100_02 | Final

16 April 2019

HDC369

Kooragang Island Waste Emplacement Facility Area 2 Closure

Project No:	IA192100
Document Title:	Construction Environmental Management Framework
Document No.:	IA192100_02
Revision:	Final
Date:	16 April 2019
Client Name:	Hunter and Central Coast Development Corporation
Client No:	HDC369
Project Manager:	Thomas Muddle
Author:	Thomas Muddle
File Name:	\\jacobs.com\ANZ\IE\Projects\04_Eastern\IA192100\21 Deliverables\CEMP\IA192100_02_KIWEF_A2_CEMF_Final.docx

Jacobs Group (Australia) Pty Limited
ABN 37 001 024 095
710 Hunter Street
Newcastle West NSW 2302 Australia
PO Box 2147 Dangar NSW 2309 Australia
T +61 2 4979 2600
F +61 2 4979 2666
www.jacobs.com

© Copyright 2019 Jacobs Group (Australia) Pty Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Limitation: This document has been prepared on behalf of, and for the exclusive use of Jacobs' client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this document by any third party.

Document history and status

Revision	Date	Description	By	Review	Approved
00	14/09/2018	Draft for Client Comment	T Muddle	A Bowden	T Muddle
01	16/04/2019	Final	T Muddle	K Collings	T Muddle

Contents

1. Introduction

1.1 Purpose and Scope

This Construction Environmental Management Framework (CEMF) sets out the environmental, stakeholder and community management requirements in relation to the Kooragang Island Waste Emplacement Facility (KIWEF) Area 2 Closure Works. The CEMF provides a link between the environmental and planning regulatory documentation and the construction environmental management documentation to be developed by the Principal Contractors relevant to their scope of works. The Principal Contractors will be required to implement and adhere to the requirements of this CEMF. The requirements of this CEMF will be included as a contract document in all design and construction contracts.

1.2 Project Overview

The endorsed approach to the closure of KIWEF is to implement minimal change in site processes by maintaining similar site hydrology, vegetation and surface soils while further isolating potential contaminants. The isolation of contaminants is to be achieved though the reduction of surface water infiltration resulting from the installation of capping with reduced permeability and a moderation of site surface gradients.

The basic principles of the closure works are to reduce surface water infiltration into the groundwater by the following means:

- Re-grading of the site to a minimum 1% grade to prevent ponding of surface waters;
- Drainage improvements;
- Provision of a 0.5 metre (m) thick, low permeability cap; and
- Rehabilitation using existing topsoil and alternative low nutrient and Chytrid free imported growth medium.

These closure works are to be undertaken within a sensitive and complex environmental context. In particular, the works need to be delivered in a manner which:

- Complies with regulatory requirements;
- Avoids direct impacts to Matters of National Environmental Significance (MNES) in particular Green and Golden Bell Frogs (GGBF) but also migratory wading birds;
- Carefully manages indirect impacts to MNES through avoidance of spread of chytrid fungus and predatory aquatic species and through avoiding impacts to water quality of surrounding waterbodies; and
- Manages fill material such that higher risk materials are appropriately isolated from surface waters.

The closure works area is relatively isolated from sensitive human receptors and standard, reasonable and feasible mitigation measures are also to be deployed to minimise environmental impacts.

1.3 Background

Extensive background information has been prepared in relation to the Project and in the first instance the Contractor should refer to the Tender Specifications. The following background is provided for environmental context only.

KIWEF is a former industrial waste disposal area located off Cormorant Road, Kooragang Island, Newcastle New South Wales (NSW). KIWEF ceased operation in 1999 and until this time was used by Broken Hill Proprietary Company Limited (BHP) as a landfill for disposal of waste from their Mayfield steelworks and associated operations. KIWEF was subject to Environment Protection Licence (EPL) 6437 issued under the

Protection of the Environment Operations Act 1997 (PoEO Act) for the scheduled action of "Waste disposal by application to land" first issued in 1999 to BHP and subsequently transferred to Regional Land Management Corporation Pty Ltd in May 2003 and then Hunter and Central Coast Development Corporation (HCCDC (also referred to as HDC in quoted text and reports commissioned by HCCDC prior to the merger of the Hunter Development Corporation with the Central Coast Development Corporation) in January 2008.

HCCDC surrendered EPL 6437 on 8 December 2010 and the NSW Environment Protection Authority (EPA) issued a conditional Surrender Notice 1111840 with subsequent variation notices being issued on 2 May 2013 (notice number 1510956) and 17 April 2014 (notice number 1520063) collectively referred to as the Surrender Notice for the remainder of this report. The Surrender Notice conditions relate primarily to the closure process, and describe the capping that is required across much of the area, and cross reference the GHD (2009) Revised Final Landform and Capping Strategy (the Capping Strategy).

HCCDC are the NSW Public Authority currently assigned responsibility for the closure of KIWEF on behalf of the NSW Government (the State). The land on which KIWEF is located (the closure works area) is owned by the Port of Newcastle Lessor (a NSW Government entity) who has contracted HCCDC as an agent of the State, to complete the KIWEF remedial works in accordance with a Binding Terms of Agreement.

For the purposes of closure, KIWEF has been divided into three areas with Area 2 being the subject of this CEMF while Areas 1 and 3 closure have been completed. Area 2 is further divided into sub areas K3 to K8 with some sub-areas further divided into specific disposal cells.

1.4 Delivery Mechanism

1.4.1 Closure Works

The closure works are to be delivered as a Construction only contract. As such the Contractor is to refer to the Tender Specifications and Design information provided by HCCDC which incorporates and supersedes any design information provided in this CEMF and supporting environmental assessment and management documentation.

1.4.2 Wedge and Peninsular Access

The access track to the Wedge and Peninsular Borrow Pit will be delivered as a design and construct contract so that the Contractor can design the access to cater to their specific equipment access requirements. In addition to complying with the specific environmental performance expectations and mitigation measures contained in this CEMF, the Wedge and Peninsular access will be required to be designed, constructed and used to the satisfaction of ARTC as the owner of the land accommodating the access track.

2. Regulatory Requirements

The key environmental obligations for the closure works arise under the following legislation:

- *Protection of the Environment Operations Act 1997* (POEO Act);
- *Environmental Planning and Assessment Act 1979* (EP&A Act); and
- *Environmental Protection and Biodiversity Conservation Act 2000* (EPBC Act).

Various environmental assessments and management plans have been prepared under these Acts as follows:

- **POEO Act** - NSW EPA (2010), Approval of the Surrender of a Licence – License 6437, (Ref: 1111840, and as varied by notice number 1510956 and 1520063) and associated documents including:
  - Golders (2011), KIWEF Closure Works, Green and Golden Bell Frog Management Plan;
  - GHD (2009), Report on KIWEF, Revised Final Landform and Capping Strategy; and
  - RCA (2012) Materials Management Plan – Kooragang Island Waste Emplacement Facility.
- **EP&A Act** – Hunter Development Corporation Determination under Division 5.1 of the EP&A Act and associated assessment documentation including:
  - ERM (2016), Review of Environmental Factors, KIWEF Area 2 Closure Works; and
  - Jacobs (2018) Addendum Review of Environmental Factors, KIWEF Areas 2 Closure Works.
- **EPBC Act** – Notice of determination of referral number 2016/7670 dated 22 March 2019 and associated documentation including:
  - ERM (2015), KIWEF Area 2 Closure Works, EPBC Referral;
  - ERM (2016), Response to Request for Information, KIWEF Area 2 Closure Works; and
  - Ramboll (2018), EPBC Referral, Preliminary Documentation Package – KIWEF Area 2 Closure Works.

The conditions and commitments of these documents are consolidated in the attached sub-plans.

The Closure Works design has been prepared to comply with these requirements and the Contractor is responsible for implementing these designs. Where departures are proposed by the Contractor, it is the Contractors obligation to demonstrate how compliance with all applicable environment regulations is achieved.

The Peninsular access track is to be designed and constructed by the Contractor to accommodate safe access for the Contractor's equipment, in a manner that achieves the general environmental performance expectations within this CEMF and to the satisfaction of ARTC.

Various other environmental legislation and requirements apply to the site as documented in Appendix A and their requirements are generally captured in the attached sub-plans.

3. General Environmental Management Requirements

3.1 Environmental and Sustainability Management System

The Contractor is required to have a corporate Environmental Management System certified under AS/NZS ISO 14001:2015.

3.2 Environmental Training

All Contractor personnel and sub-contractors will undergo environmental training before commencing works on site. Training will be undertaken in the following forms:

- Project Induction; and
- Regular (daily) pre-start discussions on environmental topics.

Records of induction and training will be kept on the Contractor's database including the topic of the training carried out, dates, names and trainer details. Inductees will be required to sign-off that they have been informed of the environmental issues and that they understand their responsibilities.

3.2.1 Induction

Prior to working on site, the Contractor will ensure that all staff and sub-contractors working on site are appropriately inducted. The Contractors induction must communicate the environmental performance expectations of this CEMF and the specific mitigation measures to achieve these expectations as documented in the Contractors CEMP. Induction content is expected to include:

- Legal and regulatory requirements including duty of care and potential consequences of infringements;
- Environmental responsibilities with detailed training on the implementation of hygiene protocols and the importance of GGBF;
- Identification of sensitive areas including threatened species habitat, waterways, asbestos impacted waste and other hazardous waste;
- Identification of boundaries for vegetation clearing, washing, refuelling and maintenance areas for vehicles, plant and equipment;
- Environmental management techniques for noise, air, surface and ground water, waste generation, contaminated land etc;
- Emergency plans and incident management including the use of spill kits;
- Reporting processes for environmental harm or environmental incidents;
- Roles and responsibilities in achieving conformance with environmental policies and requirements, including emergency preparedness and response requirements; and
- Identification and management of non-conformances.

3.2.2 Daily pre-start talks

Pre-start talks will help to ensure that timely and relevant information is communicated to the workforce and that feedback can be provided on issues of interest or concern. Pre-start talks should address weather forecasts with implications for daily site environmental management (dust or rainfall response requirements) as a minimum, and where necessary, should be used to provide refresher information on the environmental induction topics and associated environmental procedures.

In the event of environmental near misses or incidents, or changes to procedures that could result in changed levels of environmental risks, pre-start talks may be used to deliver updates.

3.3 Emergency Contacts and Response

An emergency response plan would be prepared and implemented during the Project by the Contractor. The emergency response plan should document the contractor's approach to managing potential hazards and risks, incidents and emergencies. In undertaking planning for emergencies, learning from past incidents, applying risk assessments and training methods should be documented.

3.3.1 Emergency Preparedness

The key to effective prevention of environmental incidents involves selecting the right personnel and subcontractors, promoting a positive attitude to the importance of environmental issues, training, controls, monitoring, and surveillance. During construction activities, inspections and preventative action should include:

- Daily inspections of active work sites;
- Completion of routine environmental checklists;
- Issue and timely and effective close-out of maintenance and non-compliance notices;
- Maintenance of constant supervision on site;
- On-going environmental training; and
- Environmental audits of work sites, subcontractors and compliance issues.

Environmental and safety information on hazardous substances (e.g. safety data sheets) should be made available at the main site office and near to where such substances are stored and used. These locations will be communicated to all personnel.

Testing of and training in environmental response procedures should be conducted in areas where a pollution risk is present, such as on site and near re-fuelling areas for spill awareness, or worksites near environmentally sensitive areas. Personnel involved in emergency response activities should be provided with specific training.

An up-to-date list of emergency response personnel and organisations should be developed and maintained at the Contractor's main project office.

4. Implementation

4.1 Risk Assessment

The consideration of potential environmental risks has been undertaken through the Environmental Impact Assessment Process. This process has drawn on a significant volume of information. As a minimum, the Contractor is required to have read and understood the documents listed in Chapter 2 such that they have an adequate understanding of the environmental context and management expectations for the Closure Works. In preparing the Contractor's Construction Environmental Management Plan, the Contractor is required to undertake any additional risk assessment they deem necessary to manage environmental risks, such that the performance expectations of the CEMF are achieved when implementing their nominated construction methodology.

Based on HCCDC's understanding of the site, the following priority environmental factors and aspects were identified:

- Flora and Fauna Management;
- Erosion and Sediment Control, and Water Management;
- Contaminated Materials Management; and
- Rehabilitation.

In addition to the above priority environmental management requirements, suggested mitigation measures for environmental risks including traffic, air quality, lighting, noise, waste, rehabilitation and heritage are addressed in the attached sub-plans and are to be incorporated into the Contractor's work methods.

4.2 Environmental Management Activities and Controls

The documents listed in Chapter 2 identify environmental management and monitoring measures that apply to the Closure Works. These documents include:

- Hunter Development Corporation - Report on KIWEF - Revised Final Landform and Capping Strategy - August 2009 - Revision 2, prepared by GHD (the Capping Strategy);
- 'Green and Golden Bell Frog Management Plan – Kooragang Island Waste Emplacement Facility Closure Works' dated 19 April 2011 and prepared by Golder Associates;
- 'Materials Management Plan - Kooragang Island Waste Emplacement Facility' dated November 2012 prepared by RCA Australia; and
- 'EPBC Referral Preliminary Documentation Package – KIWEF Area 2 Closure Works' June 2018 prepared by Ramboll (the PDP).

The Surrender Notice also requires that the implementation of these plans and strategies to be validated through a report provided to the NSW EPA to allow the lifting of the Surrender Notice obligations. The summary of the measures required to be implemented and when are presented in Appendix B.

Further detail on the above documents has been incorporated into sub-plans prepared as part of this CEMF. These have been prepared based on requirements of the Surrender Notice, EPBC Act Referral outcome, Review of Environmental Factors, previously completed capping works and current industry practice to provide guidance on how to manage certain aspects of environmental management during construction.

The suite of action plans addressing priority environmental aspects includes the following:

- Appendix C. Materials Management Plan
- Appendix D. Flora and Fauna Management Plan

- Appendix E. Revegetation Management Plan
- Appendix F. Water Quality Management Plan
- Appendix G. Traffic Management
- Appendix H. Air Quality Management
- Appendix I. Noise Management
- Appendix J. Heritage management

The Contractor is expected to be fully aware of the requirements of these sub-plans in preparing their tender and program and to be prepared such that extensive clearing and bulk excavation works on site do not commence prior to all required environment controls being in place for any given works area.

4.3 Environmental Control Plans or Maps

A Preliminary Environmental Control Map, reproduces Constraints Map prepared by SMEC, is provided below. This Preliminary Environmental Control Map is to be updated by the Contractor to address Contractor's specific work methods. The Environmental Control Map is to be specific to the site and outline the location of protection measures, monitoring requirements and environmentally sensitive areas. The Environmental Control Map forms the practical application of the proposed control measures contained within this CEMF.

The Environmental Control Map is to be used in project inductions, work site set-up, reviewing ongoing environmental performance and be included as information in tender documents to subcontractors where applicable.

The project Environmental Control Map is to be updated to include:

- The worksite layout and boundary, including entry/exit points and internal roads and clearing limits;
- Location of adjoining land-use and nearest noise sensitive receivers;
- Location and type of sediment and erosion control measures, including size / capacity of detention basins and wheel wash facilities;
- Location and type of fauna exclusion fences;
- Location of site offices;
- Location of spill containment and clean-up equipment;
- Location of worksite waste management facilities;
- Hours of work applicable to the worksite (including specific time windows for deliveries and any restrictions on high noise generating activities).
- Location of environmentally sensitive areas (e.g. threatened species, critical habitat, known contaminated areas, etc)
- Vegetation and trees to be protected;
- Location of stormwater drainage and watercourses leading to / from the worksite; and
- Summary of specific environmental management requirements from licenses, approvals or permit conditions.

The provisions of this plan apply in addition to any erosion and sediment control plans or other documentation that specify the location of environmental controls on site.

BEWARE
STEEP BATTER HAZARD

BEWARE
PWCS CLUSTER PONDS
NOT TO BE DISTURBED

BEWARE
STEEP BATTER HAZARD

BEWARE - RAIL CORRIDOR
NO UNAUTHORISED ACCESS

K3 BOS
BEWARE
BOS AREA LEAD DUST
NO DIGGING

PENINSULA

PWCS
PRELOAD
STOCKPILE

BEWARE
ASBESTOS WITHIN K7
(APPROX. 1.6m BELOW SURFACE)
REFER REF AND SUPPORTING DOCUMENTS
NO DIGGING AREA

AREA 2
K7

LOW AREA
CELLS 4, 6, 8
BEWARE
SOFT GROUND

CELL 7

POND 5
BEWARE
EXISTING GCL CAP
NO DIGGING AREA

BEWARE
STEEP BATTER HAZARD

APPROXIMATE
EDGE OF T4

WEDGE LOT 7

CELL 3

EXISTING CAP
(VALIDATION
ONLY REQUIRED)

CELLS 1 and 2
EXISTING CAP
(VALIDATION
ONLY REQUIRED)

BEWARE
NAVIGATIONAL TOWERS TO
NOT BE IMPACTED BY WORKS.
ACCESS MUST BE AVAILABLE
TO TOWERS AT ALL TIMES

UNSUITABLE MATERIAL STOCKPILE FROM
PREVIOUS CAPPING WORKS (K10 SOUTH)

CWR STOCKPILE FROM
PREVIOUS CAPPING
WORKS (K10 SOUTH)

NOTE: HABITAT AREA EXTENDED TO
INCLUDE ALL WETLANDS IN THIS AREA

REFER INSET

BHP BORROW PIT

INSET

Deep Pond

Deep Pond South

Pond 12

Pond 11

Pond 10

Pond 9

Railway Pond

K7Ponds

Cell 8

Cell 7

Cell 6

Cell 5

Cell 4

Cell 3

Cell 2

Cell 1

K3 West

Easement Pond

Blue Billed Duck Pond

E61S E61D

K7 1

K7 2N K7 2S

K7 4S K7 4N

K5 4

K3 1W

K3

K5 6NN K5 6NS K5 6N

K8 5W K8 5E

K5 5S K5 5N

LEGEND

- AREA 2 - KIWEF SURRENDER NOTICE BOUNDARY
- AREA 2 - (POTENTIAL BORROW)
- AREA 2 - COMMONWEALTH APPROVAL BOUNDARY (REFER NOTE 1 - PLAN 0004)
- T4 SEPARATION LINE (2016#)
- T4 SEPARATION LINE WITH BUFFER (2016#)

(#) OBTAINED FROM IMAGE FILE - INDICATIVE ONLY

- SURVEY BOUNDARIES / LEASE BOUNDARY
- EXISTING BUND WALL LOCATIONS (INDICATIVE ONLY)
- K5 6N — KI WELLS (GROUND WATER MONITORING)
- BOS AREA — BOS AREA (GHD 2010)
- HYDRO CARBON IMPACT — HYDRO CARBON IMPACT AREA (DP 2011)
- PAH IMPACT — PAH IMPACT BOUNDARY (GHD 2011)
- POND 5 — POND 5 BOUNDARY (GHD 2010)
- LIME — LIME
- LEADED DUST — LEADED DUST

WASTE CLASSIFICATION (DAMES & MOORE 1991)

- GREEN & GOLDEN BELL FROG (GGBF) KNOWN AND POTENTIAL HABITAT AREAS (GHD-2010)
- EXISTING CAP OR DRAIN - DO NOT DISTURB

150 mm ON ORIGINAL

A1

DRAWING FILE LOCATION / NAME: D:\SMEC\30011921_KIWEF\CAD\DWG\0006_D.dwg
PLOT DATE: 16 Dec 2018 TIME: 16:51:10

EXTERNAL REFERENCE FILES:
X_AH_Kooragang Image
X_Newc_a1_30011034_
X_SMEC MASTER BOS
X_SMEC MASTER HABITAT
X_SMEC MASTER GEO
X_M&P_Survey 1691.77A_

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
A1	27.09.18	ISSUED FOR 90% PROGRESS REVIEW	-	-
A2	5.10.18	ISSUED FOR 90% REVIEW	-	-
B	13.11.18	ISSUED FOR 100% REVIEW	-	-
C	28.11.18	ISSUED FOR PRE-TENDER ESTIMATE	-	-
D	17.12.18	ISSUED FOR TENDER	001	EW

TITLE	NAME
DRAFTER	MLC
DRAFTING CHECK	EW
DESIGNER	MLC
DESIGN CHECK	JH
PROJECT MANAGER	EW
PROJECT DIRECTOR	JK

SCALES AT A1 SIZE DRAWING
0 20 40 60 80 100m
SCALE 1:2000 AT ORIGINAL SIZE

DESIGNER
SMEC
SMEC AUSTRALIA PTY LTD
© ABN 47 065 475 149
74 HUNTER STREET
NEWCASTLE NSW 2300
PH +61 2 4925 9600 FAX +61 2 4925 3888

CLIENT
NSW GOVERNMENT
Hunter & Central Coast Development Corporation

TITLE
KOORAGANG ISLAND WASTE EMPLACEMENT FACILITY
STAGE 5 CLOSURE WORKS AREA 2 (K3/K5/K7) CONTRACT HCCDC 18/04
SEPARABLE PORTIONS 1 and 2 - GENERAL
CONSTRAINTS PLAN

SCALE	PHASE	PROJECT / DRAWING No.	REVISION
1: 2000	TENDER	0006	D

4.4 Environmental Schedules

The Environmental Schedules set out below represent the records likely to be required to be kept during the Project.

- Weekly and post rainfall site inspection checklist;
- Daily materials tracking forms;
- Level 2 and Level 3 notification forms;
- Notified materials tracking register;
- Water quality monitoring results register;
- Dewatering form;
- Waste Register;
- Induction record;
- Internal Audit Register;
- Non-Conformance Register;
- Complaint Form; and
- Complaint Register.

The form and content of the Environmental Schedules is to be provided by the Contractor in accordance with their Environmental Management System.

5. Monitoring, Reporting and Review

5.1 Environmental Monitoring

As part of the overall environmental management of the site, during the landfill closure works, the Contractor is to conduct at least weekly inspections of all mitigation measures. The results of these inspections will be recorded on a weekly environmental inspection record. Should non-conformances be identified, the Contractor is required to undertake corrective action to address the issue.

The following construction monitoring is required:

- Daily prestart checks on amphibian-disease hygiene station functioning and supplies, and weather forecast noting predicted wind and rain;
- Real-time classification of materials to nominated thresholds in accordance with the Materials Management Plan decision matrix;
- Post rainfall checks of sediment dam water level and water quality, and erosion and sediment control functioning;
- Inspection covering sediment dam water levels and water quality, erosion and sediment control structures, frog fences, fuel and chemical storage, stockpile bunding and covers;
- Sediment basin discharge or dewatering water quality sampling and analysis suitable to demonstrate pollution of water has/will not occur;
- noise monitoring of any out of hours construction works in accordance with Interim Construction Noise Guidelines;
- visual observations of visible dust levels to confirm no off site dust impacts; and
- post capping defects and liabilities monitoring including revegetation success monitoring.

Where recommended actions are suggested, priorities should be set against these actions for site implementation. The list of actions should be distributed to the responsible personnel. A close out system must be included.

The defects and liabilities period is linked to a demonstration of performance against parameters to be negotiated with the HCCDC. These are likely to include revegetation success and surface water quality.

In accordance with notice of determination condition 11 and 12, accurate and complete compliance records are required to be maintained and provided to the Department of Environment and Energy on request.

5.1.1 Construction Water Quality Monitoring

The closure works are required to comply with the general duty not to pollute waters under section 120 of the POEO Act. The contractor will be required to take adequate precautions to ensure either that discharge/or dewatering is not required, or otherwise undertake sampling and analysis to demonstrate that pollution of water has or will not occur associated with water releases from sediment basins.

In the absence of an EPL, to avoid causing pollution and breaches of section 120, any water discharged from site must be of the same quality, or better, than the quality of the receiving waters (at the time of discharge) or able to be demonstrated to not have caused water pollution.

It is noted that water pollution or pollution of waters means:

- placing in or on, or otherwise introducing into or onto, waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the waters is changed, or
- placing in or on, or otherwise introducing into or onto, the waters (whether through an act or omission) any refuse, litter, debris or other matter, whether solid or liquid or gaseous, so that the change in the condition of the waters or the refuse, litter, debris or other matter, either alone or together with any other refuse, litter, debris or matter present in the waters makes, or is likely to make, the waters unclean, noxious, poisonous or impure, detrimental to the health, safety, welfare or property of persons, undrinkable for farm animals, poisonous or harmful to aquatic life, animals, birds or fish in or around the waters or unsuitable for use in irrigation, or obstructs or interferes with, or is likely to obstruct or interfere with persons in the exercise or enjoyment of any right in relation to the waters, or
- placing in or on, or otherwise introducing into or onto, the waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with any standard prescribed in respect of that matter.

A summary of water quality monitoring including sample results is required to be submitted to the HCCDC following any dewatering or discharge event demonstrating that the Contractor has complied with the above obligations.

5.1.2 Environmental Auditing

Internal and external environmental audits should be undertaken throughout the construction process to ensure that the project environmental requirements and Contractors CEMP are implemented appropriately.

The auditing process should be designed to identify any non-conformances, providing an opportunity to apply corrective and / or preventative action where appropriate. The Audit schedule is to include:

- Internal environmental audit by the Contractor's Environmental Manager on a three monthly basis during construction;
- Regular attendance at the site by the KIWEF Area 2 Closure Works Independent Auditor; and
- Independent audit of compliance with the notice of determination conditions following the completion of onsite construction works and prior to completion of the project works period.

5.2 Reporting

The implementation of the Closure Strategy and contract requires the following reporting on environmental performance:

- Daily record of material management including notification of identification of potential Level 2, Level 3 or otherwise hazardous materials;
- Monthly progress reporting;
- Validation reporting following practical completion; and
- Annual compliance reporting against the notice of determination.

Detailed requirements of these reports are included in the Tender Specifications. The following summarises the expected content of each level of reporting.

5.2.1 Daily Record of Material Management

The daily record of material management is required to summarise material interaction for the day and include:

- Description of earthworks activity undertaken;

- Description of cut to fill or cut to stockpile activities including locations;
- Notification of HCCDC of suspected contaminated or otherwise hazardous material encountered and description of handling, current location, further assessment required; and
- Summary of any handling of previously notified material including update on current location.

All notifications are also to be tracked through a notifications register to record final disposal location.

5.2.2 Monthly Progress Reporting

Monthly Progress Reporting is to include details of the implementation environmental management requirements including:

- Update on any environmental risks and opportunities, and significant environmental impacts associated with the work;
- Progress against environmental objectives, targets and measures of performance; and
- Management actions, including environmental controls, training, inspections and testing.

Specifically, the environmental monthly reporting is to include such items as:

- Characterisation, site management and fate of contaminated material, collated materials tracking information;
- Quality assurance on placed material;
- Non-compliances and corrective actions;
- Environmental monitoring requirements; and
- Monthly logs and photographs and other records of the progressive compilation of information that will be integrated into the Validation Report on completion.

5.2.3 Validation Report

The Validation Report is required to satisfy Condition 4h of the Surrender Notice which requires that there is written confirmation that the cap was established in accordance with relevant specifications as follows:

"Within three months of completion of the installation of the final cap, the licensee must provide the EPA with a written Validation Report that includes:

i) Advice that the final cap has been installed;

ii) Advice from a suitably qualified and experienced person as to whether or not the cap was installed in accordance with Chapter 7 of the Landform and Capping Strategy and relevant conditions of this Notice, or future variations to this Notice;

iii) Provision of the results of all relevant test results to validate that the permeability of the final capping layer is less than or equal to K = 1 x 10^{-7}m/s. Permeability testing must be taken of the sealing layer material at a rate of not less than 1 per 2000T (or 1250m^3);

iv) Provision of information that establishes the thickness of the installed sealing and revegetation layers in the format of either:

(i) As constructed drawings, including cross sections, of the surfaces of the coal washery reject layer; and

(ii) The results of surveys undertaken for each capping layer by a registered surveyor".

The Contractor is to allow for all effort necessary to assemble adequate validation evidence throughout the implementation of the Closure Works and for the preparation of the validation report. For the avoidance of doubt, the Contractor is required to validate that the Closure works have been delivered in accordance with the design and Tender Specification in relation to capping parameters and the Materials Management Plan in relation to materials handling and tracking. The environmental performance expectations within this CEMF must be achieved as part of the Contract but are not required to be incorporated into the Validation Report. Evidence of compliance is to be available on request by HCCDC.

5.2.4 Annual compliance reporting

During the performance of the contract, and as a condition of satisfaction of the care and maintenance obligations, the Contractor will be responsible for the preparation of an annual compliance report against the conditions of the notice of determination.

5.3 Corrective Action

Non-compliance may be identified through routine weekly site inspections, impromptu site inspections, via the CEMF or CEMP review or audit process or be incident based.

Environmental non-conformance include:

- non-compliance with environmental management controls or mitigation measures specified within the CEMP;
- environmental incidents not threatening material harm to the environment; and
- environmental emergencies threatening material harm to the environment.

Corrective actions may be triggered by any of the above and will include immediate steps taken to control event, investigation and development additional controls to prevent recurrence. Corrective actions will be developed in consultation with the HCCDC and will be assigned to the appropriate staff for close out. All corrective actions will be tracked through to completion through the non-conformance tracking register.

All environmental non-conformances with project approvals, this EMP or Contractor procedures is to be recorded as an incident, investigated and closed out by the Contractor. Close-out is required to include Construction supervisor sign-off that corrective actions have been implemented or alternative solutions substituted. A summary of all non-conformances and associated corrective actions is to be provided to the HCCDC.

In addition to the above, incidents causing or threatening material harm to the environment are regulated under the POEO Act, which defines material harm under section 147, as follows:

(1a) harm to the environment is material if

(i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or

(ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and

(1b) loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment;

(2a) it does not matter that harm to the environment is caused only in the premises where the pollution incident occurs.

The POEO Act requires incidents causing or threatening material harm to the environment to immediately notify the relevant authorities, which include:

- the EPA;
- Newcastle Council;
- the Ministry of Health;
- the WorkCover Authority; and
- Fire and Rescue NSW.

The POEO Act outlines responsibilities down to an individual level to notify incidents threatening material harm to the environment immediately. In general terms all individuals are responsible for reporting such incidents to the Construction Project Manager who in turn will inform HCCDC. HCCDC would then notify relevant authorities. It also requires that an individual notify the incident where they cannot make contact with their employer. Relevant authority contact details are included in the table below and should be displayed where all site workers can access them easily in the event of a notifiable incident occurring.

Table 1 Relevant Authority Contact Details

Contact	Phone Number
The EPA Environment Line	131 555
The Ministry of Health via the Public Health Unit	1300 066 055
SafeWork NSW	13 10 50
Newcastle City Council	02 4974 2000
Fire and Rescue NSW	000

Environmental incidents relating to the *Environmental Protection and Biodiversity Conservation Act 1999* must be notified to the Secretary of the Department of the Environment and Energy. Specifically, conditions 16 and 17 of the Notice of determination require the following:

16. The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:

a. the condition which is or may be in breach; and

b. a short description of the incident and/or non-compliance.

17. The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:

a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;

b. the potential impacts of the incident or non-compliance; and

c. the method and timing of any remedial action that will be undertaken by the approval holder.

5.4 CEMF Review

This CEMF forms the basis on which the contractor's CEMP should be prepared and as such is to be reviewed/adapted or superseded based on the contractor's specific work methods and approach to environmental management. The Contractor's CEMP should be reviewed in accordance with the requirements of their environmental management system but should also be reviewed during implementation as and when required, including when the following situations arise:

- Client recommendations for changes (particularly following initial review);
- Opportunities for improvement or deficiencies in the project system are identified; or
- Following an audit of the system or the occurrence of significant incidents and non-conformances.

Appendix A. Legislative requirements

Legislation and administering authority	Requirement	Application to Closure Works
Environment Protection and Biodiversity Conservation Act 1999 Commonwealth Department of the Environment and Energy	The relevant objective of the Act is to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance. A project may be defined as a controlled action under the Act due to impacts on matters of national environmental significance.	The Project was determined to be a Controlled Action due to potential impacts to the identified key population of Green and Golden Bell Frogs and associated impacts to the ecology of the Hunter Estuary Ramsar wetland should this population be threatened. The project was approved by the Commonwealth on 22 March 2019 on the basis of the preliminary documentation provided by HCCDC. Conditions of determination have been issued and are incorporated into this CEMF. Notwithstanding anything else within this CEMF and the contract documents, the Contractor is responsible for understanding and complying with the Conditions of determination.
Environmental Planning and Assessment Act 1979 Department of Planning and Environment	Encourages proper environmental impact assessment and management of development areas for the purpose of promoting the social and economic welfare of the community and a better environment.	The Project was assessed and determined under the former Part 5 (now referred to as Division 5.1) of the EP&A Act and found unlikely to significantly impact the environment subject to the implementation of a range of mitigation measures contained within the assessment documentation. These mitigation measures have been incorporated into this CEMF.
Protection of the Environment Operations Act 1997 Environment Protection Authority (EPA)	The relevant objective of the Act is to prevent environmental pollution.	The Project is regulated under the POEO Act through the Surrender Notice but does hold a current Environment Protection Licence (for activities listed under Schedule 1). In addition to complying with the conditions of the surrender notice the general duties to prevent air/ noise/ water pollution and manage waste correctly do apply. It is the contractor's obligation to undertake works in accordance with the surrender notice and in a manner that prevents pollution. Further, the Contractor is the occupant of the site under the POEO Act (as per HCCDC18/04 contract).
Contaminated Land Management Act 1997 NSW EPA	The Act provides a process for the investigation and remediation of land where contamination presents a significant risk of harm to human health or some other aspect of the environment.	While the site is known to contain contamination it is not currently regulated under this Act as it is regulated by the EPA through the POEO Act and it is not the intention of the EPA to regulate the same site under both Acts concurrently. It is the contractor's obligation to manage contaminated materials in accordance with the

Legislation and administering authority	Requirement	Application to Closure Works
		Materials Management Plan such that contaminated materials encountered is appropriately managed to avoid exacerbation and such that the fate of such material is documented.
Dangerous Goods (Road and Rail Transport) Act 2008 EPA / SafeWork NSW	A licence is required for the storage (SafeWork NSW) and /or transport (EPA) of prescribed quantities of dangerous goods.	The Contractor is required to ensure that the transport and storage of dangerous goods exceeding licensable quantities is lawfully undertaken.
Environmentally Hazardous Chemicals Act 1985 EPA	Management of Environmentally Hazardous Chemicals.	Should any material generated or encountered at the site contain chemicals that are the subject of NSW's five (5) current Chemical Control Orders (CCO), then the material will need to be managed in accordance with that CCO. Current CCO include: · Chemical control order in relation to aluminium smelter wastes containing fluoride and/or cyanide (1986) · Chemical control order in relation to dioxin-contaminated waste materials (1986) · Organotin waste materials chemical control order 1989 · Polychlorinated biphenyl (PCB) chemical control order 1997 · Scheduled chemical wastes chemical control order 2004.
Heritage Act 1977 NSW Office of Environment and Heritage (OEH)	The Act aims to encourage the conservation of the State's heritage and provides for the identification and registration of items of State heritage significance.	Not expected to impact any items on the State Heritage Register (SHR). Should the project unexpectedly find any heritage artefacts, the relevant notifications and management actions may need to be taken.
National Parks and Wildlife Act 1974 OEH	The objectives of the Act are for the conservation of nature and the conservation of objects, places or features (including biological diversity) of cultural value within the landscape.	The proposal would not affect any area declared as a National Park, historic site, nature reserve or Aboriginal area nor would it impact any historic Aboriginal object or place, threatened species, population or endangered ecological community. The potential exists for unexpected objects to be found of significance to Aboriginal people. The Chief Executive of the OEH is the authority responsible for the protection of all Aboriginal objects and places in NSW, whether they are on national park estate or not.

Legislation and administering authority	Requirement	Application to Closure Works
Threatened Species Conservation Act 1995 OEH	Provides for the protection of any threatened species on-site.	Impacts to Threatened Species are assessed through the REF and mitigation measures to prevent significant impacts are incorporated into this EMP. Any unexpected species encountered during construction may require further assessment.
Biodiversity Conservation Act 2016 OEH	The purpose of this Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act commenced on 25 August 2017 repealing the *Threatened Species Conservation Act 1995* (TSC Act).	The proposal would be considered a pending Part 5 assessment if it commences within 18 months of August 2017. Under Clause 29 of the BC (ST) Regulations, the former planning provisions continue to apply (and Part 7 of the new Act does not apply) to a pending Part 5 assessment, with the former planning provisions defined as the provisions of the EP&A Act that would be in force if that Act had not been amended by the BC Act and which call-up guidelines established under the TSC Act.
Biosecurity Act 2015 OEH	The primary object of this Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks which includes the management of plant and animal pests.	The following pests are known to be present on site and will require appropriate management · Bitou Bush (Chrysanthemoides monilifera subsp rotundata), · Crofton Weed (Ageratina adenophora); · Pampas Grass (Cortaderia selloana). · African Olive (Olea europaea), · Lantana (Lantana camara); and · Groundsel Bush (Baccharis halimifolia). In accordance with the Act all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Surrounding ponds are also populated by Mosquito Fish (*Gambusia Holbrooki*) and the works are required to avoid any transfer or connection of water bodies that could lead to their spread.
Water Management Act 2000 Department of Lands - Water	The relevant objective of the Act is to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality.	Clause 38 or the Water Management (General) Regulation 2011 provides that a public authority is exempt from section 91E (1) of the WM Act in relation to all controlled activities that it carries out in, on or under waterfront land. As such a

Legislation and administering authority	Requirement	Application to Closure Works
		controlled activity approval is not required for the proposed activity. The water within the fill aquifer is not considered to occur naturally, no use of water in surface water bodies is proposed and no use of other naturally occurring water sources is proposed and as such a water use approval is not deemed necessary. The proposed works do not include aquifer interference and it is understood that the Aquifer interference requirements of the Act are yet to commence and as such aquifer interference approval is not deemed necessary.
State Environmental Planning Policy (Three Ports) 2013 Department of Planning and Environment	The aim of this Policy is to provide a consistent planning regime for the development and delivery of infrastructure on land in Port Botany, Port Kembla and the Port of Newcastle.	The closure works are within the land application area and Lease Area and Environmental Management Works / Environmental Protection works are permissible without consent in the Three Ports Lease Area. The Project has been assessed under the former Part 5 (Division 5.1) of the EP&A Act (refer above).
State Environmental Planning Policy 55 Department of Planning and Environment / Council	The object of this Policy is to provide for a Statewide planning approach to the remediation of contaminated land.	While the closure works also meet the definition of remediation works under this policy, the Three Ports SEPP prevails to the extent of any inconsistency. Clause 8 (4) requires that a person who carries out a remediation work must ensure that the Council notification requirements of clause 16, 17 and 18 are complied with in relation to the work. Notification of Council required 30 days in advance of commencement of Category 2 remediation. Notification of Council following completion.
State Environmental Planning Policy (Coastal Management) 2018	The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area, by: · managing development in the coastal zone and protecting the environmental assets of the coast, and	The closure works area is surrounded by, but does not include, land mapped as coastal wetlands. Parts of the closure works area are mapped as proximity area for Coastal Wetlands, Coastal Environment Area and Coastal Use Area. Importantly, the closure works area is within the Lease Area under the Three Ports SEPP and the Coastal Management SEPP does not apply through the workings of Clause 7 of the Coastal Management SEPP.

Legislation and administering authority	Requirement	Application to Closure Works
	· establishing a framework for land use planning to guide decision-making in the coastal zone, and · mapping the 4 coastal management areas that comprise the NSW coastal zone for the purpose of the definitions in the Coastal Management Act 2016.	
Newcastle Local Environment Plan Newcastle Council	This Plan aims to make local environmental planning provisions for land in the City of Newcastle in accordance with the relevant standard environmental planning instrument under the EP&A Act.	While located within the Newcastle Local Government Area the site is not located on land to which the *Newcastle Local Environmental Plan 2012* (NLEP) applies.

Appendix B. Environmental Obligation Interface

Sequence of Work Activities	Controls/Mitigation Measures	Primary Responsible
Tender and award	· Establish all required approvals under EPBC Act and EPA Act. · Finalise Closure Works design to comply with approvals. · Integrate above requirements into CEMF and Tender Specifications. · Scheduling works to the extent possible to occur outside of the core GGBF breeding period (that is, September to March), especially in areas adjacent to known and potential breeding habitat.	State. Contractor responsible for review of approvals in place and obtaining any additional necessary approvals.
Peninsular / Wedge Access	· Complete access upgrade design to accommodate Contractor equipment in agreement with ARTC.	Contractor in consultation with ARTC
Pre-earthworks monitoring and ongoing EPL Surrender Notice monitoring.	· Update relevant GGBF abundance survey data and water level and salinity logger data. · Undertake annual surface and groundwater monitoring as per EPL Surrender notice.	State Contractor to facilitate access through Closure Works Area as required.
Auditor oversight	· Undertake all necessary site inspections, provide input into materials management decision making to allow auditor sign-off of Closure Works completion.	State to appoint auditor. Contractor to facilitate access and provide validation information as requested by Auditor.
Site Establishment	· Implement hygiene protocol as required for the closure works area (NSW Threatened Species Management Information Circular No.6 (April 2008)). · Establish any controls necessary to prevent works from occurring outside the referral boundary. · Temporary frog exclusion fencing to surround the Closure Works site and ensure GGBF habitat protected from unauthorised access prior to works commencing in those works areas or their parts. · Conduct pre-clearance surveys by a qualified ecologist in week prior to works commencing in works areas or their parts. · Apply erosion and sediment controls as per sensitive environments (Managing Urban Stormwater – Soils and Construction (Landcom 2004)) and complete and line permanent basins as per designs provided by the State.	Contractor

Sequence of Work Activities	Controls/Mitigation Measures	Primary Responsible
	· Prepare stockpile area with adequate space for 'topsoil' level 1, 2 and 3 material and erosion and sediment controls as per ESCP and Materials Management Plan (RCA Australia 2012). · Level 2 and level 3 stockpile areas are to be lined in accordance with materials management plan (RCA Australia 2012) as necessary. · Store all hazardous liquids and chemicals in covered, bunded areas with capacity to retain 110% of largest container in the event of a spill. Proprietary available spill mats, drip trays and pallets can be used as appropriate. · Provide fully stocked spill kit/s and ensure that operators are aware of the location of these kits and are trained in their use.	
Bulk earthworks	· Undertake weed management in advance of broad scale clearing and bulk earthworks. · Win and transport site derived capping and land forming materials. · Use of imported capping material assessed as having a low risk of containing Chytrid Fungus. · Use of revegetation medium materials demonstrated to be low in nutrients and assessed as having a low risk of containing Chytrid Fungus. · Works are to be staged to reduce area of exposure and minimise dust, infiltration and sediment laden run-off. · Qualified ecologist to be available on call during earthworks in the event that any GGBF individuals are encountered during works, the ecologist must be called in to capture and relocate the individuals. · Materials will be managed in accordance with the approved Materials Management Plan and GGBF management plan within each area and no transport of fill, capping or topsoil between areas is to occur. · Strip topsoil to a minimum of 100mm following material management plan decision matrix for suitability for re-use. · Topsoil to be stored separately in prepared stockpile areas as per detailed design documentation. · Stockpiles to be stored for long periods are to be wrapped, covered, re-seeded or wet to minimise dust generation. · Cut to base of excavations as per detailed design documentation insuring minimum 1% grade. Cut material to be used as fill and capping in accordance with materials management plan decision matrix. · The final surface of both capped and uncapped areas will be protected by a vegetative layer. The extent of the revegetation will depend on the proposed site use (i.e. undeveloped, commercial development or habitat areas).	Contractor

Sequence of Work Activities	Controls/Mitigation Measures	Primary Responsible
	· The use of imported topsoil is to be avoided where possible. · Upon completion of the works, the works areas must be rehabilitated in accordance with Rehabilitation Management Plan. · Dispose of materials unsuitable for reuse in accordance with materials management plan. · All waste to be removed upon completion. · Upon completion, site facilities, frog exclusion fencing and security fencing shall be removed as necessary. · Non-permanent erosion and sediment controls are to remain in place until they are no-longer required. · Sediment basins and drains will remain in place as landscape features until they are no longer required. · Refuelling is not to occur in the vicinity of sediment dams, drainage lines or water bodies. · Refuel plant using drip trays/spill mats and other spill containment devices. · Store all hazardous liquids and chemicals in covered, bunded areas with capacity to retain 110% of largest container in the event of a spill. Proprietary available spill mats, drip trays and pallets can be used as appropriate. · Do not leave chemical containers open outside or inside of the bunded areas. · Provide fully stocked spill kit/s and ensure that operators are aware of the location of these kits and are trained in their use. · Spills are to be immediately contained and absorbed using materials provided in the spill kit. · All personnel are to be trained in the appropriate use and disposal of spill kit materials.	
Construction Monitoring	· Daily prestart checks on amphibian disease hygiene station functioning and supplies and weather forecast noting predicted wind and rain. · Real-time classification of soils to nominated thresholds in accordance with the Materials Management Plan decision matrix. · Post rainfall checks of sediment dam water level and water quality and erosion and sediment control functioning.	Contractor

Sequence of Work Activities	Controls/Mitigation Measures	Primary Responsible
	· Weekly site inspection checklist covering sediment dam water levels and water quality, erosion and sediment control structures, frog fences, fuel and chemical storage, stockpile bunding and covers. · Pre-discharge physical water quality condition (temperature; dissolved oxygen; pH; electrical conductivity (EC)) and chemical water quality condition in sediment dams. · Noise monitoring of any out of hours construction works in accordance with interim construction noise guidelines. · Reference to available PWCS/NCIG dust monitoring results to determine off site dust levels.	
Defect Liability period	· Check and maintain the erosion and sediment controls regularly, especially after rainfall, to ensure that they remain effective including: o Collected sediment is to be removed from the controls as necessary to ensure they remain effective. o Collected sediment is to be combined with planting medium for reuse on the site – if appropriate. o All vehicle wheels, tracks and undercarriages must be cleaned prior to exiting the site and travelling on public roads. · Three month vegetation maintenance program to include, watering, weeding as appropriate but excluding the use of fertilisers and pesticides and herbicides. · Pre and post discharge surface water monitoring in sediment dams and receiving waters. · Revegetation monitoring and maintenance to ensure adequate cover. · Preparation of an annual compliance report against the conditions of the notice of determination.	Contractor

Appendix C. Materials Management Plan

Hazardous / Contaminated Material	
Objective	To comply with legislative requirements and ensure that hazardous / contaminated material from construction activities does not cause an environmental nuisance / harm and is handled, categorised, tracked and placed in accordance with the RCA (2012) Materials Management Plan.
Targets	No exacerbation of contamination during construction No environmental incidences involving contaminated/ hazardous materials No pollution events of the surrounding environmental and water ways by contaminated material The movement and ultimate fate of materials is fully tracked
Key Documents	**State Documents** NSW EPA (2010), Approval of the Surrender of a Licence – License 6437, (Ref: 1111840, and as varied by notice number 1510956 and 1520063) GHD (2009), Report on KIWEF, Revised Final Landform and Capping Strategy (Ref: 22/14371/85882 R4) RCA (2012) 'Materials Management Plan - Kooragang Island Waste Emplacement Facility' dated November 2012.
Material Classification	**Level 1** material is any material not exhibiting characteristics indicative of other categories. **Level 2** material is identified as material with any of the following characteristics: strong hydrocarbon odour, ammonia odour, asbestos containing material, evidence of PCB impact (dark staining and phenolic odour), materials with an average concentration of >2,000 mg/kg PAH or material represented by individual PAH concentration >2,500 mg/kg. **Level 3** material is material containing Separate Phase Hydrocarbons.
Mitigation Measures and Controls	The following is generally reproduced from RCA (2012).
Contaminated material identification and management	The Contractors Materials Management Plan is to be adequate to ensure that material management is undertaken in accordance with RCA (2012) in addition to meeting the performance expectations of the Contract Specifications and this CEMF. The Contractors Materials Management Plan is to incorporate a protocol for identification and management of Contaminated Materials that is to include the following: · Appropriate resourcing for real-time supervision of all ground disturbance activities by a suitably qualified and environmental practitioner;

Hazardous / Contaminated Material	
	· Stop work requirements (localised) if any soils are encountered which have distinguishing Level 2 or Level 3 characteristics. · Characterising and delineated Level 2 and Level 3 materials in-situ or at the place of storage following excavation including input from occupational hygienist or other appropriately qualified specialist (Contractor's Specialist) to identify the substance. · Consultation with third party advisors, the State and the auditor to confirm management expectations. All contaminated material encountered during the landfill closure works will be assessed and categorised in accordance with RCA (2012). All material is to be adequately tracked such the that the composition and location of all Level 2, Level 3 and asbestos waste fate is documented and able to be validated. Uncovering of suspected level 2, level 3 or otherwise hazardous material requires the following steps to be undertaken: · Immediately cease work and contact the Site Supervisor · Demarcate the 'unexpected find' to prevent access and install appropriate environmental and safety controls. · Follow the management steps specified below in relation to each material classification; and · If substance is assessed as level 1 material not presenting an unacceptable risk to human health the Site Supervisor to remove controls and continue work.
Level 1 Material management	There is no specific management required for Level 1 material on the site and Level 1 material has unrestricted onsite re-use classification (Section 5.6.1 of RCA 2012). Level 1 material may be used for: · Topsoil where sourced from top 100mm of existing landform; · General land forming; · Buffer material to be placed above Level 2 and Level 3 Material; · Interim bunding for stockpiled material; and · Site capping material. Level 1 material properties are to be validated in accordance with the Tender Specifications for testing and analysis.
Level 2 Material management	Level 2 material is designated as having restricted site use and where encountered is to be managed as follows: · Where suspected Level 2 soils are encountered then the nature and extent of the materials should be validated by laboratory testing to assess whether the materials are still to be classified as Level 2 or Level 3 materials. · If Level 2 material is encountered but is to remain in place and will have sufficient cap (ie >500mm), the vertical extent does not need to be validated.

Hazardous / Contaminated Material	
	· The Contractor is to develop a notification detailing material type, location, estimated quantity and potential contaminants. · The Contractor is to notify the State or its representative within 24 hours of encountering Level 2 material. · Level 2 material may be relocated to a lined and covered short-term stockpiling or skip-bin for further quantification, characterisation and categorisation. · Confirmed Level 2 contaminated material is to be isolated by covering with at least 500mm of Level 1 material, plus 500 mm of cap with preference for material to be left in situ provided there is no immediate risk to the environment or community or otherwise be relocated to an on-site location.
Level 3 Material Management	Level 3 material is designated as having restricted site use and must managed as follows: · The Contractor is to develop a notification detailing material type, location, quantity and potential contaminants. · The contractor is to notify the HCCDC as soon as possible and on the day the material is encountered. · HCCDC will then notify the EPA; · Level 3 material may be relocated to a lined and covered stockpile or skip bin for further characterisation and categorisation and while a decision is made by HCCDC on the preferred manner of ultimate disposal. The HCCDC will provide direction as to the required treatment of Confirmed Level 3 contaminated material which may include: · Isolated by covering with at least 1000mm of Level 1 material, plus 500mm of cap with preference for material to be left in situ provided there is no immediate danger to the environment or community or otherwise be relocated to an on-site location with the area having appropriate controls in place; or · Transported off-site for disposed in a legal manner.
Asbestos Management	Asbestos materials (and ACM) should be managed generally as follows as specified in RCA MMP (2012): · Where at all possible, materials containing bonded asbestos wastes would be fully delineated, be assessed to be at least 1m below final capping, and remain as undisturbed materials managed by in-situ containment; · Should any fill materials containing bonded asbestos wastes require excavation as they are not in-situ more than 1m from the final cap in the earthworks, then consideration would be given to removing the materials and emplaced at a depth of 1m; · Friable asbestos would be assessed and considered for emplacement at a depth of 2.5m below the underside of the capping layer within a purpose built excavation at a location to be agreed with HCCDC; · Final location of any asbestos discovered shall be thoroughly documented including accurate survey of the emplacement area;

Hazardous / Contaminated Material	
	· Where asbestos waste is found in fill that also contains volatile organic compounds or separate phase hydrocarbons, appropriate treatment for recorded contaminants will be required; and · All asbestos is to be managed and handled in accordance with the recommendations of an appropriately licensed Asbestos Assessor/handler. The use of in-situ or ex-situ treatment approach for any materials containing bonded and friable asbestos wastes will be assessed on a case by case basis in relation to volume and risk to human health.
Other waste management	Minimal volumes of material requiring off-site disposal have been encountered in previous stages of KIWEF closure works. In the event that such material is encountered it will be classified in accordance with the Waste Classification Guidelines (2015) and disposed of to a landfill legally able to accept the waste. Wastes generated in completing the capping works are also required to disposed of off-site. All other contaminated materials will be managed on site in accordance with the Materials Management Plan. Waste management measures to be implemented include: · Licensed waste contractors will be utilised to remove waste. · All waste is to be disposed of at a lawful facility (Note: A lawful facility includes one that has the appropriate Development Consent, Environment Protection Licence or is complying with EPA approved conditions and requirements). · Waste must be classified prior to disposal – refer to NSW EPA Waste Classification Guidelines (2015). · Records of the quantity and final locations of all on and offsite waste will be maintained · Provision of skip bins (or equivalent) to be used to collect all general wastes generated during the works. · Provide an adequate number of skip bins on site to contain all general waste generated throughout the works. · Provide bins to enable waste segregation · Provide recycling services (e.g. Paper, Concrete, Steel, Cardboard, Timber). · Ensure housekeeping is maintained and waste is disposed of to the appropriate bin. · Retain waste disposal permits and figures on the amount of waste that has been removed from site.
Monitoring & Reporting	**Real-time Supervision -** Real-time observation of all ground disturbances by a suitably qualified environmental practitioner to identify and manage suspected contaminated material. **Sampling and analysis** of material properties for categorisation and validation purposes in accordance with the tender specifications. The **daily record of material management** is required to summarise material interaction for the day and include: · Description of earthworks activity undertaken;

Hazardous / Contaminated Material	
	· Description of cut to fill or cut to stockpile activities including locations; · Notification to HCCDC of suspected contaminated or otherwise hazardous material encountered and description of handling, current location, further assessment required; and · Summary of any handling of previously notified material including update on current location. All notifications are also to be tracked through a notifications register to record final disposal location. **Monthly Progress Reporting** is to include details of the implementation environmental management requirements including: · Update on any environmental risks and opportunities, and significant environmental impacts associated with the work; · Progress against environmental objectives, targets and measures of performance; and · Management actions, including environmental controls, training, inspections and testing. Specifically, the environmental monthly reporting is to include such items as: · Characterisation, site management and fate of contaminated material, collated materials tracking information; · Quality assurance on placed material; · non-compliances and corrective actions; · environmental monitoring requirements; and · monthly logs and photographs and other records of the progressive compilation of information that will be integrated into the Validation Report on completion. A **Validation Report** is required to satisfy Condition 4h of the Surrender Notice which requires that there is written confirmation the cap was established in accordance with relevant specifications.
Actions	The Contractor's CEMP is to include specific procedure for monitoring, management and documentation of materials management suitable for implementation to achieve the intent of the Materials Management Plan and Surrender Notice under the Contractors specific construction methodology.
Responsibilities	The Contractor is to ensure that appropriate resources and processes are in place and that appropriate records are kept to allow validation that materials have been managed in accordance with the Surrender Notice.
Timeframe	Duration of site activities where works may encounter potentially contaminated fill materials.

Appendix D. Flora and Fauna Management Plan

Flora and Fauna	
Objective	To comply with contractual and legislative requirements and ensure that native fauna and flora are protected from construction activities.
Targets	No death or injury to fauna including the Green and Golden Bell Frog No unapproved destruction of flora
Legal, Contractual & Other Requirements	*Environmental Protection and Biodiversity Conservation Act 1999* *Threatened Species Conservation Act 1995 (repealed)* *Biodiversity Conservation Act 2016 (Transitional Arrangements).*
Site specific planning / approval conditions / licence conditions	**State Documents** NSW EPA (2010), Approval of the Surrender of a Licence – License 6437, (Ref: 1111840, and as varied by notice number 1510956 and 1520063) Golders (2011), KIWEF Closure Works, Green and Golden Bell Frog Management Plan (Ref: 117623029-001-R-Rev0) Jacobs (2018) Addendum Review of Environmental Factors, KIWEF Area 2 Closure Works **Commonwealth Documents** Ramboll (2018), EPBC Referral, Preliminary Documentation Package – KIWEF Area 2 Closure Works (Ref: 318000395)
General Flora and Fauna Mitigation Measures and Controls	General mitigation measures to be considered include: · Adequate run-off, erosion and sedimentation controls should be in place during construction, particularly in areas where run-off has the potential to impact on nearby waterways, surrounding native vegetation, EEC regrowth, and existing drainage line and dam areas. · Care should be taken that any noxious weeds occurring on the site are not further dispersed as a result of the Proposal. A follow up Weed Control Program may be necessary to control the encroachment of these species into surrounding areas. The landowner has a legal responsibility to control and suppress these species on their property under the *Noxious Weeds Act 1995*. The Weed Control Program should be remove weeds by physical means and avoid the use of herbicides. · Stockpiling of soil that may contain seeds of exotic species shall be stockpiled away from adjacent vegetation or drainage lines where they could be spread during rainfall events. · Placement of soil stockpiles away from vegetated areas. · Utilising existing disturbed corridors such as cleared areas, roads, tracks and existing easements, where possible for set up of equipment, stockpile areas and site facilities.

Flora and Fauna	
	· Noxious weeds to be managed in accordance with the expectations under the *Biosecurity Act 2018*. It is recommended that the plants be removed by physical removal, as herbicides may impact GGBFs and their habitat. · Open excavations and storage areas to be inspected regularly for the presence of fauna species. · Plant and equipment brought on to site must be cleaned and free of deleterious material, mud and other material that may harbour weed seeds · Proposed hours of construction are to be maintained to restrict noise and light impacts on nocturnal fauna. · Utilise an onsite ecologist during construction to re-locate any native fauna which may be displaced. · Avoid rubbish and other waste build up to deter feral animals. · Habitat features such as woody debris that may be utilised by fauna within the construction area would be retained and set-aside during the construction period for reinstatement at completion of works. · Any water required for dust suppression will be drawn from ponds established for the purpose. No water for dust suppression will be drawn from existing ponds on the site. The establishment of dedicated dust suppression ponds will be undertaken to prevent the potential spread of Plague Minnow into ponds currently free of this species. The location and procedure for those dedicated dust suppression ponds will be communicated during the site induction and training. · No night works are permitted without additional assessment of potential noise and light impacts. · Lighting of site compounds, if required for safety and security, will avoid light spill outside of the construction works footprint and will be undertaken in accordance with *Australian Standard 4282—1997 Control of the obtrusive effects of outdoor lighting.*
GGBF Management	GGBF impact avoidance is to be based on the following: · Establishment and use of Chytrid Hygiene procedures such that the Chytrid fungus is not brought to site or transferred between areas of the site; · Appropriate levels of GGBF pre-clearance/disturbance surveys and relocation to ensure to the extent possible that direct disturbance areas are free of GGBF on commencement of works in each area; · Establishment of GGBF exclusion fencing such that the risk of GGBF re-entering surveyed areas is prevented; · Establishment of clear boundaries of works areas such that unnecessary disturbance is avoided, particularly adjacent to existing ponds; · Establishment of appropriate erosions and sediment controls to prevent sedimentation and pollution of waters; · Implementation of GGBF risk consideration to all decision making such that unintended consequences to GGBF can be avoided. This includes in considering suitability of imported materials from a Chytrid risk and nutrient perspective and use of chemicals including flocculants, herbicides and pesticides; and · Rehabilitation using species preferred by GGBF (refer to rehabilitation management plan).

Flora and Fauna	
Chytrid Fungus hygiene protocol	A Chytrid Hygiene procedure in accordance with the NSW Threatened Species Management Information Circular No.6 – Service Hygiene Protocol for the Control of Disease in Frogs (April (2008) or most recent revision of that document, must be implemented on the Closure Works site during all works and any other activities undertaken as part of the action. This procedure is to include: · Dedicated disinfection bays established at site entry and all vehicles required to enter via this bay; · All disinfection processes will be monitored and controlled at the Closure Works entry point; · The location of these disinfection bays, and the obligations of disinfection, will be communicated during the site induction and training; · Cleaning and disinfection of workers boots upon entry and exit from the site; · Procedures will be implemented to inspect mobile plant entering the Project site during construction activities to control soil and/or organic matter and to disinfect tyres and wheels of vehicles entering the Project site; and · Vehicles arriving at site muddy will be sent away for more intensive cleaning prior to disinfection.
Chytrid Fungus Risk Assessment Process	The contractor is to demonstrate that suitable risk assessment has been undertaken by an appropriately qualified and experienced ecologist on all imported capping and revegetation materials to demonstrate that it contains a low risk of containing Chytrid. Risk assessment should consider as a minimum: · Material not sourced from known, suspected or likely amphibian habitat areas; · Material unlikely to have had contact with amphibians and no amphibians present in material; and · Material are not to be stored in, or come in contact with material sourced from, areas of known, suspected or likely amphibian habitat prior to transport.
Pre-clearance survey design and clearance methodology.	The Contractor will be responsible for developing a pre-clearance survey and clearing methodology suitable for implementation with the contractors specific construction methods that minimises potential harm to GGBF species. The survey methodology should give consideration to the following factors: · Level of effort warranted in different areas and habitats; · Seasonal factors on GGBF use of habitat; and · Need for night time surveys. · Survey effort required is likely to include: o Targeted active searches of potential GGBF habitat located within the disturbance footprint; o Conducted to minimise disruption of breeding activities: relocated tadpoles or metamorphs; · Be conducted in accordance with hygiene protocol;

Flora and Fauna	
	· Habitat resources including all wet areas as well as rocks, logs, tussock forming vegetation, and other cover will be searched during diurnal visual inspections. · A nocturnal habitat search including visual search, spotlighting and call playback may be conducted to assess nocturnal use (breeding/calling) in the habitat supported in disturbance area, if the surveys are conducted during core breeding season (spring/summer); · Any GGBF observed within the disturbance footprint will be relocated in accordance with relocation procedure provided in the GGBF Management Plan prior to commencement of disturbance; and · The survey methodology implemented should allow the qualified and experienced ecologist to confirm that the risk of GGBF mortality has been reduced to the extent reasonable and feasible for the applicable habitat type/area. The clearing methodology should include the following: · Consideration of most appropriate time to install frog exclusion fences; · Presence of an appropriately qualified and experienced ecologists during clearing; · Gradual degradation of higher risk habitat areas progressing from areas furthest away from pond towards areas of refuge; · Relocation of cleared vegetation to areas away from immediate works that allow remaining amphibians to escape; and · Ability to open amphibian fences during clearing at key times to allow fauna to escape.
Amphibian Relocation	If any frog specimens thought to be a GGBF are observed and are within project disturbance area the following relocation procedure will be implemented: · Observer to notify Site supervisor who in turn is to notify the HCCDC, a suitably qualified ecologist, and the Contractor's supervisor of the frog's location immediately; · Contractor supervisor to halt work in the immediate vicinity to prevent accidental interaction with the frog; · The ecologist or HCCDC's environmental representative will determine whether the frog is likely to be harmed by works or is likely to migrate to an area that it could be harmed; · If likely to be harmed by works the GGBF will be captured by the ecologist or suitably trained frog handler following GGBF handling and Hygiene procedures; · A one frog per bag policy will be observed with disinfection of all equipment undertaken immediately following any contact with frogs of any description; · If healthy the frog will be held in a cool, dark, moist place until nightfall before being released to a suitable location in the immediate vicinity of capture but outside the disturbance footprint;

Flora and Fauna	
	· GGBF showing Chytrid symptoms and deemed unlikely to survive transportation will be euthanized and preserved prior to dispatch to a designated sick or dead frog recipient in accordance with Appendix 2 of the National Parks and Wildlife Service's Hygiene protocol for the control of disease in frogs (NPWS, 2008); · If deemed likely to survive transportation GGBF will be placed in a damp cloth bag or partially inflated plastic bag with leaf litter; · Dead frogs will be preserved in accordance with the approved GGBF management plan including cutting open stomach and preserving in 10 times the volume of the specimen of 65% ethonol or 10% buffered formalin · The designated sick or dead frog recipient will be contacted prior to transport to confirm appropriate procedures; · Containers used for storing frogs will be labelled with date, location and species if known; and · A standardised collection form must be completed and a copy sent with the specimen.
Actions	The contractors CEMP is required to establish the actual pre-clearance and clearance methodology, exclusion fence designs and Chytrid Risk assessment and documentation proposed.
Responsibilities	Contractor's Ecologist is responsible for ensuring risks to Fauna is minimised to the extent reasonable and feasible. Contractor's Project Manager is responsible for allowing sufficient time within program to conduct pre-clearance and clearance in a manner that maximises survival of GGBF and other fauna following the advice of the Ecologist. Contractor is responsible for notifying the Principal of any sick or dead GGBF. All personnel are responsible for ensuring that the clearing limits are addressed and native flora and fauna species are protected. All site personnel to undertake toolbox talks in relation to the reporting process for injury/ death to fauna or clearing of flora occurring beyond the required limits for construction.
Timeframe	Duration of the works.
Monitoring & Reporting	Daily visually monitoring by site supervisors for obvious signs of fauna and the functioning of controls including fences and Chytrid hygiene stations. Weekly inspections to be documented on a Weekly Environmental Inspection Checklist. Outcomes of pre-clearance surveys are to be documented and provided to the HCCDC. Observed sick or dead GGBF are to be notified to the Principal immediately.

Appendix E. Revegetation Management Plan

Revegetation Management Plan	
Objective	To comply with State and Commonwealth approvals requirements and related conditions. To provide a post construction environment that is revegetated to stabilise the capping surface; and planted with species known to be favoured by GGBF.
Targets	The capped surface is stabilised and vegetated within 12 months of construction completion. Provide a revegetated capped surface that includes species of flora known to be favoured by GGBF.
Key Documents	**State Documents** NSW EPA (2010), Approval of the Surrender of a Licence – License 6437, (Ref: 1111840, and as varied by notice number 1510956 and 1520063) Golders (2011), KIWEF Closure Works, Green and Golden Bell Frog Management Plan (Ref: 117623029-001-R-Rev0) GHD (2009), Report on KIWEF, Revised Final Landform and Capping Strategy (Ref: 22/14371/85882 R4) Jacobs (2018) Addendum Review of Environmental Factors, KIWEF Area 2 Closure Works **Commonwealth Documents** Ramboll (2018), EPBC Referral, Preliminary Documentation Package – KIWEF Area 2 Closure Works (Ref: 318000395)
Mitigation Measures and Controls	General mitigation measures to be considered include: · Care should be taken that any noxious weeds occurring on the site are not further dispersed as a result of the Proposal. A follow up Weed Control Program may be necessary to control the encroachment of these species into surrounding areas. The landowner has a legal responsibility to control and suppress these species on their property under the *Noxious Weeds Act 1995*. The Weed Control Program should be remove weeds by physical means and avoid the use of herbicides · Stockpiling of soil that may contain seeds of exotic species shall be stockpiled away from adjacent vegetation or drainage lines where they could be spread during rainfall events. · Placement of soil stockpiles away from vegetated areas. · Utilising existing disturbed corridors such as cleared areas, roads, tracks and existing easements, where possible for set up of equipment, stockpile areas and site facilities · Bitou Bush and Crofton Weed would be managed by following the Local Noxious Weed Control Plans (NCC 2006). It is recommended that the plants be removed by physical removal, as herbicides may impact GGBFs and their habitat.

Revegetation Management Plan	
	· Plant and equipment brought on to site must be cleaned and free of deleterious material, mud and other material that may harbour weed seeds · Works associated with the closure of the KIWEF must only occur within the closure works area (project footprint); and must be restricted to the extent required to satisfy the Surrender Notice requirements. · All disturbed surfaces will be revegetated within 1 month of final land forming and in compliance with the landscaping plans. · Any capping materials that are imported from outside the KIWEF facility must be sourced from an area that is assessed as having a low risk of containing Chytrid Fungus. The Chytrid Assessment Process will follow the below procedure: · The contractor is to demonstrate that suitable risk assessment has been undertaken by an appropriately qualified and experienced ecologist on all imported capping and revegetation materials to demonstrate that it contains a low risk of containing chytrid. Risk assessment should consider as a minimum: o Material not sourced from known, suspected or likely amphibian habitat areas; o Material unlikely to have had contact with amphibians and no amphibians present in material; and o Material stored in a dry location prior to transport. · Topsoil to be used for surface layers must be sourced from within KIWEF to the extent possible and will otherwise be assessed as low in nutrients and having a low risk of containing Chytrid Fungus to be protective of adjacent MNES habitat. · Upon completion of works, the works area will be rehabilitated with vegetation species known to be favoured by GGBF. · Open stormwater infrastructure across the KWIEF site will be planted with species known to be favoured by GGBF. This revegetation and rehabilitation strategy will include a 2m wide buffer on either side of the stormwater drains. The intention is to provide movement corridors for GGBF across the site. · Drainage culverts will, where practicable, be vegetated and lined with rocks and objects that may provide temporary frog refuge, in the event that a frog seeks to traverse the future capped area of KIWEF. · Habitat features such as woody debris that may be utilised by fauna within the construction area would be retained and set-aside during the construction period for reinstatement at completion of works. · Prior to the Construction Completion dates the Contractor is required to seed the vegetation layer above the capping layer and reseed areas where sparse vegetation coverage is achieved by the end of the care and maintenance period.
Species Mix	<u>Aquatic vegetation:</u> · Selection of reeds that provide good habitat cover such as Typha, Bolboshoenus, Phragmites, and Juncus; · A mixed community is preferable to single species stands;

Revegetation Management Plan	
	· GGBF prefer wetlands with sections of open water. Water depth should be deep enough to prevent Typha spreading across the entire pond area; the reeds should be mainly at the edge of ponds; Substrate at edges should be suitable for reed growth (i.e. not too many pebbles, sandbags, etc.); · Areas of low blanketing vegetation are also desirable for GGBF breeding, for example, Paspalum grass and Shoenoplectus rush; · Establishing aquatic plants with planting after Closure Works: will maximise structural suitability of wetland to immigrating GGBF as soon as construction is completed. <u>Terrestrial vegetation:</u> · Stabilise new works with sterile millet (or other suitable cover crop); · Retain seed bank in fill taken from site (to be reused); · Avoid large tree species (as roots may potentially compromise the cap); Allow terrestrial species to re-colonise Drainage culverts will, where practicable, be vegetated and lined with rocks and objects that may provide temporary frog refuge, in the event that a frog seeks to traverse the future capped area of KIWEF.
Performance Criteria	Establish adequate vegetation coverage across the closure area. Where vegetation regrowth is sparse (ie less than 50% growth) in areas of greater than 10m^2, the performance criteria will be considered to have failed and contingency measures are required. No deep-rooted vegetation (ie large shrubs or trees) on top of capped surface
Contingency Measures	Where Vegetation Coverage has been identified to be insufficient, the area will be reseeded. Where deep-rooted vegetation is identified on top of capped surface. The vegetation will be removed (mechanically where possible).
Responsibilities	The Contractor is responsible for undertaking the work, monitoring and maintenance of all elements of the revegetation management plan, until the completion of the construction maintenance period (indicatively 3 months post construction completion). The State (or its agent) is responsible for the monitoring and maintenance of all elements of the revegetation management plan and any rectification works, following the completion of the construction maintenance period.
Timeframe	For the duration of the construction works; and the construction maintenance period.
Monitoring & Reporting	Vegetation establishment will be visually monitored monthly during the construction works and construction maintenance period to identify any areas where vegetation is failing to establish. Should vegetation not establish within the construction maintenance period then targeted seeding and/or planting would be undertaken.

Appendix F. Water Quality Management Plan

Water Quality Management Plan	
Objective	To comply with State and Federal approval requirements. To prevent water discharges from construction works area to the extent possible. To manage water discharged to avoid impact to receiving waters.
Targets	No sediment or water quality impacts to the surrounding environment and waterways from the construction works.
Key Documents	**State Documents** NSW EPA (2010), Approval of the Surrender of a Licence – Licence 6437, (Ref: 1111840, and as varied by notice number 1510956 and 1520063). GHD (2009), Report on KIWEF, Revised Final Landform and Capping Strategy (Ref: 22/14371/85882 R4) **Commonwealth Documents** Ramboll (2018), EPBC Referral, Preliminary Documentation Package – KIWEF Area 2 Closure Works (Ref: 318000395)
Controls	Erosion and sediment control will be designed, installed and managed as follows: · Progressive erosion and sediment control plans (ESCPs) will be developed by the Contractor and implemented prior to the commencement of topsoil stripping and earthworks. · The for construction design for permanent sediment basins is to be in accordance with the environmental protection standards for sensitive environments based on Managing Urban Stormwater - Soils and Construction, (Landcom, 2004), as well as documents from other States and internationally (such as “International Erosion Control Association – Australasia”). · The Contractor is required to install the permanent sediment basins as per the for construction design and any necessary temporary erosion and sediment control measures in advance of bulk-earthworks reporting to each basin. · Alternative arrangements proposed by the Contractor are also required to be in accordance with these standards. · Erosion and sediment control structures are to be regularly inspected and maintained, particularly in advance of and following significant rainfall events. · Any water discharges are required to be managed to avoid pollution of waters having regard to the sensitivity of the receiving environment. In particular, any flocculants are to be demonstrated as being both effective and safe for amphibians prior to use. · Top soil/mulch stockpiles to be not greater than 2.0m in height. All stockpiles will be located clear of watercourses and drainage works. · Wastewater management facilities shall only be provided through proprietary storage and pump out systems. · All disturbed surfaces will be revegetated as soon as possible.

Water Quality Management Plan	
	· All temporary ESC works will be removed immediately prior to final completion and all surfaces will be returned to pre-existing condition. · Provision of shaker grids or rumble strip at site egress points. · if contaminated materials are encountered, they are to be managed in accordance with Materials Management Plan, and as a minimum isolated and covered to avoid runoff.
Performance Criteria	Discharge quality must comply with Performance Criteria: · TSS: < 50mg/Lt (~Turbidity 30NTU). · pH: Between 6.5 and 8.5. · Otherwise able to be demonstrated not to have caused pollution of waters.
Contingency Measures	If Water Quality performance criteria is not suitable for discharge, other management measures must be implemented prior to discharge. These may include such things as: · the trapped sediment laden water may be treated with flocculants at a rate demonstrated in advance to be effective on the local material properties and using substances safe for amphibians; · Dosing with appropriate buffers to neutralise water; · Other mitigation measures deemed appropriate which may include a purpose constructed soak-away where HCCDC advices a suitable location such that contamination in fill is not likely to be mobilised.
Responsibilities	The Contractor is responsible for undertaking the work, monitoring and maintenance of all elements of the water quality management plan until the completion of the construction maintenance period (indicatively 3 months post construction completion). The State (or its agent) is responsible for the monitoring described under the KIWEF Annual Water Monitoring and the KIWEF Continuous Data Logging.
Timeframe	Construction Water Quality and Erosion Sediment Controls will be maintained and monitored throughout the duration of site works.
Monitoring and Reporting	Daily visual monitoring by site supervisors. Documented post rainfall checks of sediment basin water level and water quality and erosion and sediment control functioning. Weekly documented inspections. Maintenance activities for ESCPs shall be documented. Sediment basin discharge or dewatering water quality sampling and analysis suitable to demonstrate pollution of water has/will not occur. All water quality data including quantity, quality and dates of water release will be maintained within the project records.

Appendix G. Traffic Management

Traffic Management	
Objective	To ensure that additional traffic from construction activities does not cause an environmental nuisance.
Targets	No valid complaints resulting from congestion from construction traffic Comply with traffic management standards
Legal, Contractual and Other Requirements	*Protection of the Environment Operations Act 1997* *Roads Act 1993* RTA Traffic Control at Worksites Roads (General) Regulation 2000 *Local Government Act 1993*
Site specific planning / approval conditions / licence conditions	Not applicable.
Controls (means and resources)	The Contractor is required to develop a Traffic Management Plan detailing the route to the site, times of activity, types of machinery, signage, traffic control measures, once the source of any imported materials has been identified. The following traffic management control measures to be implemented are to be detailed in Construction Traffic Management Procedures (CTMP): · Traffic will be required to adhere to routes and speed limits designated by the Contractor, in consultation with the HCCDC, ARTC, NCIG and RMS and the RMS Contractor for the Tourle Street / Cormorant Road upgrade works (if ongoing); · Worksite speed limits will be determined for areas of the site based on road type, road condition and adjacent work activity; · Normal road rules apply unless specifically stated otherwise; · Barrier systems may be used at the discretion of the Contractor to define the designated routes; · All project personnel will be required to undertake the site induction that will specify appropriate traffic practices on site; · Site staff with responsibilities for control of construction activities will perform site inspections aimed at maintaining traffic at determined worksite speed limits; · Following site surface stabilisation/ rehabilitation works to control erosion, foot and vehicular traffic will be avoided on recently stabilised areas wherever practical; · Water spraying (where appropriate) will be used to minimise the generation of dust from roadway surfaces; · An inspection system will be established by the Contractor to assess effectiveness of traffic control measures. The assessments will determine if any modification is required to practices on site or the CTMP; and · An incident management procedure for emergencies relating to traffic management for the project works.

Traffic Management	
Actions	Contractor to incorporate the above traffic management measures into Contractor's Traffic Management Plans.
Responsibilities	The Contractor is responsible for ensuring traffic management plans are developed, approved and implemented.
Timeframe	Duration of site works.
Monitoring and Reporting	Daily inspection, checks and regular maintenance to be completed for traffic control measures.

Appendix H. Air Quality Management

Dust and Air Quality	
Objective	To ensure that dust and other air emissions from construction activities do not cause impacts on sensitive receivers and equipment.
Targets	No visible dust (or offensive odours) leaving site and reaching: · Identified or potential GGBF habitat, particularly water bodies and fringing vegetation; and · Cormorant Road or neighbouring coal loader operations.
Legal, Contractual and Other Requirements	Contract specification Review of Environmental Factors Kooragang Island Waste Emplacement Facility Area 2 Closure Works (ERM 2016) *Protection of the Environment Operations Act 1997* *Protection of the Environment Operations (Clean Air) Regulation 2002*
Site specific planning / approval conditions / licence conditions	All activities associated with the closure, capping, rehabilitation and post-closure maintenance and monitoring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.
Controls (means and resources)	Mitigation measures include amending the nature of work in the event that construction works do not meet the above Objective. Operation of all facilities and equipment on the site will be performed so as to minimise reduce the emission of dust, odour and other air impurities including: · Use of water sprays to reduce dust emission from trafficable areas, work areas, stockpiles and other exposed areas but not to draw water from existing ponds as per the flora and fauna management plan; · Where necessary, stabilisation of long term stockpiles; · Reduce the number and extent of disturbed areas at a given time during the remediation activity on site; · Control of haul loading vehicles, whereby the load will not exceed the height of the haul boards and tailboards on the vehicles; · The vehicle speed shall be restricted along the haul roads on site to minimise dust generation and potential spilling of hauled material; · Cleaning/maintenance of the access and haul roads where they interface with public roads to prevent sediment tracking; · Loads of soil or contaminated material entering and leaving site will be covered. Internal material transport will also require a cover if material is likely to or observed to be generating dust; · Any excavated material likely to generate odours will be covered; · Maintenance and servicing of plant and vehicles to minimise reduce emission of air pollutants; · Observations of prevailing (and forecast) weather conditions, to program site activities in order to minimise air quality issues;

Dust and Air Quality	
	· Modify work practices during dry and windy conditions; · Progressively stabilise and/or revegetate as areas of works as completed; · Provide shaker grids or rumble strip at site egress points and where aggregate is used, minimum size is 150mm; · Remove mud from haul vehicles prior to entering public roads; · Remove spilt mud by construction equipment or vehicles on public roads; and · Provide awareness training in the need to minimise dust during site inductions and toolbox talks.
Actions	Contractor to implement reasonable and feasible measures from the above to achieve air quality goal.
Responsibilities	Contractor
Timeframe	Duration of site works. Water tankers and other measures available at the commencement of earthworks. Spilt mud and sediment to be removed from public roads as soon as practicable, and at least prior to the end of each shift.
Monitoring and Reporting	Daily observations of dust generation, mud tracking, vehicle emissions, site generated odours and weather conditions (wind direction and strength). Weekly inspect to record functioning of air quality controls.

Appendix I. Noise Management

Noise and Vibration	
Objective	To ensure that noise and vibration from construction activities does not cause environmental nuisance or unnecessarily disturb fauna.
Targets	No valid noise / vibration complaints resulting from construction works. No unreasonable noise or vibration. No noise and vibration impacts on external receptors.
Legal, Contractual and Other Requirements	Works are to be undertaken in accordance with the Interim Construction Noise Guidelines with works to be restricted to: · 7 am to 6 pm Monday – Friday · 8 am to 1 pm Saturdays No work outside of these hours without HCCDC's approval (except for emergency situations). *Protection of the Environment Operations Act 1997* *Protection of the Environment Operations (Noise Control) Regulation 2000*
Site specific planning / approval conditions / licence conditions	All activities associated with the closure, capping, rehabilitation and post-closure maintenance and monitoring at the premises must be carried out in a competent manner. This includes: · The processing, handling, movement and storage of materials and substances used at the premises; and · The treatment, storage, processing, reprocessing, transport and disposal of any waste generated by the activity. All plant and equipment installed at the premises or used in connection with the closure, capping, rehabilitation and post-closure maintenance and monitoring activities at the premises must be: · Maintained in a proper and efficient condition; and · Operated in a proper and efficient manner.

Noise and Vibration	
Controls (means and resources)	No work will be undertaken outside of the agreed hours without prior approval (except in an emergency situation). Delivery operations or other noise generating activities at compound and storage areas will take place during the designated construction hours nominated above, unless specifically required by Police or RTA requirements. Reasonable and feasible mitigation measures to be considered as required include: · Avoiding where practical the use of noisy plant simultaneously close together or adjacent to sensitive receptors; · All plant will be maintained in accordance with the manufacturer's requirements; · Stationary noise generating equipment to be orientated away from sensitive areas; · Undertaking loading and unloading activities away from sensitive areas and during designated construction hours; · Selection of the most appropriate plant and equipment to minimise noise generation and include where necessary screening and enclosures; · Regular checks are to be undertaken to ensure all equipment and vehicles are in good working order and are operated correctly; and · Awareness training and information will be provided to project personnel in relation to the vibration requirements on the project and the need to minimise vibration when in close proximity to operational areas (rail corridor).
Responsibilities	Contractor
Timeframe	Duration of site works.
Monitoring and Reporting	Vehicle inspections to be recorded on daily vehicle pre-start checks.

Appendix J. Heritage management

Heritage Management Archaeology and Heritage	
Objective	To ensure that undiscovered heritage and archaeological items are protected from construction activities.
Targets	Unknown or undocumented heritage sites are not knowingly destroyed, defaced or damaged. Identify and protect any new artefacts or heritage sites before any harm can take place.
Legal, Contractual & Other Requirements	*Heritage Act 1977* *National Parks and Wildlife Act 1974*
Controls (means & resources)	No known heritage items or areas have been identified within the project site or surrounds. As such, heritage mitigation measures are limited to restricting access beyond the project boundary and the implementation of the following 'chance find' protocol: · In the event that potential Aboriginal and Historic heritage items are discovered, STOP ALL WORK in the vicinity of the find and immediately notify the relevant Construction Supervisor and Environmental Manager; · Contact HCCDC to notify of the find as soon as they receive notification; · In the event of uncovering remains that are potentially human, the NSW Police are also to be contacted immediately; · Record the details and take non-intrusive photos of the find and relay information to HCCDC; · HCCDC will contact a qualified archaeologist to get advice regarding the nature and potential significance of the find; · If the qualified archaeologist advises that the find is not a potential heritage item, work will recommence in consultation with HCCDC; · If the qualified archaeologist advises that the find is a potential heritage item HCCDC will contact and notify the relevant authority; and · Work is not to recommence in the area of the identified find until clearance is received from HCCDC.
Responsibilities	All persons are responsible for reporting items of potential cultural or heritage value. Contractor's representative will ensure the implementation of the above chance finds protocol in the event that items of potential cultural or heritage value are uncovered.
Timeframe	Duration of site works
Monitoring & Reporting	Ongoing visual observations for previously unidentified items. Reporting of any chance finds in accordance with the above protocol.

APPENDIX 4
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (DARACON, 2019)

DARACON Group

Construction Environmental Management Plan (CEMP)

Sub Plan to IPMP

1634

INTEGRATED MANAGEMENT SYSTEM

Sub-Plan Details	
Type of Document:	Sub Plan to IPMP
Sub-Plan Name:	Construction Environmental Management Plan (CEMP)
Issue N°.	2.0
Issue Date:	12/08/2019
Next Review Date:	Insert Review Date
Sub-Plan Developed By:	Cheslyn Africa

Project Details	
Project Name:	Kooragang Island Waste Emplacement Facility
Project Number:	1634
Address of Project:	Cormorant Road, Kooragang NSW
Principal Contractor:	Daracon Contractors
Principal Contractor Address:	20 Kullara Close, Beresfield NSW 2322
Project Client:	Hunter and Central Coast Development Corporation

Sub-Plan Review Control

Issue N°.	Description of Changes to the Plan	Date
1.0	Draft for review and approval	12/08/19
2.0	Updated Following Client Review	21/10/19

Document Template Revision Control

Issue N°.	Description of Changes to the Template	Date
1.0	Initial Approval	22/05/2018

Sub-Plan Approval	Name	Position	Signature
Document Owner:	Cheslyn Africa	Project Manager	
Document Approver:	Michael Rummery	Divisional Manager	

Sub-Plan Issue Control	
Insert document controlled copy number if printed and/or issued externally:	

TABLE OF CONTENTS

APPENDICES

1 PURPOSE

This Construction Environmental Management Plan (CEMP) has been developed with specific information to allow for effective management and control of the project. This plan has been developed taking into consideration the Integrated Project Management Plan (IPMP), Daracon's Legal and Other Requirements including but not limited to relevant Acts, Regulations, Codes of Practice and Industry Standards / Guidelines.

In addition, the framework for this plan has been prepared to align with the Daracon Management System (DMS), AS/NZS & ISO Standards and Client requirements where applicable. The CEMP forms part of Daracon's Integrated Project Management Plan but can also be reviewed as a standalone document to verify compliance with Regulatory approvals.

2 PROJECT OVERVIEW AND SCOPE

The KIWE Facility Area 2 Stage 5 HCCDC18/04 project involves the following scope of work, which is covered by this CEMP for the following specific activities:

- Site Mobilisation, including Survey, services search, dilapidation report: establishment of site amenities, temporary fencing, GGBR fencing, surveys and hygiene protocols;
- Management of Haul Roads, including traffic control and maintenance;
- Installation of Erosion and Sediment Control plans, modify and maintain as works progress;
- Clearing and Grubbing of existing vegetation on site;
- Excavation, earth movement and regrading to sub-grade level, including classification and stockpiling of excavated material;
- Ongoing attendance and visual, olfactory and other required assessment as necessary to characterise the sub-grade layer as being meeting Level 1 contamination in accordance with the KIWEF MMP;
- Identification and treatment of Level 2 materials in accordance with the KIWEF MMP;
- Identification and treatment of Level 3 materials in accordance with the KIWEF MMP;
- Excavation and management of sub-grade material exhibiting contamination levels in excess of the Level 1 contamination criteria;
- Compaction and/or treatment of the sub-grade and removal of unsuitable material;
- Testing of the sub-grade, and trimming and compaction of the whole site to achieve a smooth, hard, and consistent surface to allow placement of an engineered cap (sealing layer);
- Testing of the sub-grade, and trimming and compaction of the low area and demonstration of the presence of a 500 thick sealing layer comprising in-situ and/or imported material, and excavation and replacement with imported sealing layer material as required;
- Excavate for, supply, bed, lay, and backfill for new drainage structures (such as pits, pipes, drains and liners, drop structures, sediment basins and the like);
- Capping Demonstration/ Capping Demonstration Pad;

- Win from designated areas or stockpiles, supply, place, trim and compact the capping layer which must achieve the specified level of permeability and thickness and be demonstrated by the Contractor as being fully compliant;
- Sourcing capping (sealing layer) material from Borrow Areas, stockpiles, or nominated sources;
- Supply, place, trim and compact the sealing layer which must achieve the specified level of permeability and be a minimum of 500mm thick and be accepted by the Site Auditor as being suitable;
- Undertake geotechnical investigation to confirm the in-situ sealing layer achieves the specified level of permeability and be a minimal of 500mm thick, or partial thickness where required, of suitable material and be accepted by the Site Auditor. If the in-situ sealing layer is not compliant the material shall be excavated and replaced/ compacted as required to achieve compliance;
- Undertake geotechnical investigation to confirm the NCIG capping achieves the specified permeability and be a minimum of 500mm thick of suitable material graded to 1%. If the NCIG capping I not compliant the Contractor shall seek advice from the Principal and undertake the works as directed;
- If required by the Principal, installation of Extreme Weather GGBF Refuges within the Area 2 closure works footprint to provide GGBF movement corridors throughout the Area 2 site during droughts and extended dry periods;
- Supply and install, including all seaming and welding: geotextile layers, geo-membrane liners, drainage layers and associated drainage works, and supply and undertake all QA/QC, monitoring, testing and validation reporting to verify that the works have been completed in accordance with the contract and technical specifications;
- Placement of a 100mm revegetation layer over the sealing layer, including seeding, landscaping and be demonstrated by the Contractor as being full compliant.
- Construction of and protection from erosion of drainage structures including scour protection and rock placement;
- Access tracks;
- Dust suppression as required;
- Certification of works from the Environmental Consultant, Geotechnical Consultant, and other consultants as necessary and included in a ‘Validation Report’ that demonstrates that the cap has been installed in accordance with the Approval of the Surrender of Licence No.6437 and all relevant conditions;
- Removal of all temporary fencing and make good any existing fencing;
- Clear/ clean stormwater lines upon the completion of contract and
- 13 week maintenance period.

Other operations will be undertaken by Daracon that are considered normal in delivery of the above activities. Additional activities may also be realised at the request of the Client throughout the duration of the project.

3 CEMP REFERENCE DOCUMENTS

3.1 LEGISLATION

- Work Health Safety Act 2011;
- Work Health Safety Regulation 2017;
- Rail Safety National Law Act NSW 2012;
- Rail Safety *(Adoption of National Law)* Act 2012;
- Rail Safety National Law Regulations 2012;
- Rail Safety *(Adoption of National Law)* Regulation 2012;
- Protection of the Environment Operations Act NSW 1997;
- NSW Threatened Species Conservation Act 1995;
- NSW Noxious Weeds Act 1993;
- NSW Heritage Act 1977;
- NSW Local Government Act 1993;
- Commonwealth Aboriginal & Torres Strait Islander Heritage Protection Act 1984;
- NSW National Parks and Wildlife Act 1974;
- NSW Native Vegetation Act 2003;
- NSW Water Management Act 2000;
- NSW Threatened Species Conservation Act 1995;
- Commonwealth Environmental Protection and Biodiversity Conservation Act 1999;
- Environmental Planning and Assessment Act 1979 No 203;
- Environmental Planning and Assessment Regulation 2000;
- NSW Pesticides Act 1999;
- NSW Pesticides Regulation 2009;
- NSW Rural Fires Act 1997;
- Biodiversity Conservation Act 2016;
- Biodiversity Regulation 2017;
- Biosecurity Act 2015;
- Biosecurity Regulation 2017;
- Contaminated Land Management Act 1997;
- NSW Waste Avoidance and Resource Recovery Act 2001;
- Protection of the Environment Operations (Clean Air) Regulation NSW 2002;
- NSW Environmentally Hazardous Chemicals Act 1985 and
- Newcastle City Council Local Environmental Plan.

3.2 STANDARDS, CODES OR GUIDELINES

- SafeWork NSW Codes of Practice;
- SafeWork Australia Codes of Practice;

- Australian and NZ (AS/NZS) Standards;
- Australian Rail Track Corporation (ARTC) Codes of Practice, Engineering Standards and Guidelines;
- ISO9001:2015 Quality Management System;
- AS/NZS 4801:2001 Occupational Health and Safety Management Systems;
- ISO14001:2015 Environmental Management Systems;
- Managing Urban Stormwater: Soils and Construction - Volume 1, 4th Edition (*Bluebook*);
- AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- Roads & Maritime Services Traffic Control at Worksites Manual;
- Approved Methods for Sampling and Analysis of Air Pollutants in NSW;
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW;
- Bunding and Spill Management Guidelines;
- BS385 Evaluation and measurement for vibration in buildings
- Environmental Management System Guidelines;
- EPA guidelines on contaminated land management (multiple documents);
- Government Resource Efficiency Policy (GREP);
- Guideline for the Preparation of Environmental Management Plans;
- Interim Construction Noise Guideline;
- EPA Waste Classification Guidelines;
- Project approvals and/or Licensing

3.3 PROJECT APPROVALS AND/OR LICENSING

- NSW EPA “Approval of the Surrender of a Licence No. 6437” which has been modified with subsequent notices issued by the EPA being:
- KIWEF Surrender Variation Notice number 1510956 issued 02 May 2013,
- KIWEF Surrender Variation Notice number 1520063 issued 17 April 2014,
- Approval under Commonwealth Environmental Protection and Biodiversity Conservation Act 1999,
- Approval under Environmental Planning and Assessment Act 1979 (Part 5),
- Memorandum of Understanding (MOU) between Port Waratah Coal Services Pty Ltd, Hunter Development Corporation and Port of Newcastle Operations Pty Ltd as trustee of the Port of Newcastle Investments (Property) Trust Pty Ltd,
- Memorandum of Understanding (MOU) between Newcastle Coal Infrastructure Group Pty Ltd, Hunter & Central Coast Development Corporation Pty Ltd and Port of Newcastle Operations Pty Ltd,
- PWCS Stockpile Agreement,
- Summerhill Stockpile Agreement,
- Approvals under the Water Management Act 2000 / Water Act 1912 for access to ground or surface water during construction;

- Environment Protection Licence (EPL) in accordance with the Protection of the Environment Operations Act 1997 for extractive industries as well as crushing and grinding where applicable;
- Controlled Activity Approval where required and
- Local Council Permit(s).

3.4 KEY CLIENT DOCUMENTS

The following Client documents have been identified as being important to ensure Daracon deliver the project safely, with minimal environmental impact and to specification.

TABLE 1 – KEY CLIENT DOCUMENTS

Key Client Document Number and Name	
8489-301/4	Materials Management Plan (RCA Australia) (MMP RCA 2012)
IA19210002 | Draft	Construction Environmental Management Framework (Jacobs) (CEMF Jacobs 2018)
117623029-001-R-Rev0	Golders (2011), KIWEF Closure works Green and Golden Bell Frog Management Plan
5222-002/1	Permeability and Infiltration Assessment
30011921	Geotechnical & Environmental Factual Report
0320327 Final	ERM (2016) Review of Environmental Factors (ERM)
IA192100_01| Final	Jacobs (2018) Addendum Review of Environmental Factors
318000395 - Final	Rambol (2018), EPBC Referral, Preliminary Documentation Package – KIWEF Area 2 closure works
Volume 1A 05 Technical Specification KIWEF Area 2 – 2019-05-08_Final	Kooragang Island Waste Emplacement Facility – Section 3 Technical Specification
Volume 1A 04 Preliminaries KIWEF Area 2 – 2019-05-08_Final	Kooragang Island Waste Emplacement Facility – Section 2 Preliminaries
Volume 1A 03 General Conditions GC21 Ed2 KIWEF Area 2 – 2019-07-05_Final	GC21 Ed2 General Conditions
	KIWEF – Separable Portion 1 & 2 Drawing Set
	KIWEF – Separable Portion 3 & 4 Drawing Set

Where there are changes to the above document references, communication of changes that are applicable to this project will be communicated to all workers using a suitable means of communication as prescribed within this Sub-Plan.

4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT

4.1 CONDITIONS OF APPROVAL (COA)

This Construction Environmental Management Plan (CEMP) and sub plans have been prepared to comply with the Minister for Planning and Infrastructure's Conditions of Approval for the project.

The CEMP has been developed and adopted in accordance with Daracon's Certified Environmental Management System under ISO14001:2015, Project specifications, and the Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004).

This CEMP meets the requirements of the CoA and outlines the following at a minimum:

- Project details including activities to be undertaken;
- Specific mitigation measures and controls that can be applied onsite to avoid or minimise negative environmental impacts;
- Specific mechanisms for compliance with applicable policies, approvals, licences, permits, consultation agreements and legislation;
- Environmental management related roles and responsibilities of personnel;
- States objectives and targets for issues important to the environmental performance of the Project and
- Outlines monitoring processes to check the adequacy of controls as they are implemented during construction.

4.2 PREPARATION & SUBMISSION OF CEMP

Safeguards	Source	Responsible Position	Output
MITIGATION MESAURES			

The CEMP for this project has been prepared in accordance with the requirements of Daracon's Environmental Management System and the Environment Policy. It incorporates all requirements of the environmental assessment documentation for the project. The CEMP should be reviewed during the implementation and also if and when required including the following: ▪ Client recommendation for changes following review, ▪ Opportunities for improvement or deficiencies in the project system are identified, or ▪ Following an audit of the system or the occurrence of significant incidents and non-conformances	CEMF (Jacobs 2018) – 5.4	Project Manager	

4.3 PLANNING

4.3.1 ENVIRONMENTAL GLOBAL RISK ASSESSMENT WORKSHOP (GRA)

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
An on-site risk workshop (RW) will be held within 21 days of the contract date for the project and the following activities: ▪ Access, ▪ Materials Handling, ▪ Temporary WHS controls and Environmental controls, ▪ Leachate, Groundwater and Surface water, ▪ Winning of suitable capping materials, ▪ Importation of suitable capping materials and any necessary fill, ▪ Erosion & Sediment Control measures, ▪ Management of the risks to threatened species (GGBF), ▪ Other site information, ▪ Temporary access to the peninsula	Preliminaries Clause 2.1	Project Manager	

4.3.2 REGULATORY REQUIREMENTS, REPORTING AND COMPLIANCE

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			

The key environmental obligations for the closure works arise under the following legislation: ▪ Protection of the Environment Operations Act 1997 (POEO Act); ▪ Environmental Planning & Assessment Act 1979 (EP&A Act); and ▪ Environmental Protection and Biodiversity Conservation Act 2000 (EPBC Act), Various environmental assessments and management plans have been prepared under these Acts as follows: • POEO Act – NSW EPA (2010), Approval of the Surrender of a licence – License 6437, Ref: 1111840 and as varied by notice number 1510956 and 1520063 and associated documents including: - KIWEF Closure works, Green and Golden Bell Frog Management Plan prepared by Golders (2011); - GHD (2009), Report on KIWEF, Revised Final Landform and Capping Strategy; and - RCA (2012) Materials Management Plan – Kooragang Island Waste Emplacement Facility. • EP&A Act – Hunter Development Corporation Determination under Division 5.1 of the EP&A Act and associated assessment documentation including: - ERM (2016), Review of Environmental Factors, KIWEF Area 2 Closure Works; and - Jacobs (2018) Addendum Review of Environmental Factors, KIWEF Areas 2 Closure Works. • EPBC Act – Notice of determination of referral number 2016/7670 and associated documentation including: - ERM (2015), KIWEF Area 2 Closure Works, EPBC Referral; - ERM (2016), Response to Request for Information, KIWEF Area 2 Closure Works; and - Ramboll (2018), EPBC Referral, Preliminary Documentation Package – KIWEF Area 2 Closure Works	CEMF (Jacobs 2018) – 2	Project Manager, ENV Manager, Site Supervisor	IPMP, Site Induction, Training,

4.3.3 ENVIRONMENTAL OBJECTIVES AND TARGETS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-commencement of Works			

See Appendix 1: *Achieving Environmental Objectives and Targets* which includes the Project Organisation Chart, description of Roles and Responsibilities, Key Performance indicators and the frequency of Monitoring and Reporting. Specific Objectives and Targets are included in Chapter 5 *Operational Control* for each functional area.	IPMP Ch.5, Appendix 1, Appendix 2	Project Manager	As per KPI.

4.3.4 ENVIRONMENTAL WORK METHOD STATEMENT

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Work Method Statements will be prepared for the following activities: ▪ Site Establishment, ▪ Clearing and Grubbing, ▪ Topsoil strip & stockpile, ▪ General earthworks, ▪ Import and placement of capping material, ▪ Drainage works, ▪ Revegetation of site The EWMS must include at least the following elements: ▪ Description of the work activity, including any plant and equipment to be used; Outline of the sequence of tasks for the activity, including interfaces with other construction activities; ▪ Identification of any environmental and/or socially sensitive areas, sites or places; Identification of potential environmental risks/impacts due to the work activity; ▪ Mitigation measures to reduce the identified environmental risk, including assigned responsibilities to site management personnel; ▪ Process for assessing the performance of the implemented mitigation measures.	Daracon IPMP	Project Manager, ENV Manager, WHS Advisor	SWMS

4.4 RESOURCES, RESPONSIBILITY AND AUTHORITY

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
See Appendix 1: Achieving Environmental Objectives and Targets	IPMP Appendix 1 Appendix 2	Project Manager	IPMP Appendices.

4.5 SELECTION & MANAGEMENT OF SUBCONTRACTORS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Daracon will ensure subcontractor compliance with duties including planning, implementing and monitoring environmental protection measures and for keeping environmental records by managing them in accordance with Daracon's IPMP and this CEMP. Daracon will retain the environmental protection for the duties for the following all subcontracted work. Daracon is responsible for the surveillance of all subcontractors environmental protection measures to monitor the effectiveness of these measures. The surveillance program includes formal bi-weekly activity surveillance and weekly environmental inspections. It also includes daily supervision and visual inspections. All environmental documentation submitted by subcontractors will be subject to review and approval by Daracon staff to ensure compliance with the contract requirements, before works may begin. Environmental Checklists have been updated with checks to be made on Subcontractor's activities. All statistics relating to these checklists/ surveillance will be included in the monthly report. In accordance with Preliminaries Clause 5.2 Daracon have engaged dedicated Geotechnical and Environmental Consultants to oversee the implementation of the Environmental Protection measures. Descriptions of their roles can be found in Appendix 1.		Project Manager	Inductions, Toolbox Talk and pre-start

4.6 COMPETENCE, TRAINING & AWARENESS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
All staff working, including sub-contractors on this site are provided with the environmental training required to competently carry out their work. All site staff, contractors and sub-contractors are inducted before commencing work. Daracon site personnel will conduct an onsite induction prior to commencement A Training Register and Induction Register is kept on site.	CEMF (Jacobs 2018) – 3.2	Project Manager, Site Supervisor, WHS Co-ordinator	Site Induction, Training Matrix

4.7 WORKING HOURS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			

Approved working hours on this project are: Monday – Friday 7am to 6pm Saturdays – 8am to 1pm No works are to occur on Sundays and Public Holidays Management of working hours shall be in accordance with IM-PRO-0324-001 Fatigue Management Where works are required outside of approved hours on this project, the Project Manager shall assess whether a formal request is to be submitted to the Client representative for review and approval with the relevant project authority. See IPMP Hours of Work (Section 5.1) for Daracon's procedures. Daracon may at times seek approval from HCCDC for works outside these hours. Daracon may also be required to work outside these hours without prior approval by the Principal in the following circumstances: (a) delivery of materials outside of normal working hours, where delivery at such times is required by the Police or other authorities for reasons of safety or otherwise; or (b) work during an emergency, where such work is necessary to avoid the loss of lives, property and/or prevent environmental harm. In this instance, Daracon will notify the Principal as soon as it becomes apparent that the works will extend beyond the approved hours.	CEMF (Jacobs 2018) – Appendix I Noise Management	Daracon Project Manager	Site Induction

4.8 COMMUNICATION

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Daracon will utilise its emergency response management plan to communicate environmental problems and incidents with site personnel, the client and relevant authorities and stake holders.		Project Manager, Site Supervisor	Site Induction, Incident report,

4.8.1 LIAISON WITH EPA

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			

The Daracon Project Manager and or delegate are 24-hour contacts for the Project. They have the authority to stop works if necessary. They are the key emergency response personnel during a site emergency. The Daracon Environmental and Quality Manager (or delegate) is the authorised contact person for communications with the client and the EPA on environmental matters. A report will be prepared on each occasion the site is visited by EPA, and the Principal will be immediately notified. The Report will be provided to the Principal within 1 working day (24hrs) of the visit. If statutory notice is given to the EPA as required under the POEO Act, notification will be provided to the Secretary within 24hrs after the notification was given to the EPA.		Project Manager	Report to client

4.8.2 COMMUNITY LIAISON AND/OR NOTIFICATION

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Project Signage is not a requirement of the Contract. The main access point to the site will be manned at all times during work hours and an after hours contact number provided at the site entry point.		Project Manager, Site Supervisor	

4.8.3 COMPLAINTS MANAGEMENT

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
A Communications Register is kept and located on site, which will also include all enquiries and complaints received for the Project. Within one working day (24hrs) of receiving a complaint about any environmental issue, including any pollution incidents, arising from the Work Under the Contract, Daracon will submit a written report to the Principal detailing the complaint and the action taken to remedy the problem. Daracon will keep a register of all complaints, which must include the following details: (a) date and time of complaint; (b) method by which the complaint was made (telephone, letter, meeting, etc); (c) name, address, contact telephone number of complainant (if no such details were provided, a note to that effect); (d) nature of complaint; (e) action taken in response including follow up contact with the complainant;		Project Manager, Project Engineer	Communication Register

(f) any monitoring to confirm that the complaint has been satisfactorily resolved; (g) If no action was taken, the reasons why no action was taken by Daracon.			

4.9 EMERGENCY PLANNING

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Daracon will implement an emergency response management plan and all site personnel working on the project will be inducted into the requirements of the emergency response plan (IM-DDK-0323-005). Environmental risks may include use of unknown hazardous substances, pollution on site and near re-fuelling areas, working near environmentally sensitive areas or findings of Level 2 or 3 material.	CEMF (Jacobs 2018) 3.3. IM-DDK-0323-005	Project Manager	ERMP, Site Induction

4.10 MONITORING, INSPECTION AND AUDITING

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Refer to Appendix A for a Schedule of Tests and Inspections. Project specific daily monitoring is undertaken in accordance with the project approvals and GGBF Management Plan. Environmental and ESC inspections are undertaken weekly on this project and additional ESC inspections are done prior to adverse weather conditions and after more than 10mm of rain in a 24 hr period using IM-REP-0503-001. Copies of Inspection Reports prepared by Environmental Staff will be kept with project records and will be closed out within the agreed timeframes. A risk based audit program has been prepared for this project. Refer to Table 3 of Daracon's IPMP. Sample monitoring records can be found in Appendix B including Daily Frog Fence Monitoring,	CEMF (Jacobs 2018) Ch.5 GGBF Management Plan Ch.3	Project Manager, Site Supervisor, Environmental Co-ordinator	Environmental Inspection Checklist Erosion & Sediment Control Inspections

4.11 ENVIRONMENTAL NONCONFORMITIES

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			

Non-compliance may be identified through routine weekly site inspections, impromptu site inspections, via the CEMF or CEMP review or audit process or be incident based. Environmental non-conformances may include: ▪ Non-compliance with environmental management controls or mitigation measures specified within the CEMP; ▪ Environmental incidents not threatening material harm to the environment; and ▪ Environmental emergencies threatening material harm to the environment, including pollution from re-fuelling, significant damage to environmental controls and potential findings of Level 2 or 3 material. Corrective actions may be triggered by any of the above and will include immediate steps taken to control event, investigation and development additional controls to prevent recurrence. Corrective actions will be developed in consultation with the HCCDC and will be assigned to the appropriate staff for close out. All corrective actions will be tracked through to completion. All environmental non-conformances with project approvals, this CEMP or Daracon procedures is to be recorded as an incident, investigated and closed out in a timely manner. Close-out is required to include sign-off that corrective actions have been implemented or alternative solutions substituted. A summary of all non-conformances and associated corrective actions is to be provided to the client.	CEMF (Jacobs 2018) - 5.3	Project Manager, Site Supervisor, Environmental Co-ordinator	Incident Notification

4.12 RECORDS OF ENVIRONMENTAL ACTIVITIES

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Project records are kept on site to demonstrate compliance with this CEMP, IPMP and sub plans.	CEMF (Jacobs 2018) - 5.1	Project Manager, Site Supervisor, Environmental Co-ordinator	Environmental Inspection Checklist Erosion & Sediment Control Inspections

4.13 MANAGEMENT REVIEW

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
A management review will be undertaken as required on this project. Nonconformities and deficiencies will be reviewed and the effectiveness of corrective and preventative actions verified. Areas of opportunity for improvement and any procedural changes required will be identified.		Project Manager	

5 OPERATIONAL CONTROL

5.1 SOIL & WATER QUALITY MANAGEMENT

5.1.1 EROSION AND SEDIMENTATION CONTROL

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To comply with State and Federal approval requirements. To prevent water discharges from construction works area to the extent possible. To manage water discharged to avoid impact to receiving waters.	CEMF (Jacobs 2018) - Appendix F Water Quality Management Plan	Project Manager, Site Supervisor, Environmental Co-ordinator	As below
TARGETS			
No sediment or water quality impacts to the surrounding environment and waterways from the construction works.	CEMF (Jacobs 2018) - Appendix F Water Quality Management Plan	Project Manager, Site Supervisor, Environmental Co-ordinator	As below
MITIGATION MEASURES			
Pre-Commencement of Works			
Establishment of appropriate erosion and sediment controls to prevent sedimentation and pollution of waterways	CEMF (Jacobs 2018) Appendix F Water Quality Management	Project Manager, Site Supervisor	Erosion & Sediment Control plans, Environmental Inspection Checklist Site Induction
During Works			
Progressive erosion and sediment control plans (ESCO) will be developed and implemented prior to the commencement of topsoil stripping and earthworks,	CEMF (Jacobs 2018) Appendix F Water Quality Management	Environmental Representative, Project Engineer	Erosion & Sediment Control plans
Erosion and Sediment control structures are to be regularly inspected and maintained, particularly in advance of and following significant rainfall events		Project Manager, Site Supervisor, Project Engineer, Site Engineer, Environmental Co-ordinator	Environmental Inspection Checklist
All disturbed surfaces will be revegetated as soon as possible		Project Manager, Site Supervisor, Project Engineer	Ongoing inspections, Environmental Inspection checklist
All temporary ESC works will be removed immediately prior to final completion and all surfaces will be returned to pre-existing condition		Site Supervisor	Ongoing inspections, Environmental Inspection checklist

Provision of a shaker grid or rumble strip at site egress points		Site Supervisor	Ongoing inspections, Environmental Inspection checklist
Adequate run-off, erosion and sedimentation controls should be in place during construction, particularly in area's where run-off has the potential to impact on nearby waterways, surrounding native vegetation, EEC regrowth and existing drainage line and dam area's	CEMF (Jacobs 2018) Appendix D Flora & Fauna Management	Project Manager, Site Supervisor, Environmental Co-ordinator	Ongoing inspections, Environmental Inspection checklist

5.1.2 WASTE WATER MANAGEMENT

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
During Works			
Any water discharges are required to be managed to avoid pollution of waters having regard to the sensitivity of the receiving environment. In particular, any flocculants are to be demonstrated as being both effective and safe for amphibians prior to use	CEMF (Jacobs 2018) Appendix F Water Quality Management	Project Manager, Site Supervisor, Project Engineer, Site Engineer, Environmental Co-ordinator	
Wastewater management facilities shall only be provided through proprietary storage and pump out systems	CEMF (Jacobs 2018)– Appendix F Water Quality Management	Project Manager, Site Supervisor,	
Any water discharges are required to be managed to avoid pollution of waters having regard to the sensitivity of the receiving environment. In particular, any flocculants are to be demonstrated as being both effective and safe for amphibians prior to use	CEMF (Jacobs 2018)– Appendix F Water Quality Management	Project Manager, Site Supervisor, Project Engineer, Site Engineer, Environmental Co-ordinator	
Hold Points – place hold points relevant to this section below.			
Discharge quality must comply with the following performance criteria: • TSS: < 50mg/Lt (~Turbidity 30NTU), • pH: Between 6.5 and 8.5, • otherwise able to be demonstrated not to have caused pollution of waters,			

5.1.3 STOCKPILE MANAGEMENT

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
During Works			
Top soil/mulch stockpiles to be not greater than 2.0m in height and located clear of watercourse or drainage works	CEMF (Jacobs 2018) – Appendix F Water Quality Management	Project Manager, Site Supervisor	Environmental Inspection checklist
Where necessary, long term stockpiles should be stabilised	CEMF (Jacobs 2018) – Appendix H Air Quality Management	Site Supervisor	Daily inspections, Environmental Inspection checklist

Stockpiling of spoil that may contain seeds of exotic species shall be stockpiled away from adjacent vegetation or drainage lines where they could be spread during rainfall events	CEMF (Jacobs 2018) – Appendix D Flora & Fauna Management & Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Daily inspections, Environmental Inspection checklist
Soil Stockpiles are to be placed away from vegetated area's		Project Manager, Site Supervisor	Daily inspections, Environmental Inspection checklist
Utilising existing disturbed corridors such as cleared area's, roads, tracks and existing easements where possible for set up of equipment, stockpile area's and facilities		Project Manager, Site Supervisor	Daily inspections, Environmental Inspection checklist

5.1.4 WATER EXTRACTION

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
During Works			
Water for the project is being drawn from the town supply in accordance with Hunter Water procedures.		Project Manager, Site Supervisor	

5.1.5 CONSTRUCTION SITE DEWATERING

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Dewatering is not anticipated for the Project works. If dewatering is required a EWMS would be prepared in accordance with Section 1.18 of the Technical Specification.		Project Manager	

5.1.6 WORKS IN WATERWAYS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
It is not anticipated that works in waterways will be required for this Project.			

5.1.6.1 TEMPORARY WATERWAY CROSSINGS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
It is not anticipated that Temporary waterway crossing will be required for this Project.			

5.1.7 SEDIMENT BASINS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
The construction design for permanent sediment basins is to be in accordance with the environmental protection standards for sensitive environments based on Managing Urban Stormwater – Soils & Construction (Landcom, 2004) as well as documents from other states and internationally (such as "International Erosion Control Association – Australasia")	CEMF (Jacobs 2018)– Appendix F Water Quality Management	Project Manager, ENV Manager	EWMS
Permanent sediment basins as per the for construction design and any necessary temporary erosion and sediment control measures in advance of the bulk earthworks.	CEMF (Jacobs 2018)– Appendix F Water Quality Management	Project Manager, ENV Manager	

5.1.7.1 FLOCCULATION

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
As a last resort flocculation may be undertaken in accordance with Appendix F of the CEMF.	CEMF (Jacobs 2018)– Appendix F Water Quality Management	Project Manager, ENV Manager	
Hold Points – place hold points relevant to this section below.			

5.2 CONTAMINATED LAND

Safeguards	Source	Responsible Position	Output
OBJECTIVE			
To comply with legislative requirements and ensure that hazardous / contaminated material from construction activities does not cause an environmental nuisance / harm and is handled, categorised, tracked and placed in accordance with the RCA (2012) Materials Management Plan.	CEMF (Jacobs 2018) - Appendix C Materials Management Plan	Project Manager, Site Supervisor, Environmental Co-ordinator	As below
TARGETS			

No exacerbation of contamination during construction No environmental incidences involving contaminated/ hazardous materials No pollution events of the surrounding environmental and water ways by contaminated material The movement and ultimate fate of materials is fully tracked	CEMF (Jacobs 2018) - Appendix C Materials Management Plan	Project Manager, Site Supervisor, Environmental Co-ordinator	As below
MITIGATION MEASURES			
Pre-Commencement of Works			
Daracon will engage a suitably qualified environmental practitioner to conduct onsite supervision during the earthworks processes whom will provide framework and protocols around the identification and management of contaminated materials, a role description can be found in Appendix A. Daracon have prepared a Materials Management Plan that includes a Decision Matrix to determine appropriate on-site materials categorisation, reuse, storage, treatment and management of typical soils encountered during proposed ground engaging activities. The key operational mitigation measures are included below	CEMF (Jacobs 2018)– Appendix C Materials Management MMP (RCA 2012)	Project Manager, Site Supervisor, Environmental Supervision	
During Works			
Contaminated material identification and management			
Real-Time supervision by the Daracon's Environmental Consultant. If suspected level 2, level 3 or otherwise hazardous material is identified the following steps wil be undertaken: • Immediately cease work and contact the Site Supervisor • Demarcate the 'unexpected find' to prevent access and install appropriate environmental and safety controls. • Follow the management steps specified below in relation to each material classification; and • If substance is assessed as level 1 material not presenting an unacceptable risk to human health the Site Supervisor to remove controls and continue work	CEMF (Jacobs 2018)– Appendix C Material Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Report
Level 1 Material Management			
There is no specific management required for Level 1 material on the site and Level 1 material has unrestricted onsite re-use classification (Section 5.6.1 of RCA 2012). Level 1 material may be used for: • Topsoil where sourced from top 100mm of existing landform; • General land forming; • Buffer material to be placed above Level 2 and Level 3 Material; • Interim bunding for stockpiled material; and • Site capping material. Level 1 material properties will be validated in accordance with the Tender Specifications for testing and analysis.	CEMF (Jacobs 2018)– Appendix C Material Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Report
Level 2 Material Management			

Level 2 material is designated as having restricted site use and where encountered is to be managed as follows: • Where suspected Level 2 soils are encountered then the nature and extent of the materials will be validated by laboratory testing to assess whether the materials are still to be classified as Level 2 or Level 3 materials. • If Level 2 material is encountered but is to remain in place having sufficient cap (ie >500mm), the vertical extent does not need to be validated. The Principal will be notified in accordance with Level2/3 Notification Form (Appendix B). within 24 hours of encountering Level 2 material. • Level 2 material may be relocated to a lined skip-bin or covered short-term stockpiling for further quantification, characterisation and categorisation. • Confirmed Level 2 contaminated material is to be isolated by covering with at least 500mm of Level 1 material, plus 500mm of cap with preference for material to be left in situ provided there is no immediate risk to the environment or community or otherwise be relocated to an on-site location	CEMF (Jacobs 2018)– Appendix C Material Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Report
Level 3 Material Management			
Level 3 material is designated as having restricted site use and must managed as follows: The Principal will be notified as soon as reasonably practicable and on the same day of encountering the material (See Appendix B for Notification Form).. · The Principal will then notify the EPA; · Level 3 material may be relocated to a lined and covered stockpile or skip bin for further characterisation and categorisation and while a decision is made by the Principal on the preferred manner of ultimate disposal. The Principal will provide direction as to the required treatment of Confirmed Level 3 contaminated material which may include: · Isolated by covering with at least 1000mm of Level 1 material, plus 500mm of cap with preference for material to be left in situ provided there is no immediate danger to the environment or community or otherwise be relocated to an on-site location with the area having appropriate controls in place; or Transported off-site for disposed in a legal manner.	CEMF (Jacobs 2018)– Appendix C Material Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Report
Asbestos Management			
Asbestos materials (and ACM) will be managed generally as follows as specified in RCA MMP (2012): • Where at all possible, materials containing bonded asbestos wastes would be fully delineated, be assessed to be at least 1m below final capping, and remain as undisturbed materials managed by in-situ containment; • Should any fill materials containing bonded asbestos wastes require excavation as they are not in-situ more than 1m from the final cap in the earthworks, then consideration would be given to removing the materials and emplaced at a depth of 1m; • Friable asbestos would be assessed and considered for emplacement at a depth of 2.5m below the underside of the capping layer within a purpose-built excavation at a location to be agreed with the Principal;	CEMF (Jacobs 2018)– Appendix C Material Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Report

• Final location of any asbestos discovered shall be thoroughly documented including accurate survey of the emplacement area; Where asbestos waste is found in fill that also contains volatile organic compounds or separate phase hydrocarbons, appropriate treatment for recorded contaminants will be required; and • All asbestos is to be managed and handled in accordance with the recommendations of an appropriately licensed Asbestos Assessor/handler. The use of in-situ or ex-situ treatment approach for any materials containing bonded and friable asbestos wastes will be assessed on a case by case basis in relation to volume and risk to human health			
Other Wastes			
Minimal volumes of material requiring off-site disposal have been encountered in previous stages of KIWEF closure works. In the event that such material is encountered it will be classified in accordance with the Waste Classification Guidelines (2015) and disposed of to a landfill legally able to accept the waste. Wastes generated in completing the capping works are also required to disposed of off-site. All other contaminated materials will be managed on site in accordance with the Materials Management Plan. Waste management measures to be implemented include: • Licensed waste contractors will be utilised to remove waste. • All waste is to be disposed of at a lawful facility (Note: A lawful facility includes one that has the appropriate Development Consent, Environment Protection Licence or is complying with EPA approved conditions and requirements). • Waste must be classified prior to disposal – refer to NSW EPA Waste Classification Guidelines (2015). • Records of the quantity and final locations of all on and offsite waste will be maintained • Provision of skip bins (or equivalent) to be used to collect all general wastes generated during the works. • Provide an adequate number of skip bins on site to contain all general waste generated throughout the works. • Provide bins to enable waste segregation • Provide recycling services (e.g. Paper, Concrete, Steel, Cardboard, Timber). • Ensure housekeeping is maintained and waste is disposed of to the appropriate bin. • Retain waste disposal permits and figures on the amount of waste that has been removed from site.	CEMF (Jacobs 2018)– Appendix C Material Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Report/Bi-Monthly WRAPP Report
Post Completion of Works			
At the completion of the works, a Validation Report is required to satisfy Condition 4h of the Surrender Notice which requires that there is written confirmation that the cap was established in accordance with relevant specifications as follows: "Within three months of completion of the installation of the final cap, the licensee must provide the EPA with a written Validation Report that includes:	CEMF (Jacobs 2018) – 5.2.3	Project Manager, Geotechnical Consultant	Validation Report

i) Advice that the final cap has been installed; ii) Advice from a suitably qualified and experienced person as to whether or not the cap was installed in accordance with Chapter 7 of the Landform and Capping Strategy and relevant conditions of this Notice, or future variations to this Notice. Please refer to MMP for details. iii) Provision of the results of all relevant test results to validate that the permeability of the final capping layer is less than or equal to K = 1 x 10-7m/s. Permeability testing must be taken of the sealing layer material at a rate of not less than 1 per 2000T (or 1250m3); iv) Provision of information that establishes the thickness of the installed sealing and revegetation layers in the format of either: (i) As constructed drawings, including cross sections, of the surfaces of the coal washery reject layer; and (ii) The results of surveys undertaken for each capping layer by a registered surveyor".			
Hold Points – place hold points relevant to this section below.			

5.3 SPILL PREVENTION AND RESPONSE

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
All staff will be made aware of the Emergency Response Management Plan (ERMP) and Site Emergency Plan. Daracon's OW1.07 Working with and Storage of Hazardous Chemicals may be used by Daracons Senior Management for training purposes.	CEMF (Jacobs 2018) – Appendix B Environmental Obligation interface	Project Manager	Site Induction
During Works			
Various fuels, oils, and other hazardous chemicals may be used and/or stored on site. All chemicals are stored in accordance with the manufacturer's instructions and the MSDS. Fuel and other chemicals will be stored and handled in accordance with relevant Australian standards such as: ▪ AS 1940-2004 The storage and handling of flammable and combustible liquids; ▪ AS/NSZ 4452:1997 The storage and handling of toxic substances; ▪ AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods; and ▪ AS/NZS 1547:2012 On-site domestic wastewater management. Hazardous liquids and chemicals will be stored in a covered, bunded area with capacity to retain 110% of the largest container in the event of a spill.	CEMF (Jacobs 2018) – Appendix B Environmental Obligation interface	Project Manager, Site Supervisor	Site Induction, Environmental checklist

Fully stocked spill kits will be available onsite and all operators and personnel will be made aware of the location and be trained in their use. Refuelling is not to occur in the vicinity of sediment dams, drainage lines or water bodies Refuel plant using drip trays/spill mats and other spill containment devices. Do not leave chemical containers open outside or inside of the bunded areas. Spills are to be immediately contained and absorbed using materials provided in the spill kit. All personnel are to be trained in the appropriate use and disposal of spill kit materials.			

5.4 AIR QUALITY

Safeguards	Source	Responsible Position	Output
OBJECTIVES	i.e. Clause	i.e. ENV Manager	i.e. EWMS
To ensure that dust and other air emissions from construction activities do not cause impacts on sensitive receivers and equipment.	CEMF (Jacobs 2018)– Appendix H Air Quality	Project Manager, Site Supervisor, Geotechnical Consultant	Environmental checklist, Geotech Daily Report
TARGETS	i.e. Clause	i.e. ENV Manager	i.e. EWMS
No visible dust (or offensive odours) leaving site and reaching: • Identified or potential GGBF habitat, particularly water bodies and fringing vegetation; and • Cormorant Road or neighbouring coal loader operations.	CEMF (Jacobs 2018)– Appendix H Air Quality	Project Manager, Site Supervisor, Geotechnical Consultant	Environmental checklist, Geotech Daily Report
MITIGATION MEASURES			
During Works			
Use of water sprays to reduce dust emission from trafficable area's, work area's stockpiles and other exposed area's	CEMF (Jacobs 2018) – Appendix H Air Quality Management		Environmental Inspection checklist
Reduce the number of and extent of disturbed area's at a given time during the remediation activity onsite		Project Manager, Site Supervisor, Project Engineer	Environmental Inspection checklist
Control of haul loading vehicles, whereby the load will not exceed the height of the haul boards and tailboards on the vehicles		Site Supervisor,	Environmental Inspection checklist
The vehicle speed onsite shall be restricted along the haul roads to minimise dust generation and potential spilling of hauled material		Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist

Cleaning/maintenance of the access and haul roads on site to minimise dust generation and potential spilling of hauled material		Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Loads of soil or contaminated material entering and leaving the site will be covered. Internal material transport may also require a cover if material is likely to or observed to be generating dust		Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Any excavated material likely to generate odours will be covered		Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Maintenance and servicing of plant and vehicles to minimise and reduce emissions of air pollutants		Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Observations of prevailing (and forecast) weather conditions to program site activities in order to minimise air quality issues		Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Modify work practices during dry and windy conditions		Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Provide shaker grids or rumble strip at site egress points and where aggregate is used, minimum size is 150mm		Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Remove mud from haul vehicles prior to entering public roads		Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Provide awareness training in the need to minimise dust during site inductions and toolbox talks		Project Manager	Site Induction, Daily prestart
Any water required for dust suppression will be drawn from ponds established for the purpose. No water for dust suppression will be drawn from existing ponds on the site. All water required for dust suppression will be drawn from a metered standpipe from Hunter Water network	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Site Induction, Daily prestart, Environmental Inspection checklist
Post Completion of Works			
Progressively stabilise and or revegetate as area's of work are completed	CEMF (Jacobs 2018) – Appendix H Water Quality Management	Project Manager, Site Supervisor	Environmental Inspection checklist

5.4.1 FIRE SAFETY AND BURNING OFF

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
During Works			
No burning off of any material on site. Fire Extinguishers are provided on site, within plant and in vehicles to ensure the safety of personnel and property. All items of plant used during proclaimed high fire danger periods that could discharge sparks must be fitted with spark arresters. Do not undertake cutting, welding, grinding or other activities likely to generate fires in the open on days when a total fire ban is proclaimed. When there is a risk of fire being caused by work such as welding, thermal or oxygen cutting, heating or other fire producing or spark producing operations or when burning off is proposed, training to all personnel in fire prevention, fire safety and basic firefighting skills. Total fire ban declarations and resultant work restrictions will be communicated to staff by pre-start. If hot-works are anticipated for the days activities the NSW Rural Fire Service website will be viewed by the Project to determine if there is a fire ban - https://www.rfs.nsw.gov.au/fire-information/fdr-and-tobans During total fire bans, the various items of plant that have the potential to discharge sparks, are fitted with spark arresters.		Project Manager, Site Supervisor	Daily Prestart & Toolbox, Site induction, Hot work permit,

5.5 NOISE CONTROL

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To ensure that noise and vibration from construction activities does not cause environmental nuisance or unnecessarily disturb fauna.	CEMF (Jacobs 2018)– Appendix I Noise Management	Project Manager, Site Supervisor	Daily Prestart & Toolbox, Site induction,
TARGETS			
No valid noise / vibration complaints resulting from construction works. No unreasonable noise or vibration. No noise and vibration impacts on external receptors	CEMF (Jacobs 2018)– Appendix I Noise Management	Project Manager, Site Supervisor	Daily Prestart & Toolbox, Site induction,
MITIGATION MEASURES			
Pre-Commencement of Works			

Awareness training and information will be provided to project personnel in relation to the vibration requirements on the project and the need to minimise vibration when in close proximity to operational area's (rail corridor),	CEMF (Jacobs 2018) – Appendix I Noise Management	Project Manager, Site Supervisor	Daily Pestart & Toolbox, Site Induction
Selection of the most appropriate plant and equipment to minimise noise generation and include where necessary screening and enclosures,		Project Manager, Site Supervisor	Plant pre-start checklist
During Works			
Construction works are confined to normal working hours: Monday to Friday 7 am to 6 pm, Saturday 8 am to 1pm No work on Sunday or public holidays. No works to be undertaken outside of the agreed hours without prior approval (except in emergency situation),	CEMF (Jacobs 2018) – Appendix I Noise Management	Project Manager, Site Supervisor	Site Specific Induction, Daily Prestart checklist for plant and machinery,
Avoid where practical the use of noisy plant simultaneously close together or adjacent to sensitive receptors and stationary noise generating equipment to be orientated away from sensitive areas.		Project Manager, Site Supervisor	
All plant will be maintained in accordance with the manufacturer's requirements.		Site Supervisor, Plant Mechanics, Plant operators	Daily plant pre-start, Site Induction
Undertaking loading and unloading activities away from sensitive areas and during designated construction hours,		Site Supervisor	Site Induction
Regular checks are to be undertaken to ensure all equipment and vehicles are in good working order and are operated correctly, and;		Plant operator	Daily plant pre-start, Site Induction

5.6 GROUND VIBRATION & AIRBLAST

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
During Works			
Given that the types of machinery to be used during construction do not have significant impact energy and that blasting is not required, vibration from these activities are not likely to be detectable to the nearest residents. Awareness training and information will be provided to project personnel in relation to the vibration requirements on the project and the need to minimise vibration when in close proximity to operational areas (rail corridor). Refer to ETC-08-04.	CEMF (Jacobs 2018) – Appendix I Noise Management	Project Manager, Site Supervisor	

5.7 BIODIVERSITY

5.7.1 VEGETATION MANAGEMENT

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To comply with contractual and legislative requirements and ensure that native fauna and flora are protected from construction activities.	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Environmental Inspection checklist
TARGETS	i.e. Clause	i.e. ENV Manager	i.e. EWMS
No unapproved destruction of flora	CEMF (Jacobs 2018)– Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Environmental Inspection checklist
MITIGATION MEASURES			
Pre-Commencement of Works			
Care should be taken that any noxious weeds occurring on the site are not to be further dispersed.	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	
During Works			
Plant and equipment brought on to site will be cleaned and free of deleterious material, mud and other material that may harbour weed seeds. Any capping materials imported from outside the KIWEF facility will be sourced from an area that is assessed as having a low risk of containing Chytrid Fungus. Topsoil to be used for surface layers will be sourced from within KIWEF to the extent possible and will otherwise be assessed as required.	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	

5.7.2 NOXIOUS WEED MANAGEMENT

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
During Works			

Care should be taken that any noxious weeds occurring on the site are not further dispersed as a result of the works. A follow up weed control program may be necessary to control the encroachment of these species into surrounding areas. The landowner has a legal responsibility to control and suppress these species on their property under the Noxious Weed Act 1995.The weed control program should remove weeds by physical means and avoid the use of herbicides	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Environmental Inspection checklist
Noxious weeds are to be managed in accordance with the expectations under the Biosecurity Act 2018. It is recommended that the plants be removed by physical removal, as herbicides may impact GGBF's and their habitat.		Project Manager, Site Supervisor	Environmental Inspection checklist Daily Site Visual Inspection
Plant and equipment brought onto site must be cleaned and free of deleterious material, mud and other material that may harbour weed seeds		Project Manager, Site Supervisor	Plant pre delivery inspection, Site Induction,
Bitou Bush and Crofton Weed would be managed by following the Local Noxious Weed Control Plans (NCC 2006). It is recommended that the plants be removed by physical removal, as herbicides may impact GGBFs and their habitat.	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Environmental Inspection checklist Daily Site Visual Inspection

5.7.3 FAUNA MANAGEMENT

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To comply with contractual and legislative requirements and ensure that native fauna and flora are protected from construction activities.	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor, Environmental Consultant	Daily Frog Fence Check, GGBF Mortality Report, Environmental Inspection checklist
TARGETS			
No death or injury to fauna including the Green and Golden Bell Frog	CEMF (Jacobs 2018)– Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Daily Frog Fence Check, GGBF Mortality Report, Environmental Inspection checklist
MITIGATION MEASURES			
Pre-Commencement of Works			

Engage Specialist Environmental Consultant to undertake environmental protection oversight. Implement hygiene protocol as required for the closure works area (NSW Threatened Species Management Information Circular No.6 (April 2008)). Establish any controls necessary to prevent works from occurring outside the referral boundary. Temporary frog exclusion fencing will surround the Closure Works site and ensure GGBF habitat protected from unauthorised access prior to works commencing in those works areas or their parts. Conduct pre-clearance surveys by a qualified ecologist in week prior to works commencing in works areas or their parts. Apply erosion and sediment controls as per sensitive environments (Managing Urban Stormwater – Soils and Construction (Landcom 2004)) and complete and line permanent basins as per designs provided by the State.	CEMF (Jacobs 2018)– Appendix D Flora and Fauna Management Plan GGBF Management Plan (Golders 2010)	Project Manager, Site Supervisor, Environmental Consultant	Daily Frog Fence Check, GGBF Mortality Report, Environmental Inspection checklist
During Works			
Open excavations and storage areas are to be inspected regularly for the presence of fauna species	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan GGBF Management Plan (Golders 2010)	Project Manager, Site Supervisor	Environmental Inspection checklist Daily Site Visual Inspection
Proposed hours of construction are to be maintained to restrict noise and light impacts on nocturnal fauna		Project Manager, Site Supervisor	Site Induction
Plant and equipment brought on to site must be cleaned and free of deleterious material, mud and other material that may harbour weed seeds		Project Manager, Site Supervisor	Site Induction
Utilise an onsite ecologist during construction to relocate any native fauna which may be displaced		Project Manager, Site Supervisor	Environmental Inspection checklist Daily Site Visual Inspection
Habitat features such as woody debris that may be utilised by fauna within the construction area would be retained and set-aside during the construction period for re-instatement at the completion of the works		Project Manager, Site Supervisor	Environmental Inspection checklist Daily Site Visual Inspection
No night works are permitted without additional assessment of potential noise and light impacts		Project Manager, Site Supervisor	Site Induction

GGBF impact avoidance is to be based on the following: ▪ Establishment and use of Chytrid Hygeiene procedures such that the Chytrid fungus is not brought to site or transferred between area's of the site, ▪ Appropriate levels of GGBF pre-clearance/disturbance surveys and relocation to ensure to the extent possible that direct disturbance area's are free of GGBF on the commencement of works in each area, ▪ Establishment of GGBF exclusion fencing such that the risk of GGBF re-entering the area is prevented, ▪ Establishment of clear boundaries of works areas such that unnecessary disturbance is avoided, particularly adjacent to existing ponds,	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan GGBF Management Plan (Golders 2010)	Ecologist, Project Manager, Site Supervisor	Ecologist Pre-clearance survey, Site Induction, Environmental Inspection checklist
A Chytrid Hygiene procedure in accordance with the NSW Threatened Species Management Information Circular No.6 – Service Hygiene Protocol for the Control of Disease in Frogs (April (2008) or most recent revision of that document, must be implemented on site during all works and any other activities undertaken as part of the action. This procedure is to include: ▪ Dedicated disinfection bays established at site entry and all vehicles required to enter via this bay; ▪ All disinfection processes will be monitored and controlled at the Closure Works entry point; ▪ The location of these disinfection bays, and the obligations of disinfection, will be communicated during the site induction and training; ▪ Cleaning and disinfection of workers boots upon entry and exit from the site; ▪ Procedures will be implemented to inspect mobile plant entering the Project site during construction activities to control soil and/or organic matter and to disinfect tyres and wheels of vehicles entering the Project site; and ▪ Vehicles arriving at site muddy will be sent away for more intensive cleaning prior to disinfection.	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Site Induction, Environmental Inspection checklist
Show that suitable risk assessment has been undertaken by an appropriately qualified and experienced ecologist on all imported capping and revegetation materials to demonstrate that it contains a low risk of containing Chytrid. Risk assessment should consider as a minimum: ▪ Material not sourced from known, suspected or likely amphibian habitat areas; ▪ Material unlikely to have had contact with amphibians and no amphibians present in material; and	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Geotechnical & Environmental Consultant, Ecologist Project Manager, Site Supervisor	Ecologist Pre-clearance survey, Site Induction, Environmental Inspection checklist

▪ Material stored in a dry location prior to transport.			
Pre-clearance survey and clearing methodology will be implemented such that it minimises potential harm to GGBF species. The survey methodology will give consideration to the following factors: ▪ Level of effort warranted in different areas and habitats; ▪ Seasonal factors on GGBF use of habitat; and ▪ Need for night time surveys. ▪ Survey effort required is likely to include: o Targeted active searches of potential GGBF habitat located within the disturbance footprint; o Conducted to minimise disruption of breeding activities: relocated tadpoles or metamorphs; ▪ Be conducted in accordance with hygiene protocol; ▪ Habitat resources including all wet areas as well as rocks, logs, tussock forming vegetation, and other cover will be searched during diurnal visual inspections. ▪ A nocturnal habitat search including visual search, spotlighting and call playback may be conducted to assess nocturnal use (breeding/calling) in the habitat supported in disturbance area, if the surveys are conducted during core breeding season (spring/summer); ▪ Any GGBF observed within the disturbance footprint will be relocated in accordance with relocation procedure provided in the GGBF Management Plan prior to commencement of disturbance; and ▪ The survey methodology implemented should allow the qualified and experienced ecologist to confirm that the risk of GGBF mortality has been reduced to the extent reasonable and feasible for the applicable habitat type/area. The clearing methodology should include the following: ▪ Consideration of most appropriate time to install frog exclusion fences; ▪ Presence of an appropriately qualified and experienced ecologists during clearing; ▪ Gradual degradation of higher risk habitat areas progressing from areas furthest away from pond towards areas of refuge; ▪ Relocation of cleared vegetation to areas away from immediate works that	CEMF (Jacobs 2018)– Appendix D Flora and Fauna Management Plan GGBF Management Plan (Golders 2010)	Ecologist Project Manager,	Ecologist Pre-clearance survey, Site Induction, Environmental Inspection checklist

allow remaining amphibians to escape; and ▪ Ability to open amphibian fences during clearing at key times to allow fauna to escape.			
If any frog specimens thought to be a GGBF are observed and are within project disturbance area the following relocation procedure will be implemented: ▪ Observer to notify Site supervisor who in turn is to notify the HDC, a suitably qualified ecologist, and the Contractor's supervisor of the frog's location immediately; ▪ Contractor supervisor to halt work in the immediate vicinity to prevent accidental interaction with the frog; ▪ The ecologist or HDC's environmental representative will determine whether the frog is likely to be harmed by works or is likely to migrate to an area that it could be harmed; ▪ If likely to be harmed by works the GGBF will be captured by the ecologist or suitably trained frog handler following GGBF handling and Hygiene procedures; ▪ A one frog per bag policy will be observed with disinfection of all equipment undertaken immediately following any contact with frogs of any description; ▪ If healthy, the frog will be held in a cool, dark, moist place until nightfall before being released to a suitable location in the immediate vicinity of capture but outside the disturbance footprint; ▪ GGBF showing Chytrid symptoms and deemed unlikely to survive transportation will be euthanized and preserved prior to dispatch to a designated sick or dead frog recipient in accordance with Appendix 2 of the National Parks and Wildlife Service's Hygiene protocol for the control of disease in frogs (NPWS, 2008); ▪ If deemed likely to survive transportation GGBF will be placed in a damp cloth bag or partially inflated plastic bag with leaf litter; ▪ Dead frogs will be preserved in accordance with the approved GGBF management plan including cutting open stomach and preserving in 10 times the volume of the specimen of 65% ethonol or 10% buffered formalin ▪ The designated sick or dead frog recipient will be contacted prior to	CEMF (Jacobs 2018)– Appendix D Flora and Fauna Management Plan GGBF Management Plan (Golders 2010)	Ecologist Project Manager, ENV Manager	Ecologist Pre-clearance survey, Site Induction, Environmental Inspection checklist

transport to confirm appropriate procedures; ▪ Containers used for storing frogs will be labelled with date, location and species if known; and ▪ A standardised collection form must be completed and a copy sent with the specimen.			
Post Completion of Works			
Upon completion of works all site security fencing, frog exclusion fencing shall be removed as necessary		Ecologist Project Manager, ENV Manager	Environmental Inspection checklist

5.7.4 USE OF PESTICIDES & HERBICIDES

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Implementation of GGBF risk consideration to all decision making such that unintended consequences to GGBF can be avoided. This includes considering suitability of imported materials from a Chytrid risk and nutrient perspective and use of chemicals including flocculants, herbicides and pesticides	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	Site Induction

5.8 HERITAGE

5.8.1 ABORIGINAL HERITAGE

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To ensure that undiscovered heritage and archaeological items are protected from construction activities.	CEMF (Jacobs 2018) – Appendix J Heritage Management Plan	Project Manager, Site Supervisor	Site Induction
TARGETS			
Unknown or undocumented heritage sites are not knowingly destroyed, defaced or damaged. Identify and protect any new artefacts or heritage sites before any harm can take place.	CEMF (Jacobs 2018) – Appendix J Heritage Management Plan	Project Manager, Site Supervisor	Site Induction
MITIGATION MEASURES			
Pre-Commencement of Works			

No known heritage items or area's have been identified within the project site or surrounds. As such, heritage mitigation measures are limited to restricting access beyond the project boundary and the implementation of an "unexpected finds" procedure IM-PRO-0504-002 (Appendix 4)	CEMF (Jacobs 2018) – Appendix J Heritage Management	Project Manager, ENV Manager	Unexpected finds procedure, Site Induction
During Works			
In the event that potential Aboriginal and Historic heritage items are discovered the following steps must be undertaken: ▪ STOP ALL WORK in the vicinity of the find and immediately notify the Project Manager, Site Supervisor and Environmental Manager, ▪ Contact HCCDC and the PAP to notify them of the find as soon as possible, ▪ In the event of uncovering remains that are potentially human, the NSW police are also to be contacted immediately, ▪ Record the details and take non-intrusive photos of the find and relay the information to HCCDC and their PAP, ▪ HCCDC will contact a qualified archaeologist to get advice regarding the nature and potential significance of the find, ▪ If the qualified archaeologist advises that the find is not a potential heritage item, work will recommence in consultation with HCCDC, ▪ If the qualified archaeologist advises that the find is a potential heritage item HCCDC will contact and notify the relevant authority; and ▪ Work is not to recommence in the area of the identified find until clearance is received from HCCDC	CEMF (Jacobs 2018) – Appendix J Heritage Management	Project Manager, Site Supervisor	Ongoing visual inspections,

5.8.2 NON-ABORIGINAL HERITAGE

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
No known heritage items or area's have been identified within the project site or surrounds. As such, heritage mitigation measures are limited to restricting access beyond the project boundary and the implementation of an "unexpected finds" procedure	CEMF (Jacobs 2018) – Appendix J Heritage Management	Project Manager, ENV Manager	Unexpected finds procedure, Site Induction
During Works			
In the event that potential Historic heritage items are discovered the following steps must be undertaken: ▪ STOP ALL WORK in the vicinity of the find and immediately notify the Project Manager, Site Supervisor and Environmental Manager, ▪ Contact HCCDC and the PAP to notify them of the find as soon as possible,	CEMF (Jacobs 2018) – Appendix J Heritage Management	Project Manager, Site Supervisor	Ongoing visual inspections,

▪ In the event of uncovering remains that are potentially human, the NSW police are also to be contacted immediately, ▪ Record the details and take non-intrusive photos of the find and relay the information to HCCDC and their PAP, ▪ HCCDC will contact a qualified archaeologist to get advice regarding the nature and potential significance of the find, ▪ If the qualified archaeologist advises that the find is not a potential heritage item, work will recommence in consultation with HCCDC, ▪ If the qualified archaeologist advises that the find is a potential heritage item HCCDC will contact and notify the relevant authority; and ▪ Work is not to recommence in the area of the identified find until clearance is received from HCCDC			

5.9 WASTE MANAGEMENT AND RESOURCE RECOVERY

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Waste minimisation and management measures will be implemented including: ▪ Recycling and diverting from landfill surplus soil, rock, and other excavate or demolition materials wherever practical, ▪ Separately collecting and streaming quantities of waste concrete, bricks, blocks, timber, metals, plasterboard, paper and packaging, glass and plastics and offering them for recycling where possible	Prelims Specification 6.3	Project Manager Site Supervisor	Daily prestart, Environmental Inspection checklist Daily Site Visual Inspection
During Works			
Avoid rubbish and other waste build up to deter feral animals	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Site Supervisor	Daily prestart, Environmental Inspection checklist Daily Site Visual Inspection
A waste register will be maintained during the works and submit a progress report every 2 months	Prelims Specification 6.3	Project Manager Site Supervisor	B-monthly reporting
All other contaminated materials will be managed on site in accordance with the MMP.	CEMF (Jacobs 2018) – Appendix C Materials Management Plan	Project Manager Site Supervisor	

Post Completion of Works			
All waste to be removed at the completion of the works	CEMF (Jacobs 2018) – Appendix B Environmental Obligation Interface Plan	Project Manager Site Supervisor	

5.10 WORK IN ENVIRONMENTALLY SENSITIVE AREAS

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
No sensitive area's have been identified onsite			

5.11 ENVIRONMENTAL INCIDENT AND REPORTING

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Incidents will be classified, managed and reported as per the requirements of Daracon's Incident Reporting and Investigation Management Procedure IM-PRO-0306-01 (Appendix 3)	IM-PRO-0306-01	Project Manager, Site Supervisor	IM-REP-1407-003

5.12 SITE FACILITIES

Safeguards	Source	Responsible Position	Output
MITIGATION MEASURES			
Pre-Commencement of Works			
Lighting of site compounds if required for safety and security , will avoid light spill outside of the construction works footprint and will be undertaken in accordance with the Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	

5.13 TRAFFIC MANAGEMENT

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To ensure that additional traffic from construction activities does not cause an environmental nuisance.	CEMF (Jacobs 2018) – Appendix G Traffic Management	Project Manager, Site Supervisor	Induction
TARGETS			

No valid complaints resulting from congestion from construction traffic Comply with traffic management standards	CEMF (Jacobs 2018) – Appendix G Traffic Management	Project Manager, Site Supervisor	Induction
MITIGATION MEASURES			
During Works			
Worksite speed limits will be determined and for areas of the site based on road type, road condition and adjacent work activity. Normal road rules apply unless stated otherwise. Site induction completed by all site personnel to specify appropriate traffic movements onsite. Water cart used where possible to minimise generation of dust from surfaces.	CEMF (Jacobs 2018) – Appendix G Traffic Management	Project Manager, Site Supervisor	Induction

5.14 RESTORATION OF SITE

Safeguards	Source	Responsible Position	Output
OBJECTIVES			
To comply with State and Commonwealth approvals requirements and related conditions. To provide a post construction environment that is revegetated to stabilise the capping surface; and planted with species known to be favoured by GGBF.	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Site Induction, Daily prestart and toolbox,
TARGETS			
The capped surface is stabilised and vegetated within 12 months of construction completion. Provide a revegetated capped surface that includes species of flora known to be favoured by GGBF.	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Site Induction, Daily prestart and toolbox,
MITIGATION MEASURES			
Post Completion of Works			
Rehabilitation using species preferred by GGBF	CEMF (Jacobs 2018) – Appendix D Flora and Fauna Management Plan	Project Manager, Site Supervisor	
Works associated with the closure of the KIWEF must only occur within the closure works area (project footprint); and must be restricted to the extent required to satisfy the Surrender Notice requirements. All disturbed surfaces will be revegetated within 1 month of final land forming and in compliance with the landscaping plans	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Site Induction, Daily prestart and toolbox,

Topsoil to be used for surface layers must be sourced from within KIWEF to the extent possible and will otherwise be assessed as low in nutrients and having a low risk of containing Chytrid Fungus to be protective of adjacent MNES habitat. Upon completion of works, the works area will be rehabilitated with vegetation species known to be favoured by GGBF. Open stormwater infrastructure across the KWIEF site will be planted with species known to be favoured by GGBF. This revegetation and rehabilitation strategy will include a 2m wide buffer on either side of the stormwater drains. The intention is to provide movement corridors for GGBF across the site. Drainage culverts will, where practicable, be vegetated and lined with rocks and objects that may provide temporary frog refuge, in the event that a frog seeks to traverse the future capped area of KIWEF. Habitat features such as woody debris that may be utilised by fauna within the construction area would be retained and set-aside during the construction period for reinstatement at completion of works. Prior to the Construction Completion dates the Contractor is required to seed the vegetation layer above the capping layer and reseed areas where sparse vegetation coverage is achieved by the end of the care and maintenance period.	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Site Induction, Daily prestart and toolbox, Environmental Inspection checklist
Aquatic vegetation: ▪ Selection of reeds that provide good habitat cover such as Typha, Bolboshoenus, Phragmites, and Juncus; ▪ A mixed community is preferable to single species stands; ▪ GGBF prefer wetlands with sections of open water. Water depth should be deep enough to prevent Typha spreading across the entire pond area; the reeds should be mainly at the edge of ponds; Substrate at edges should be suitable for reed growth (i.e. not too many pebbles, sandbags, etc.); ▪ Areas of low blanketing vegetation are also desirable for GGBF breeding, for example, Paspalum grass and Shoenoplectus rush; ▪ Establishing aquatic plants with planting after Closure Works: will maximise structural suitability of wetland to immigrating GGBF as soon as construction is completed. <u>Terrestrial vegetation:</u> ▪ Stabilise new works with sterile millet (or other suitable cover crop); ▪ Retain seed bank in fill taken from site (to be reused); ▪ Avoid large tree species (as roots may potentially compromise the cap); Allow terrestrial species to re-colonise Drainage culverts will, where practicable, be vegetated and lined with rocks and objects that may provide	CEMF (Jacobs 2018) – Appendix E Revegetation Management Plan	Project Manager, Site Supervisor	Daily prestart and toolbox, Environmental Inspection checklist

temporary frog refuge, in the event that a frog seeks to traverse the future capped area of KIWEF.			

6 ACCOUNTABILITY

6.1 MANAGING DIRECTOR

The Managing Director shall ensure that all resources needed to fulfil the requirements outlined within this plan are made available. The Managing Director shall hold all relevant managers accountable to implement and monitor all applicable requirements within this Sub-Plan.

6.2 MANAGER RESPONSIBLE FOR DARACON GROUP SYSTEMS

The Manager responsible for Daracon Group Systems shall ensure that the requirements of this plan are effectively implemented. This shall be completed by implementing adequate review and monitoring processes to ensure compliance with this Sub-Plan.

6.3 GENERAL AND DIVISIONAL MANAGERS

Senior Management (*General and Divisional Managers*) are required to have a strong understanding of the requirements of this Plan applicable to their projects. They are to ensure requirements outlined within are effectively implemented and monitored across all their responsible operational areas of the business.

6.4 SITE MANAGEMENT PERSONNEL

Site Management Personnel are required to have a strong understanding of the requirements in this Plan to ensure effective implementation on the project. Site Management must hold all workers on this project accountable to follow and work in accordance with this Sub-Plan.

6.5 ENVIRONMENTAL SITE REPRESENTATIVE (ESR)

The Environmental Site Representative (ESR) nominated in the Organisation Chart in Appendix 1 of the IPMP will be suitably qualified and is responsible to ensure the onsite matters relating to Environmental Management are implemented effectively and as per regulatory requirements and contractual specifications.

6.6 ENVIRONMENTAL MANAGEMENT REPRESENTATIVE (EMR)

The Environmental Management Representative (EMR) will be located offsite for the duration of the project however will have the overall responsibility to ensure that the Environmental Site Representative is held accountable to ensure the onsite matters relating to Environmental Management are implemented effectively and as per regulatory requirements and RMS specifications.

The EMR will attend site from time to time to assist the project team relating to Environmental Management on the project and will be available via phone and email.

6.7 DARACON WORKERS

All Daracon workers shall fully comply with the requirements of this Sub-Plan.

6.8 SUBCONTRACTORS

Where Subcontractors are working under the Daracon Management System on this project, all Subcontractors and their workers shall fully comply with the requirements of this Sub-Plan.

7 DEFINITIONS

All terms referenced within this plan are included within **REG.00001** *Definitions & Glossary of Terms Register.*

8 ASSOCIATED DOCUMENTS AND PROCEDURES

Approved Forms, Process Flowcharts, Registers and/or other documents referenced within the body of, or those that are associated with this plan, are accessible and made available for all Daracon personnel via the following link: **http://dms/cs/login/login.htm.**

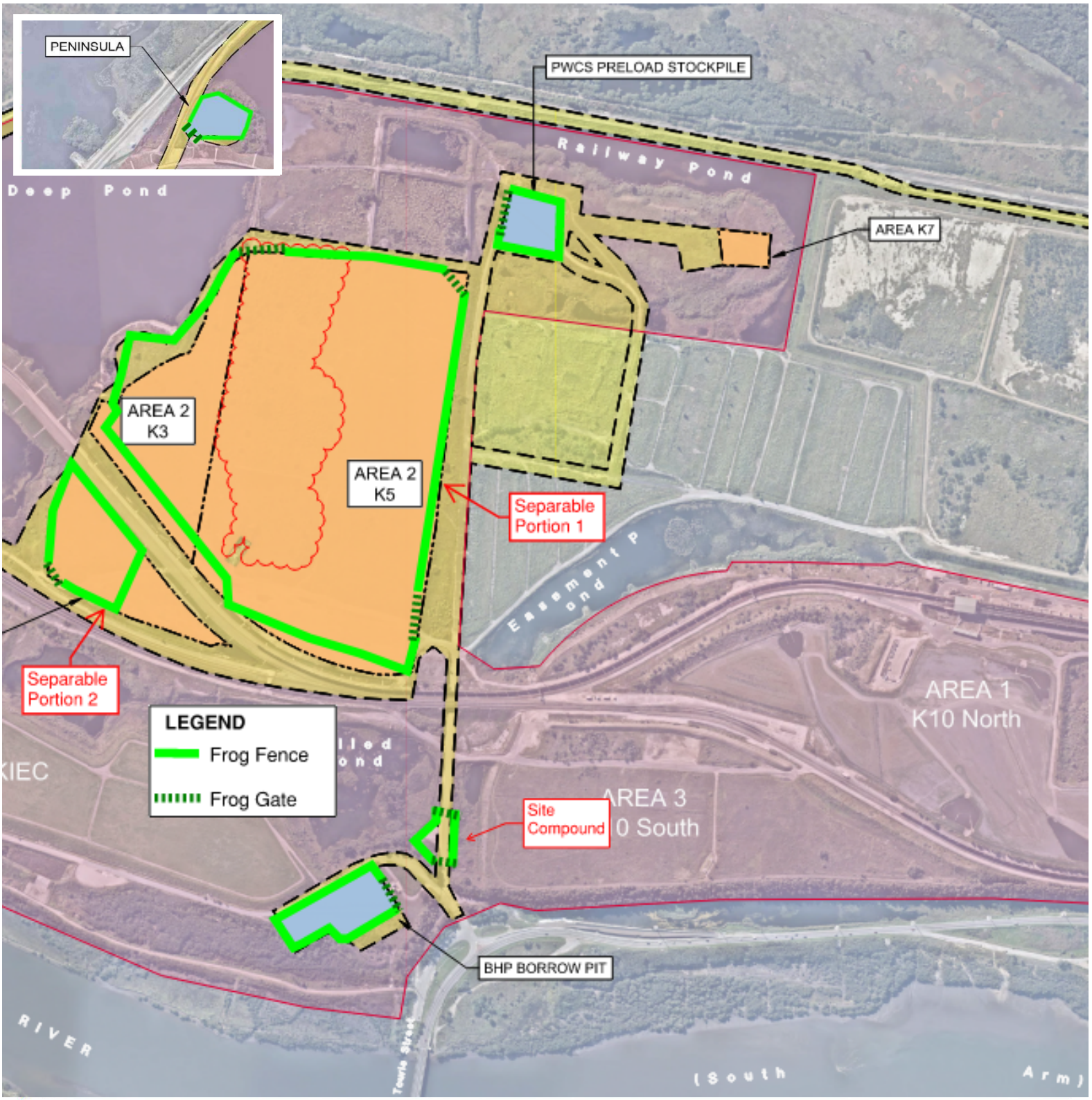
APPENDIX 1 Achieving Environmental Targets and Objectives

APPENDIX 2 Sample Monitoring Records

APPENDIX 3 Incident Reporting and Investigation Procedure

APPENDIX 4 Unexpected Finds Procedure

APPENDIX 5
AMPHIBIAN HYGIENE CHECKLIST AND ENVIRONMENTAL SITE CHECKS (DARACON, 2020)



	Frog Fence	Amphibian Hygiene Station	Wheel Wash	Weather	Inspected By	Date
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						

REPORT: ENVIRONMENTAL INSPECTION

To be completed **weekly, following/during rain event** or **as specified by Regulator/Client** by Supervisor or Leading Hand then forward to Project Manager **weekly**. Please use ☑ or ☒ to complete the below table.

Job Title:	**Job No:**
Date:	**Day:**
Rainfall: mm	Incident or Complaint Y/N Ref:
Inspection By:	

Action	Inspected	Compliant	Time	Comment & Actions	By Whom (sign)
Erosion & Sediment Controls					
Sediment Fence					
Drains					
Silt traps					
Clean Roads					
Stockpiles					
Dust					
Sediment Ponds					
Water Sampled					
Intentional Discharge					
Unintentional Discharge					
Sediment Removed					
Waste Management					
Tidy Site					
Waste Disposal					
Soil	Volume		m^3	Destination:	
Concrete	Volume		m^3	Destination:	
				Destination:	
Truck Wheel cleaning					
Concrete Washout bay					
Other Environmental controls placed and effective					
Water cart use				Water sourced from;	
Neighbourhood					
Fauna / flora					
Heritage					
Noise & vibration					
Chemicals					
Bunding					
Fuel / servicing					

Supervisor – Action Complete	**Project Manager – noted & placed on file**
Name	Name
Sign Date	Sign Date