Kooragang Island Waste Emplacement Facility: Area 2 Closure Works

Hunter & Central Coast Development Corporation

Addendum Review of Environmental Factors

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1. Introduction

1.1 Background

The Kooragang Island Waste Emplacement Facility (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. The EPL was subsequently transferred to Regional Land Management Corporation Pty Ltd in May 2003 and then Hunter Development Corporation (HDC) in January 2008. HDC has subsequently merged with the former Central Coast Development Authority to become the Hunter and Central Coast Development Corporation (HCCDC) and references to HDC in quoted text hereafter should be interpreted as a reference to HCCDC.

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. Surrender conditions relate primarily to the closure process and describe the capping that is required across much of the area through reference to the GHD (2009) Revised Final Landform and Capping Strategy (the Capping Strategy).

HCCDC are the NSW Public Authority currently assigned responsible for the closure of KIWEF (the Closure Works) 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 the Closure Works, KIWEF has been divided into three areas with Area 2 being the subject of this Addendum Review of Environmental Factors (REF) while Areas 1 and 3 closure have been completed under a separate assessment. Area 2 is further divided into sub areas K3 to K8 with some sub-areas further divided into specific disposal cells. Appendix A reproduces figures illustrating these locations as prepared by HCCDC and Ramboll (2018).

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.

The intended outcome of the Closure Works is a site supporting similar levels of vegetation and providing similar surface water flows to surrounding ponds and habitat areas with a reduced contaminant load migrating from the fill material to the surrounding environment.

1.2 Assessment status

KIWEF including Area 2 has undergone extensive prior assessment, with a REF prepared to address the objects of the *Environmental Planning and Assessment Act 1979* (EP&A Act) in March 2016 (ERM, 2016). A Referral was completed in December 2015 (ERM, 2015) and a Preliminary Documentation Package completed in July 2018 (Ramboll, 2018) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* EPBC Act. Both ERM (2016 and 2015) considered preliminary design information, while Ramboll (2018) considered a more advanced design as intended to be implemented.

1.2.1 Key findings of prior assessments

The key findings of ERM (2016) were identified as:

- *"the proposal provides significant long term benefits to the environment by limiting the potential for contaminated material from emplaced fill leaching into the surrounding environment;*
- *the hydro-salinity regime of ponds immediately down gradient of the works are predicted to generally become slightly "wetter" and less saline as a result of the Closure Works;*
- *improvements are predicted in surface water quality due to the Closure Works, which would enhance ecological benefits to listed protected species;*
- *predicted changes to hydrology would not be of a magnitude that would significantly impact Matters of National Environmental Significance as listed under the EPBC Act;*
- *it is highly unlikely that the proposed works would disrupt the breeding cycle of any species assessed;*
- *areas of appropriate foraging and breeding habitat would be retained within and adjacent to the proposal site;*
- *the Closure Works will not provide additional water pathways by which Mosquito Fish (Gambusia holbrooki) could migrate.*

Based on the above findings the capping design is confirmed as appropriate and beneficial in:

- *separating water flow pathways (surface and ground water) to optimise clean water sources for habitat ponds;*
- *enabling the collection and drainage of treated waters with relatively low salinity;*
- *having no discernible effect on hydro-salinity conditions in the majority of adjacent ponds; and*
- *promoting an integrated post-construction sustaining water cycle across the managed landform".*

1.3 Closure Works previously considered

The Closure Works as previously considered are provided in full in Chapter 2 of ERM (2016) and are summarised generally as being to undertake the closure of Area 2 (K3 and K5) of KIWEF in accordance with the Surrender Notice and Capping Strategy (GHD, 2009) and the placement of additional Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) over a small area containing asbestos within K7. The standard capping methodology is dictated by Condition 4 of the Surrender Notice, and was considered by ERM (2016) as follows:

- *"Establishment of erosion and sedimentation controls and construction of sedimentation basins as required;*
- *Remove any vegetation and strip the top 100 millimetres (mm) of soil. Stockpile for re-use if deemed suitable;*
- *Construct trunk drainage where required;*
- *General earthworks (cut/fill) activities to establish the regraded surface with a final minimum 1% grade. If the stripped 100 mm of soil is suitable for re-use, stockpile for use in revegetation, or screen and incorporate as fill for grading. Cut from within this area, if deemed suitable, may be used as fill and capped. Additional fill shall be sourced from an approved offsite source. Earthworks shall be compacted in accordance with the Technical Specification. Topsoil and re-vegetate the disturbed area if no further capping material is required. Any unsuitable cut material shall be stockpiled in Stage 7 area (as defined in GHD (2009) - noted to be no longer available with alternative location to be identified during the detailed design stage) and later capped;*
- *Place 0.5 metres (m) capping material over the regraded surface at a final minimum 1% grade. Compact the capping material to achieve a maximum permeability of $1x10^{-7}$m/s. Construction of the capping layer "should ensure that the final surface provides a barrier to the migration of water into the waste (or fill),*

controls emissions to water and atmosphere, promotes sound land management and conservation, and prevents hazards and protects amenity" (EPA, 1998);

- *Topsoil 100 mm thick using stockpiled surface soils or imported topsoil and revegetate the disturbed area;*
- *Any cut material which is considered geotechnically unsuitable to use as fill shall be relocated to the proposed unsuitable material containment area; and*
- *Any cut material which is significantly contaminated (as defined by the materials management plan) shall be either disposed of off-site or relocated to a nominated containment cell area as directed by the principal".*

Noted departures from the standard capping methodology presented above were identified as including:

- In areas identified as suitable Green and Golden Bell Frog (GGBF) habitat, including the area bordering the freshwater wetlands, capping will be undertaken up to within 30 m of the identified habitat area, with the exception of the area located near K3/1W (which will be capped) and then revegetated. No regrading, capping or other disturbance will be undertaken within other GGBF habitat areas;
- To reduce the risk of migration of impacts around Cell 5, the permeability is to be reduced to $1x10^{-8}$ m/s for a zone (nominally 10- 20 m) adjoining the Cell 5 area;
- Minor re-contouring of Cell 5 by placing compacted Coal Washery Reject is recommended to a minimum grade of 1% to shed surface water away from the north, west and southern boundaries of the Geo-synthetic Clay Liner and tie into proposed surface levels of the adjoining capped areas;
- Placement of VENM or other material as approved in the EPL in the area of K7 where only 1.6m of fill has been placed, to provide at least 3m cover over asbestos disposal areas;
- Limited availability of "topsoil" requiring importation of alternative "revegetation medium" with low nutrient and low Chytrid Fungus risk;
- No access to the previously identified geotechnically unsuitable material storage area (Stage 7 area) requiring alternative disposal solutions on site (location to be determined); and
- The Post HCCDC Remediation Runoff Flow Paths predicted by the GHD Capping Plan may also be altered to address changes in ground surfaces caused by neighbouring site developments (including the NCIG rail flyover) and the existing site topography.

The Surrender Notice requires that Closure Works be undertaken in accordance with the following documents:

- '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;
- 'K26/32 and K24/31 Ponds Action Plan– Kooragang Island Waste Emplacement Facility' dated 31 May 2011 and prepared by Golder Associates; and
- 'Materials Management Plan - Kooragang Island Waste Emplacement Facility' dated November 2012 prepared by RCA Australia.

The requirements of these documents may be superseded by the Closure Works rationalisation process undertaken by HCCDC to avoid impacts to GGBF. It should be noted that the K26/32 and K24/31 Ponds are not associated with Area 2 or K7 and as such the requirements of that report are not considered further in ERM (2015 and 2016) or this addendum. The environmental management commitments made within these documents were incorporated into the mitigation measures developed by ERM (2016).

1.4 Scope and purpose of Addendum REF

Under Section 5.5 of the EP&A Act, HCCDC has the following obligation:

> *For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a determining authority in its consideration of an activity shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.*

This duty is usually met and documented through the preparation of an REF and documentation of endorsement of the findings by the determining authority. It is noted that an REF forms a snapshot in time and in the event that circumstances change between the assessment being completed and the activity commencing the duty under Section 5.5 of the EP&A Act remains. As such, the identified purpose of this Addendum REF is to identify, assess and document any changed circumstances since the REF was completed to allow HCCDC to rely on the original REF (ERM 2016) and addendum REF to fully consider the environmental impacts of the activity as now proposed.

Based on the above, the scope and purpose of this Addendum REF is limited to the assessment of change since the REF (ERM, 2016) was completed. These changes are identified as:

- Implementation of a modified cap within the low area within Area 2 as illustrated in Appendix A;
- Capitalise on existing capping materials within Borrow Sites across Kooragang Island, including: Peninsula Borrow Pit; K7 Pre-load Area; and Hunter River Remediation Project (HRRP) Borrow Pit; and
- New access to the Peninsula Borrow Pit and Wedge area via an existing Australian Rail Track Corporation (ARTC) haul road involving some track upgrades (the upgraded haul route).

These works are herein referred to as 'the proposal'. This addendum also considers the implications of legislative changes, new species listings under NSW legislation and potential for changes in vegetation and habitat as they relate to the proposal.

The purpose of the REF (ERM, 2016) and this Addendum REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail protective measures to be implemented. The description of the proposed work and associated environmental impacts have been undertaken in the context of clause 228 of the *Environmental Planning and Assessment Regulation 2000* and the *Threatened Species Conservation Act 1995* (TSC Act). In doing so, the REF helps to fulfil the requirements of Section 5.5 of the EP&A Act that HCCDC examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Part 5.1 of the EP&A Act; and
- The significance of any impact on threatened species as defined by the Threatened Species Conservation Act 1995 (TSC Act) and/or Fisheries Management Act 1994 (FM Act), in section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement.

The implications of the proposal on Matters of National Environmental Significance (MNES) under the EPBC Act are being assessed separately through the Ramboll (2018) Preliminary Documentation Package.

1.5 Statutory framework

ERM (2016) considered the statutory framework for the Closure Works and found:

- As concluded by legal advice separately obtained by HCCDC in relation to earlier stages of closure, and reconfirmed by HCCDC under current legislation, the Closure Works are best described as environmental management or environmental protection works as opposed to remediation works;
- Environmental Protection or Management Works were permissible without consent under *State Environmental Planning Policy (Three Ports) 2014* (Three Ports SEPP);
- While the Closure Works also meet the definition of remediation works under *State Environmental Planning Policy 55 – Contaminated Land Remediation* (Remediation SEPP), the Three Ports SEPP prevails to the extent of any inconsistency; and
- There remains a duty to notify Newcastle Council of the remediation works in advance of commencement under the State Environmental Planning Policy 55 – Remediation of Land (Remediation SEPP).

The full summary of the statutory framework is provided in ERM (2016). These findings are considered to remain valid for the Closure Works as modified (the proposal) with the following additional considerations:

- Amendments to the EP&A Act;
- Commencement of the *Biodiversity Conservation Act 2016* (BC Act); and
- Commencement of *State Environmental Planning Policy (Coastal Management) 2017* (Coastal Management SEPP).

The implications of these legislative changes are considered below.

1.5.1 Amendments to the EP&A Act

Various amendments to the EP&A Act came into force on 1 March 2018 as a result of the enactment of *Environmental Planning and Assessment Amendment Act 2017*. Amendments primarily relate to the changes to section numbering but also altered the objectives of the EP&A Act to include objectives of good design and amenity of the built environment; the sustainable management of built and cultural heritage (including Aboriginal cultural heritage); and the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.

There are no material changes to Part 5 (now Division 5.1) of the EP&A Act that affect the assessment or determination of the proposal.

1.5.2 Biodiversity Conservation Act 2016

The BC Act commenced on 25 August 2017 repealing the *Threatened Species Conservation Act 1995* (TSC Act). Schedule 9 Part 1 of the BC Act identifies that the regulations may contain provisions of a savings or transitional nature consequent on the enactment of this Act. The *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (BC (ST) Regulations) identifies the following as "pending Part 5 assessment":

> *"an environmental impact assessment of the activity that began under Part 5 of the Environmental Planning and Assessment Act 1979 before the commencement of the new Act (but only if the proponent commences to carry out the activity within 18 months after the commencement of the new 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.

HCCDC has confirmed that the Area 2 Closure Works are intended to commence by 24 February 2019 and as such the TSC Act remains applicable as described in ERM (2016).

1.5.3 State Environmental Planning Policy (Coastal Management) 2018

The Coastal Management SEPP updates and consolidates into one integrated policy *State Environmental Planning Policy 14* (Coastal Wetlands SEPP), *State Environmental Planning Policy 26* (Littoral Rainforests SEPP) and *State Environmental Planning Policy 71* (Coastal Protection SEPP), including clause 5.5 of the *Standard Instrument – Principal Local Environmental Plan*. These policies are now repealed.

The Coastal Management SEPP gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. The coastal zone is comprised of four coastal management areas as follows:

- Coastal wetlands and littoral rainforests area; areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26;
- Coastal vulnerability area; areas subject to coastal hazards such as coastal erosion and tidal inundation;
- Coastal environment area; areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included; and
- Coastal use area; land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The Proposal area is surrounded by, but does not include, land mapped as coastal wetlands. Parts of the Proposal area are mapped as proximity area for Coastal Wetlands, Coastal Environment Area and Coastal Use Area. Importantly, the Proposal 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.

2. Description of proposed modified activity

As identified in Section 1.4, the scope of this Addendum is limited to the assessment of change since the original REF (ERM, 2016) was completed. The following changes have been identified by HCCDC as requiring assessment and are identified on Figure 2-4 of Ramboll (2018) (refer to Appendix A):

- Opportunities to capitalise on existing *in-situ* capping across Area 2;
- Implementation of a modified capping methodology within the area identified as the Low Area;
- Winning capping materials from within the surrender notice area, including:
  - the Peninsula Borrow Pit;
  - the K7 Pre-load Area; and
  - the HRRP Borrow Pit; and
- Accessing the Peninsula Borrow Pit and Wedge area via an upgraded existing haul road and other additional access tracks.

For consistency, the modification to the project description are reproduced from the Preliminary Documentation Package prepared by Ramboll (2018) as reproduced in the following sections in italics. Cross references are to sections and figures within Ramboll (2018) with figures reproduced in Appendix A for reference.

2.1 In-situ capping

"State identified areas of the KIWEF where in-situ materials may already form an effective cap, which if avoided, would minimise the ground disturbance requirements potentially protecting areas of GGBF foraging habitat as well as providing time and cost savings. SMEC, on behalf of the State, undertook an investigation to determine whether the existing in-situ materials satisfied the objectives of the Closure Strategy (the Area 2 Rationalisation Investigation).

*The Area 2 Rationalisation Investigation identified that the in-situ capping material (see **Figure 2-4**) which forms the southern section of Area 2 would meet the requirements of the Closure Strategy with minor modifications such as drainage improvements, and placement of a revegetation layer using material won from the KIWEF".*

2.2 Modified cap within the Low Area

*"During the hydro-salinity modelling of the Area 2 Capping Works it was identified that construction of the standard capping design as presented in the Closure Strategy and described in **Section 2.1** would result in an increase in stormwater runoff into Deep Pond (see **Figure 2-1**). Modelling indicated that the increase in stormwater runoff would result in changes to the hydrological regime within Deep Pond, specifically regarding water depth and salinity levels.*

*As such, the capping design was reconsidered to minimise hydrological changes and it was determined that the Low Area (see **Figure 2-2**) could be designed to retain a significant portion of the stormwater runoff within a deep soil layer overlaid by an evapotranspiration layer referred to as a Modified Cap. The Modified cap provides the opportunity to decrease the amount of stormwater run-off through greater retention and increased transpiration. The benefits of the proposed Modified cap are further discussed in **Section 6.1** and presented in full in the KIWEF Area 2 Closure Works Area 2 Hydro Salinity Model (SMEC 2018) included in **Appendix 5**.*

*The remainder of Area 2 would be capped using the standard capping design as presented in the Closure Strategy and described in **Section 2.1** with the exception of the areas specified for insitu capping in **Section 2.3.1"**.*

2.3 Peninsula Borrow Pit

The Peninsula Borrow Pit is located on the western side of Deep Pond, the Peninsula Borrow Pit is comprised of coal washery rejects (placed by BHP during the original construction of the KIWEF), overlain by dredged sands/sediments (placed by NCIG during construction of the rail flyover modification). HCCDC has advised that investigation of the NCIG material has been difficult due to access issues but are expected to be consistent with materials tested on the eastern side of Deep Pond, that were confirmed suitable as capping material. Due to the location of the Peninsula Borrow Pit, material won from this location would be used to cap areas inside of the Wedge.

*"The Peninsula Borrow Pit provides suitable material to be utilised for capping or fill during the Project. The exclusive use of this material in the Wedge West area (see **Figure 2-4**) provides the opportunity to minimise additional disturbance resulting from required haul road improvements. This is further discussed in **Section 2.3.6**.*

*The removal of material from this area for fill or capping purposes may be undertaken as part of the Project. As such, the disturbance of this area has been included in the assessment of impacts included throughout **Section 6** to **Section 11**.*

The methodology for extraction of this material would include:

- *Completion of an ecological survey prior to and during the establishment of frog fencing around the perimeter of the works area;*
- *Establishment of erosion and sedimentation controls;*
- *Ecological survey of the fenced site to confirm all GGBF's (and other fauna) captured inside the frog fencing are removed prior to commencement of ground disturbance activities;*
- *Strip topsoil and excavate capping/fill materials;*
- *Reshaping and stabilisation of Peninsula Borrow Pit footprint."*

2.4 K7 Preload Stockpile

The K7 Pre-Load Stockpile is a 33,000m^3 stockpile placed within the Closure Works area by Port Waratah Coal Services (PWCS) as part of the Terminal 4 (T4) investigation works. The stockpile is comprised of geochemically inert dredged clayey sands that are anticipated to be suitable for forming subgrades and landform. Material from the K7 Pre-Load Stockpile is intended to be used to backfill the HRRP borrow pit (described below), to provide cover above asbestos disposal area in K7 and for general land forming.

*"The K7 Preload Stockpile provides suitable material to be utilised for capping or fill material during the Project. The removal of material from this area for fill or capping purposes may be undertaken as part of the Project. As such, the disturbance of this area has been included in the assessment of impacts included throughout **Section 6** to **Section 11**. The methodology for extraction of this material would include:*

- *Completion of an ecological survey prior to and during the establishment of frog fencing around the perimeter of the works area;*
- *Establishment of erosion and sedimentation controls;*
- *Ecological survey of the fenced site to confirm all GGBF (and other fauna) captured inside the frog fencing are removed prior to commencement of ground disturbance activities;*
- *Vegetation removal, strip topsoil and stockpile;*
- *Due to proximity to GGBF habitat (that is the Ponds surrounding Area K7) excavation of the approximately 33,000 m^3 of capping/fill materials would be conducted from the top down and the centre out, to minimise erosion and sediment control concerns;*
- *Reshaping and stabilisation of K7 Preload Stockpile footprint."*

2.5 HRRP Borrow Pit

The HRRP Borrow Pit is a one-hectare site that was previously used during the HRRP to collect leachate from the Kooragang Island Emplacement Cell prior to treatment and discharge. Following the completion of the HRRP the leachate pond was decommissioned, validated as being clean and backfilled with surplus coal washery rejects from within the Closure Works area. This coal washery reject is intended to be used as capping material in the sections of Area 2 closest to deep pond.

*"The State identified a potential additional source of material which may be suitable for use in capping or fill material which is known as the HRRP Borrow Pit and is identified on **Figure 2-4**.*

*The take of material from this area for fill or capping purposes would be undertaken as part of the Project. As such, the disturbance of this area has been included in the assessment of impacts included throughout **Section 6** to **Section 11**. The methodology for extraction of this material would include:*

- *Completion of an ecological survey prior to and during the establishment of frog fencing around the perimeter of the works area;*
- *Establishment of erosion and sedimentation controls;*
- *Ecological survey of the fenced site to confirm all GGBF's (and other fauna) captured inside the frog fencing are removed prior to commencement of ground disturbance activities;*
- *Strip topsoil, excavation of identified available volume of capping/fill materials;*
- *Backfilling of HRRP Borrow Pit with geotechnically and environmentally suitable materials to existing ground level."*

2.6 Peninsula Borrow Pit and Wedge haul road upgrade

*"To access the Wedge (Lot 7) and Peninsula Borrow Pit areas, the State would need to upgrade existing access tracks. Access roads follow the alignment shown on **Figure 2-2.** Detailed design for the access track upgrades would be undertaken as part of a design and construct component of the construction contractor package and would be required to meet the ARTC rail exclusion zone requirements.*

*The expected upgrades to the access track include the installation of a pipeline and culvert across an existing drainage swale and some minor recontouring works. These works are necessary to enable heavy and long vehicles movements along the existing access track that would otherwise be unsafe. The pipeline and culvert would avoid changes to the overland flows and of water under the haul road and the recontouring will enable long vehicles suitable gradient and clearances to traverse an elevated portion of the existing track. The proposed location of the upgrade works is shown of **Figure 2-4**. The extent of the works would involve the following tasks at a minimum:*

- *Completion of an ecological survey prior to and during the establishment of frog fencing between the active works area and identified GGBF habitat (noting the proximity of the works area to an active rail corridor);*
- *Establishment of erosion and sedimentation controls;*
- *Ecological survey of the fenced site to confirm all GGBF's (and other fauna) captured inside the frog fencing are removed prior to commencement of ground disturbance activities;*
- *Placement and compaction of additional material to flatten the access haul road and enable long vehicles (for example machinery floats) to safely traverse the access track;*
- *Placement of a pipeline and culvert across drainage swale;*
- *Backfilling around pipeline;*
- *Installation of rail safety infrastructure to illustrate rail exclusion zones and limit proximity to rail line of large vehicles travelling along the access route."*

2.7 Justification of proposed changes

Following the determination of the Area 2 Closure Works as a Controlled Action in 2016, the State undertook a detailed investigation process to minimise impacts to MNES. This investigation sought to identify options to:

- Reduce the disturbance footprint where possible;
- Reduce indirect impact to surrounding habitat for GGBF; whilst
- Achieving the outcomes required by the EPA to close the landfill pursuant to the conditions of the KIWEF Surrender Notice.

As described by Ramboll (2018), following extensive investigations to rationalise the Closure Works and minimise the potential impacts to the GGBF and Hunter Estuary Wetlands Ramsar Site, HCCDC identified changes which result in either cost and time efficiencies, improved environmental outcomes, or both. HCCDC advised that consultation with the EPA confirmed:

- The general support of the EPA for the proposed changes to the Closure Works; and
- That the Closure Works were not materially different to the approved Closure Strategy and therefore did not require a modification to the Surrender Notice.

3. Summary of additional investigations

In responding to the declaration of the project as a Controlled Activity under the EPBC Act, HCCDC commissioned, or gained access to, the following additional investigations:

- SMEC (2018) *KIWEF Area 2 Closure Works: Area 2 Hydro-Salinity Model*;
- University of Newcastle (2017) *Research Program on the Green and Golden Bell Frog (Litoria aurea) on Kooragang Island Annual Report (2016-2017);* and
- University of Newcastle (2018) *Area 1 and Area 3 Closure Works for Remediation of the former BHP Kooragang Island Waste Emplacement Facility: Summary of the Impact and Benefit to the Green and Golden Bell Frog (Litoria aurea) and its Habitat.*

A review of these documents as they relate to the findings of ERM (2016) and scope of this Addendum REF is provided below.

3.1 Hydro-salinity modelling

A quantitative Area 2 hydro-salinity model was undertaken by SMEC (2018) to quantify the existing or 'pre-capping' hydrological and hydrogeological environment, the post capping drainage design and the potential impacts to the hydrology and water quality resulting from the Proposal. The hydro-salinity model sought to replicate the hydro-salinity regime of each pond by modelling the following processes:

- Surface water runoff from contributing catchment areas;
- Groundwater inflows into each pond;
- Groundwater outflows from each pond;
- Surface water flows between ponds and from some ponds to receiving waters; and
- Evapotranspiration losses from each pond.

The results of the modelling demonstrate that the implementation of the proposed Area 2 Closure Works (under the Modified Cap design) result in water levels increasing slightly within the receiving water body (Deep Pond), confirming the consideration in ERM (2016) that conditions would be generally 'wetter' than the existing conditions.

The results of the modelling also demonstrate that after the capping of Area 2, predicted changes to water quality would result in:

- 32.3% of the time the predicted conditions are within the optimum water quality range for chytrid protection and GGBF breeding (1,650 µS/cm to 2,900 µS/cm) representing a negative 9.9% shift from existing; and
- 94.8% of the time, predicted conditions are within the optimum conditions for GGBF breeding (<2,900 µS/cm, Tadpole Health Threshold) representing a positive 3.3% shift from existing.

The environmental effects associated with the Proposal are expected to represent a minor change to the existing conditions, and modelling by SMEC confirms the consideration by ERM (2016) that post capping conditions would be slightly fresher. The modelling also concluded that due to the hydraulic isolation of Area 2 from other ponds across the KIWEF negligible cumulative impacts to hydro-salinity would eventuate.

The findings of the hydro-salinity modelling are not considered to alter the conclusions of ERM (2016) in relation to impacts on GGBF.

3.2 Green and Golden Bell Frog population monitoring update

The University of Newcastle has completed substantial additional investigations since ERM (2016). This has included annual population monitoring over the 2016-2017 breeding season and a summary of the impact and benefit to the GGBF and its habitat from the completion of Closure Works in KIWEF Areas 1 and 3.

The key findings of the population monitoring (University of Newcastle, 2017) of relevance to planning for the Closure Works of Area 2 is summarised as follows:

> *"1. At a local scale, the best chance for persistence of bell frogs in good numbers seems to involve a mosaic of habitats that include:*
>
> *i. A larger permanent wetland edged by emergent vegetation, but with some significant area of open water*
>
> *ii. Nearby ephemeral wetlands that provide suitable breeding sites in wet years*
>
> *iii. Other nearby semi-permanent wetlands that provide breeding or refuge sites in dry years.*
>
> *iv. This mosaic of wetlands should be within a 0.5 km radius*
>
> *v. It is not essential for the permanent wetland to be free of Gambusia, but the nearby ephemeral and semi-permanent wetlands should be Gambusia-free as much as possible.*
>
> *2. At present, the NCIG CHEMP wetlands are very important for the GGBF in the NW island.*
>
> *3. The BHP CHEMP wetlands are playing an important role in the Central part of the island.*
>
> *4. The 'Northern Rail Corridor' remains the most important part of Kooragang Island for GGBF, with more than 50% of the animals detected with in this part of the industrial zone.*
>
> *5. Bell frogs show high levels of site fidelity. This has important implications for any future mitigation of human activity on key wetlands (e,g. in the northern rail corridor).*
>
> *6. Dispersal is evidently sufficient to allow colonisation of new ponds within a 0.5 kilometre radius, as evidenced by the presence of bell frogs at three constructed wetlands from which they were absent last year.*
>
> *7. Female bell frogs may be reproducing earlier (in their second year) on Kooragang Island than occurs in the chytrid-free population on Broughton Island, perhaps as a result of rapid adaptation. If confirmed, this means that the survival of females into their third and fourth years may be less critical than previously believed.*
>
> *8. Notwithstanding the previous point, very few animals survive to their third year. For the best chances of securing the Kooragang Island population against periods of prolonged drought, there should be sufficient permanent and semi-permanent wetlands capable of providing Gambusia-free breeding habits though a succession of dry years".*

The key findings of the summary of the impact and benefit to the GGBF and its habitat from the completion of Closure Works in KIWEF Areas 1 and 3 (University of Newcastle, 2018) is reproduced as follows:

- *The Stage 1 Closure Works by HDC in Areas 1 and 3 have led to the creation of nine constructed wetlands that provide a large amount of habitat suitable for the green and golden bell frog Litoria aurea.*
- *Prior to the Closure Works, no suitable wetland habitat existed in those Areas and recorded occupancy by L. aurea was low (HDC response to SEWPaC, 2013)*
- *These nine new wetlands have improved wetland connectivity across the southern part of the T4 site.*

- *Between them, the HDC constructed wetlands have a range of hydroperiods. That range, combined with the spatial connectivity of these wetlands, has resulted in an improved habitat mosaic for L. aurea in the southern part of T4.*
- *All of the new wetlands have been occupied by L. aurea within two summer seasons of construction. Six of the nine were occupied within a year of construction.*
- *Prior to 2015, a very high proportion of the L. aurea detected in T4 were located in the northern part of the site. Since the construction of the HDC wetlands, the distribution of L. aurea across T4 has become more even, and the numbers across the southern part of the site have increased. These patterns can be attributed with confidence to the increase in habitat area and connectivity resulting from the Stage 1 Closure Works.*
- *Breeding has occurred in all of the nine of the wetlands constructed during Phase 1. These represent a large proportion of wetlands in T4 that are known breeding locations for L. aurea. In 2017-18, tadpoles and metamorphs (the strongest evidence of breeding at a given wetland) were detected at eight wetlands across T4; seven of these were at HDC constructed wetlands in Areas 1 and 3.*
- *The elevation and construction method of the new wetlands has effectively hydrologically isolated each from the pre-existing wetlands on T4. This will strongly reduce the possibility of the HDC wetlands from becoming infested by the invasive mosquito-fish Gambusia. As Gambusia are known to reduce successful breeding of L. aurea (by predation upon tadpoles), this feature is likely an important factor in the rapid success of the new wetlands as breeding habitat for L. aurea. Furthermore, the elevation of these wetlands is likely to provide a Gambusia-free habitat even after large flood events (such as January 2016).*
- *The success of the HDC constructed wetlands in providing habitat for L. aurea may serve as a model for construction of new habitat for this species.*

The additional monitoring of population dynamics by the University of Newcastle confirmed the consideration by ERM (2016) that the variability of hydro-salinity regimes within and between ponds remains important for GGBF survival but that the provision of gambusia free breeding habitat may be of greater importance based on the understanding of earlier breeding meaning chytrid survival beyond two years is less critical for reproduction.

4. Consideration of works in ARTC lands

The Peninsular and Wedge access track upgrades and use would occur within ARTC controlled lands. These works would be undertaken by or on behalf of HCCDC and the intention is that they are assessed and determined as part of the overall proposal. For ease of ARTC reference, works to upgrade and use the existing ARTC access track to access the Peninsular and Wedge areas are described in this chapter.

4.1 Statutory Considerations

Under section 5.4 of the EP&A Act, Sections 5.5 and 5.7 do not apply to or in respect of the following (despite the terms of those sections):

- A modification of an activity, whose environmental impact has already been considered, that will reduce its overall environmental impact;
- A routine activity (such as the maintenance of infrastructure) that the Minister determines has a low environmental impact and that is carried out in accordance with a code approved by the Minister; or
- An activity (or part of an activity) that has been approved, or is to be carried out, by another determining authority after environmental assessment in accordance with this Division.

As a result of section 5.4, should HCCDC determine the project under section 5.5 of the EP&A Act, ARTC would not need to separately consider and determine the upgrade works on their land associated with the proposal.

4.2 Existing environment

The Peninsular and Wedge Access Track upgrades would occur on the existing ARTC access track. This track runs between the western bank of Deep Pond North and the existing ARTC rail track servicing port facilities on Kooragang Island. The access track is generally elevated from Deep Pond, devoid of vegetation, isolated from human receptors and formed on fill material associated with the development of the rail corridor.

4.3 Scope of works

As described above, the track upgrade works are likely to be limited to re-profiling sections of track to make them suitable for the arrival and departure of plant and equipment required for the winning of material from the Peninsular Borrow Pit and Closure Works within the Wedge. This work is expected to be limited to the installation of one culvert to maintain drainage and placement of appropriate material for access track development, consistent with ARTC specifications or current materials.

Once upgraded, the access track is expected to be used for the mobilisation and demobilisation of plant and equipment and daily access by workers during the proposal. Bulk transfer of materials along this access track is not anticipated.

4.4 Potential impacts

The potential impacts have been identified as consistent with the short term impacts associated with the broader proposal. As the works do not involve changed hydrology or land use, no ongoing impacts are anticipated. For ease of reference, short term impacts identified associated with the proposal are reproduced in Table 1.

Table 1: Access Track Impacts

Aspect	Potential Impacts of Overall Proposal	Assessment of impacts of works in ARTC Lands
Biodiversity	The proposal may result in some direct mortality to a small number of individuals during clearance works. Breeding habitat will remain unaffected. Based on the EPBC Act and TSC Act assessments undertaken, the proposal is unlikely to have a significant impact on MNES, or NSW listed flora and fauna providing that the range of mitigation measures and management strategies recommended to reduce impacts are successfully implemented. The proposal provides benefits to the environment by: · limiting the potential for contaminated material from emplaced fill leaching into surrounding habitats; · improvements in water quality due to the proposal would provide ecological benefits to protected species; · potential negative effects during Closure Works and revegetation would not be of a magnitude that would significantly impact on flora, fauna or ecological communities; · it is highly unlikely that the proposed works would disrupt the breeding cycle of any species; and · areas of appropriate foraging and breeding habitat would be retained within and adjacent to the Closure Works area. Given the temporary and negligible effects of the construction activities and the negligible ongoing negative impacts associated with completion of the capping activities, there will be no significant impact on the ecological character of the Ramsar wetland, nor the species it contains.	Access to the Peninsula Borrow Pit and Wedge is from the east and via a haul road that flanks the northern perimeter of Deep Pond, which was identified as known habitat for GGBF. The proposed upgrade of the access track would involve work along a portion of the shoreline of Deep Pond. An assessment of impact significance for the GGBF is provided in Appendix B. If not managed appropriately, potential impacts associated with the upgrade and use of the access track may include: · removal of potential habitat resources of a portion of the shoreline of Deep Pond; · direct mortality during the upgrade of the access track; and · potential run-off and indirect impacts to the Deep Pond. Mitigation measures would be implemented to manage the risk of indirect and indirect impacts to biodiversity, including applying the appropriate erosion and sediment controls, undertaking pre-clearance surveys prior to upgrade works, and restricting works within GGBF habitat. Frog fencing would be installed prior to commencement of ground disturbance activities. Works would be undertaken in accordance with measures outlined in the *Green and Golden Bell Frog Management Plan* (Golder, 2011) and the mitigation measures proposed below in Section 4.5. Overall these access track upgrades are not expected to result in a significant impact to any listed threatened species or migratory species.
Traffic	In the event that all material is required to be imported, approximately 230,000m3 will be required to be delivered to the site. This equates to approximately 5500 truckloads over the course of the proposal. The works are expected to be undertaken over a 6 – 12 month timeframe. This equates to an approximate 40 deliveries per day or 80 truck movements (40 in and 40 out) or two truck movements every 10 minutes.	The upgrades required for the use of the ARTC access track would involve the installation of a pipeline and culvert, and minor regrading works. It is expected that these upgrades would take one to two weeks to complete and would be limited to about 20 metres of the track to the north of the Deep Pond. Once the upgrades have been completed, heavy and light vehicles would utilise the

Aspect	Potential Impacts of Overall Proposal	Assessment of impacts of works in ARTC Lands
	No long term operational traffic movements will be generated by the proposal. As such the vehicle numbers and short term nature of the works do not warrant any intersection treatments. While existing traffic issues resulting from identified insufficient capacity may be exacerbated, the proposal is not expected to cause significant traffic impacts on its own.	access track. Access would be undertaken in liaison with ARTC to ensure the use of the access track by the proposal does not interfere with the ongoing operational access requirements of ARTC. Overall the proposed activity is not expected to cause significant traffic impacts.
Water quality	Pond hydrology may be altered as a result of the Closure Works when compared to the existing conditions, as a result of a general increase in surface water discharge from capped areas; and reduced groundwater flows due to decreased infiltration through the capped area. The changes to hydrology as a result of the proposed activity are expected to be negligible in comparison to the continuing effects of direct rainfall, evaporation and unchanged interaction with aquifers. The changes to pond hydrology at the KIWEF are expected to be limited to: · Slightly altered wetting and drying regimes in ponds that will likely to be generally wetter due to an increase of surface water in-flows from the closure area via lined sediment basins; and · Water quality changes in the ponds are expected to be slightly fresher with improved general water quality, due to the reduction of leached contaminants, as a result of increased surface water in-flows and reduced infiltration via the fill aquifer to surface water bodies. The potential for groundwater impacts associated with existing emplaced material are most recently assessed in in association with the T4 Project. In particular Douglass Partners (2013) identified that the Closure Works would reduce the potential for impact associated with the contaminants found within the existing landfill “through longer particle travel times and reduced mobility of existing contamination compared to the existing case”.	The access track upgrade works would require the placement of materials to regrade the access track adjacent to the Deep Pond. The introduction of additional materials has the potential to impact on water quality through erosion and sedimentation reaching the Deep Pond if not managed appropriately. These potential impacts would be managed in accordance with controls outlined in Section 4.5. The access track upgrade works would also include the addition of a pipeline and culvert. This would prevent ponding as a result of the recontouring works, and would maintain surface water flows as existing. Overall, potential impacts to the water quality are not anticipated to be significant, and would be appropriately managed in accordance with safeguards outlined in the Section 4.5. There would be no impacts to groundwater as a result of upgrades to or use of the access track.
Noise	The nearest residence is over 1,300 m from the proposal area and is separated by elevated and operational rail embankments and set amongst light industrial operations. Existing noise producers in the area include rail and road traffic, activities associated	As noted, the nearest residences are over one kilometre south west of the proposal, at Mangrove Road, Sandgate. Activities associated with the upgrade of the access track would be limited to excavation and small plant, and would be consistent

Aspect	Potential Impacts of Overall Proposal	Assessment of impacts of works in ARTC Lands
	with the coal loaders and various industrial activities within the industrial estates. Noise from the proposal is likely to be inaudible above traffic noise at the nearest residents and of negligible annoyance in relation to usual ambient noise exposure. Noise exceedances of the noise affected level related to the proposed works are unlikely given the type and small amount of plant, the distance to the closest residential receiver and the relatively high criteria. Given that the types of machine to be used during construction do not have significant impact energy and that blasting is not required, vibrations resulting from the activities are not likely to be detectable to the nearest residents.	with the noise sources assessed as part of the Proposal. No out of hours works would be required. Noise levels from the use of the access track would be unlikely to be audible and therefore impacts would be negligible.
Visual	The highly disturbed visual catchment of the Proposal area is defined by a vegetated embankment along Cormorant Road to the south, the Newcastle Coal Infrastructure Group and Port Waratah Coal Services coal loading facilities to the east, the overall KIWEF area to the north, the Steel River development to the south west, the railway corridor to the west and north and the Hunter River South Arm to the south. These areas are characterised by cleared disturbed land, industry, reclaimed agricultural land, and nature reserves. The limited visual amenity of the site has been modified by landfilling, with small areas of native vegetation remaining along the southern boundary of the property, associated with the Hunter River. The site is not readily visible from publicly accessible locations. The nearest residences are over 1,300 m to the south west at Mangrove Road, Sandgate. The construction and operational visibility would be minimal due to vegetation and local topography obstructing lines of view from outside onto the site. Should views into the proposal area be available, visual impacts would still be minimal given the distance of the viewpoint, the short-term nature of works and the extensive disturbance which has taken place previously on the site. No ongoing impacts are likely as the site will be rehabilitated consistent with its existing	The use of the access track would be consistent with its existing use. The frequency of vehicles using the track during development of the Proposal would likely be higher than usual, however as the visual catchment of the proposed activities is limited, visual impacts would be considered negligible.

Aspect	Potential Impacts of Overall Proposal	Assessment of impacts of works in ARTC Lands
	character and at a similar elevation and gradient. The proposed Closure Works are in keeping with existing environment and will incur minimal visual change in the long term. Due to the existence of heavy industries within the site's visual catchment, the proposed works will be consistent with the surrounding landscape.	
Contamination and waste	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. All other wastes and contaminated materials will be managed on site in accordance with the Materials Management Plan.	Materials required for the regrading of the access track would be sourced from an appropriate off-site source. It is anticipated that minimal volumes of waste would be generated by the access track upgrade.
Heritage	Because of the site's previous land use, its' highly modified nature and the nature of the proposal, it is considered that there is no potential for occurrence of items of indigenous heritage. Given the past history of filling in the area, the proposal is unlikely to pose a risk to indigenous or non-indigenous cultural heritage artefacts. No disturbance or excavation of natural soil is proposed and therefore risk of disturbing areas of archaeological potential is very low.	No registered heritage items are in proximity to the access track. Minimal ground disturbance would be required for the upgrade works, and due the levels of disturbance in the area, it is very unlikely that any indigenous or non-indigenous heritage would be uncovered during these works. Standard mitigation measures, including stop-work procedures would be implemented in case any unrecorded heritage is encountered during works.
Air quality	The air quality of the locality and nature of the proposal is such that no significant impact on air quality is expected from the works. Some local, short term emissions may be experienced during construction due to dust from earthworks and engine exhausts, however such emissions will be minor and short-term during dry weather conditions. Should significantly odorous materials be encountered during the works, they will be segregated and covered to the extent practicable, in accordance with the sites Materials Management Plan. No ongoing or long term air quality impacts will result from the operation of the proposal.	The proposed access track upgrade works would involve a localised area of regrading works, which could generate dust and other emissions during excavation and compaction works. These emissions will be minor and limited to the section of track being upgraded (about 20 metres in length). Controls, such as dust suppression would be put in place to manage impacts to air quality. The ongoing use of the access track by heavy and light vehicles may result in dust and other air impurities contributing to existing local and regional air quality. These impacts would be localised and short term. No ongoing or long term air quality impacts will result from the proposed activities.
Social and Economic	Given the short term nature of construction and the small scale of the works, minimal	Existing users of the access track are restricted to ARTC operational staff. The use

Aspect	Potential Impacts of Overall Proposal	Assessment of impacts of works in ARTC Lands
	social impacts from the Proposal is expected. Social impacts include the brief contribution of the construction works to the generation of local employment and support of local business. The works will not hinder the function of any other business or community activities in the area. The works also provide a positive social benefit by reducing the potential exposure of contaminants to surrounding areas.	of the access track would be managed to not restrict its ongoing use by ARTC staff. The access track upgrade works would be completed within one to two weeks and in consultation with ARTC, and so overall the proposed activity will not hinder the function of any other business or community activities in the area. Rail safety infrastructure would be installed to illustrate rail exclusion zones and limit proximity to rail line of large vehicles travelling along the access route. These would be required to meet the ARTC rail exclusion zone requirements.
Cumulative	The site is surrounded by various major developments including operational coal terminals and other waste disposal facilities in various stages of closure. Neighbouring projects identified include: · proposed PWCS T4 Project; · operational NCIG coal terminal and recently constructer rail flyover; · completed KIWEF Area 1 closure; · upcoming KIWEF Area 3 Closure Works; and · upcoming Tourle Street Bridge duplication and Egret Street upgrades. As such the activity has the potential to contribute to cumulative impact on the following environmental conditions: · Additional construction traffic on existing road networks with identified inadequate capacity · Dust and other air impurities contributing to existing local and regional air quality concerns during construction; · Clearing of foraging habitat for various fauna species; · Generation of waste requiring landfill disposal; and · Changes to water chemistry in water-flows to the Hunter River.	There would be no further cumulative impacts associated with the proposed access track upgrade and use of the access track to those identified within ERM (2016) or the remainder of this Addendum REF.

4.5 Applicable mitigation measures for works in ARTC Lands

The works to upgrade the access track would be undertaken as a design and construct contract to be entered into between HCCDC and the preferred construction contractor. This contract will include a requirement that the design and construction is to be developed in consultation with ARTC and to the satisfaction of ARTC. Mitigation measures to be implemented for the Peninsular and Wedge access component of the proposal are

provided in Table 2. It is expected that a separate environmental management plan would be prepared for the access track upgrade works and adopt the mitigation measures in Table 5 2 in addition to complying with any applicable conditions arising out of the Commonwealth EPBC referral process and ARTC requirements.

Table 2: Summary of mitigation measures

Sequence of Work Activities	Controls/Mitigation Measures
Pre-earthworks planning	· Principal Contractor to incorporate Principal's EMP requirements as relevant to the works within ARTC land and undertake all necessary environmental inductions prior to proceeding with works.
Site Establishment	· Implement hygiene protocol as required for the Closure Works area (NSW Threatened Species Management Information Circular No.6 (April 2008)). · Implement safety zone fencing as required by ARTC. · Install temporary frog exclusion fencing between Deep Pond and access track upgrade works area and ensure GGBF habitat is protected from unauthorised access prior to works commencing in those works areas or their parts. · Conduct pre-clearance surveys by a qualified ecologist 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)). · Hazardous liquids and chemicals are not to be stored or handled on ARTC lands. · Provide fully stocked spill kit/s and ensure that operators are aware of the location of these kits and are trained in their use.
Upgrade works	· Use only imported 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. · 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. · Upon completion of the works, the works areas not required for ongoing access must be rehabilitated with local native vegetation species. · 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. · Refuelling is not to occur in ARTC land. · 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.
Use of access track	· Speed limits to be agreed with ARTC and complied with. · Communication protocol with ARTC to be agreed and complied with.

Sequence of Work Activities	Controls/Mitigation Measures
	· Use of access track post rainfall and during dawn and dust should be undertaken at reduced speeds that allow fauna and amphibians to be observed and avoided.
Construction Monitoring	· Daily prestart checks on amphibian disease hygiene station functioning and supplies and weather forecast noting predicted wind and rain. · Post rainfall checks of erosion and sediment control functioning. · Weekly site inspection checklist covering water quality, erosion and sediment control structures, frog fences. · Noise monitoring of any out of hours construction works in accordance with interim construction noise guidelines.
Defect Liability period	· Check and maintain the erosion and sediment controls regularly, especially after rainfall, to ensure that they remain effective including: Collected sediment is to be removed from the controls as necessary to ensure they remain effective. Collected sediment is to be combined with planting medium for reuse on the site – if appropriate. 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. Revegetation monitoring and maintenance to ensure adequate cover.

5. Proposal impact assessment

5.1 Identified impact mechanisms

The changes identified above may result in the following potential impacts:

- The reliance of in-situ capping reduces disturbance and material import and transfer requirements;
- The extraction of fill and capping materials from the three borrow sites will result in an approximate two-hectare new disturbance area from that originally proposed but with reduce material import requirements;
- The upgrade works required to the access track are localised and will not create a significant disturbance footprint; and
- The hydro-salinity modelling works undertaken modelled both the impacts of the original proposed action (standard cap) and the current proposed action (modified cap) and confirmed that implementing a Modified Cap would minimise the potential changes to salinity levels within the surrounding ponds receiving water from the Closure Works area.

Consideration of impacts is provided in Table 1 with further consideration of key issues provided below.

Table 1: Preliminary consideration of impacts

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
Biodiversity	ERM (2016) summarised impacts to biodiversity generally as follows: The Proposal will temporarily remove an area of potential foraging habitat (5.2 ha) for adult GGBF, which may also result in some direct mortality to a small number of individuals during clearance works. Breeding habitat will remain unaffected. Based on the EPBC Act and TSC Act assessments undertaken, the proposal is unlikely to have a significant impact on MNES, or NSW listed flora and fauna providing that the range of mitigation measures and management strategies recommended to reduce impacts are successfully implemented. The proposal provides benefits to the environment by: · limiting the potential for contaminated material from emplaced fill leaching into surrounding habitats; · improvements in water quality due to the Proposal would provide ecological benefits to protected species; · potential negative effects during Proposal and revegetation would not be of a magnitude that would significantly impact on flora, fauna or ecological communities;	· New disturbance areas. · New design. · New understanding of hydro-salinity. · New understanding of GGBF ecology.	· Reduced indirect impacts over those previously considered. · Increased certainty that no significant indirect impacts associated with hydro-salinity are likely. · Increased certainty that no significant direct or indirect short term impacts are likely and that long-term benefits are achievable through provision of new habitat.	Refer to biodiversity assessment in Section 5.3. Impacts to MNES were assessed separately by Ramboll (2018).

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	· it is highly unlikely that the proposed works would disrupt the breeding cycle of any species; and · areas of appropriate foraging and breeding habitat would be retained within and adjacent to the proposal site. Given the temporary and negligible effects of the construction activities and the negligible ongoing negative impacts associated with completion of the capping activities, there will be no significant impact on the ecological character of the Ramsar wetland, nor the species it contains.			
Traffic	In the event that all material is required to be imported, approximately 230,000m3 will be required to be delivered to the site. This equates to approximately 5500 truckloads over the course of the Proposal. The works are expected to be undertaken over a 6 to12 month timeframe. This equates to approximately 40 deliveries per day or 80 truck movements (40 in and 40 out) or two truck movements every 10 minutes. No long term operational traffic movements will be generated by the Proposal. As such the vehicle numbers and short term nature of the works do not warrant any intersection treatments. While existing traffic issues resulting from identified insufficient capacity may be exacerbated by the proposed activity the	· Reduced need for material importation through use of in-situ capping and onsite capping materials. · Timing no longer coincides with duplication of Tourle Street Bridge.	· Reduced traffic impact. · Reduced cumulative impacts.	No need for further assessment.

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	proposal is not expected to cause significant traffic impacts on its own.			
Water quality	Pond hydrology may be altered as a result of the Proposal when compared to the existing conditions, as a result of a general increase in surface water discharge from capped areas; and reduced groundwater flows due to decreased infiltration through the capped area. The changes to hydrology as a result of the proposed activity are expected to be negligible in comparison to the continuing effects of direct rainfall, evaporation and unchanged interaction with aquifers. The changes to pond hydrology at the KIWEF are expected to be limited to: · Slightly altered wetting and drying regimes in ponds that will likely to be generally wetter due to an increase of surface water in-flows from the closure area via lined sediment basins; and · Water quality changes in the ponds are expected to be slightly fresher with improved general water quality, due to the reduction of leached contaminants, as a result of increased surface water in-flows and reduced infiltration via the fill aquifer to surface water bodies. The potential for groundwater impacts associated with existing emplaced material are most recently assessed in in association with the T4 Project. In particular Douglass Partners (2013) identified that the Closure Works would	· New design and works areas	Reduced impacts over those anticipated under the un-rationalised design, with an increased certainty of hydro-salinity impacts and increased proportion of time within optimum GGBF habitat range provided by hydro-salinity model outcomes.	Refer to hydro-salinity modelling by SMEC (2018) with summary provided in Section 3.1 and additional consideration of hydro-salinity impacts provided in Section 5.2.

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	reduce the potential for impact associated with the contaminants found within the existing landfill “through longer particle travel times and reduced mobility of existing contamination compared to the existing case”.			
Noise	The nearest residence is over 1300 m from the Proposal area and separated by elevated and operational rail embankments and set amongst light industrial operations. Existing noise producers in the area include rail and road traffic, activities associated with the coal loaders and various industrial activities within the industrial estates. Noise from the proposal is likely to be inaudible above traffic noise at the nearest residents and of negligible annoyance in relation to usual ambient noise exposure. Noise exceedances of the noise affected level related to the works are unlikely given the type and small amount of plant, the distance to the closest residential receiver and the relatively high criteria. Given that the types of machine to be used during construction do not have significant impact energy and that blasting is not required, vibrations resulting from the activities are not likely to be detectable to the nearest residents.	· New works locations	The new works areas and access arrangements remain over 1000 metres from residential reciters. No new residential receivers have emerged since the original assessment was undertaken by ERM (2016). Specific closure methodology is yet to be determined and as such noise performance outcomes will continue to be managed in accordance with applicable guidelines.	No additional assessment identified with mitigation measures remaining applicable to manage works to achieve performance expectations.
Visual	The highly disturbed visual catchment of the Proposal area is defined by a vegetated embankment along Cormorant Road to the south, the NCIG and PWCS coal loading facilities to the east, the overall KIWEF area to	· New design	No change to final landform observable from publicly accessible locations beyond removal of artificial K7 pre-load stockpile.	No further consideration required.

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	the north, the Steel River development to the south west, the railway corridor to the west and north and the Hunter River South Arm to the south. These areas are characterised by cleared disturbed land, industry, reclaimed agricultural land, and nature reserves. The limited visual amenity of the site has been modified by landfilling, with small areas of native vegetation remaining along the southern boundary of the property, associated with the Hunter River. The site is not readily visible from publicly accessible locations. The nearest residences are over 1300 m to the south west at Mangrove Road, Sandgate. The construction and operational visibility would be minimal due to vegetation and local topography obstructing lines of view from outside onto the site. Should views into the Proposal area be available, visual impacts would still be minimal given the distance of the viewpoint, the short-term nature of works and the extensive disturbance which has taken place previously on the site. No ongoing impacts are likely as the site will be rehabilitated consistent with its existing character and at a similar elevation and gradient. The proposed Closure Works are in keeping with existing environment and will incur minimal visual change in the long term. Due to the existence of heavy industries within the site's			

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	visual catchment, the proposed works will be consistent with the surrounding landscape.			
Contamination and waste	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. All other wastes and contaminated materials will be managed on site in accordance with the Materials Management Plan.	· New design	Required to achieve performance expectations consistent with un-rationalised design and as such no change in contamination management is likely.	No need for further assessment.
Heritage	Because of the site's previous land use, its' highly modified nature and the nature of the proposal, it is considered that there is no potential for occurrence of items of indigenous heritage. Given the past history of filling in the area, the proposal is unlikely to pose a risk to indigenous or non-indigenous cultural heritage artefacts. No disturbance or excavation of natural soil is proposed and therefore risk of disturbing areas of archaeological potential is very low.	· New works areas	All works limited to areas of substantial prior disturbance. No increased risk of impacts to heritage will be introduced by the new works areas.	No need for further consideration.
Air quality	The air quality of the locality and nature of the proposal is such that no significant impact on air quality is expected from the works. Some local, short term emissions may be experienced during construction due to dust from earthworks and engine exhausts, however such emissions will be minor and short-term during dry weather conditions. Should significantly odorous	· New works areas and design	Performance expectations remain the same as under un-rationalised design and no new air quality impact mechanisms are introduced.	No need for further consideration.

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	materials be encountered during the works, they will be segregated and covered to the extent practicable, in accordance with the sites Materials Management Plan. No ongoing or long term air quality impacts will result from the operation of the proposal.			
Social and Economic	Given the short term nature of construction and the small scale of the works, minimal social impacts from the proposal are expected. Social impacts include the brief contribution of the construction works to the generation of local employment and support of local business. The works will not hinder the function of any other business or community activities in the area. The works also provide a positive social benefit by reducing the potential exposure of contaminants to surrounding areas.	· Nil	Social and economic impacts are expected to be consistent with previous findings.	No further consideration required.
Cumulative	The site is surrounded by various major developments including operational coal terminals and other waste disposal facilities in various stages of closure. Neighbouring projects identified include: · Proposed PWCS T4 Project; · Operational NCIG coal terminal and recently constructer rail flyover; · Completed KIWEF Area 1 closure; · Upcoming KIWEF Area 3 Closure Works; and	· Closure timeframe · Reduced requirement for imported material · Altered disturbance footprint	· PWCS has announced that T4 project will not proceed. · Area 1 and Area 3 Closure Works are completed and are providing breeding and foraging habitat. · Tourle Street Bridge duplication and Cormorant Road upgrades have been completed.	Substantially reduced potential for cumulative impacts to arise. Not further consideration required.

Environmental Aspect	Consideration of Impact of original activity	Change mechanism	Comparison of impacts to those previously considered	Additional assessment required
	· Upcoming Tourle Street Bridge duplication and Egret Street upgrades. As such the activity has the potential to contribute to cumulative impact on the following environmental conditions: · Additional construction traffic on existing road networks with identified inadequate capacity; · Dust and other air impurities contributing to existing local and regional air quality concerns during construction; · Clearing of foraging habitat for various fauna species; · Generation of waste requiring landfill disposal; and · Changes to water chemistry in water-flows to the Hunter River.			

5.2 Additional hydro-salinity assessment

ERM (2016) identified that

"Pond hydrology may be altered as a result of the Closure Works when compared to the existing conditions, as a result of a general increase in surface water discharge from capped areas; and reduced groundwater flows due to decreased infiltration through the capped area. The changes to hydrology as a result of the proposed activity are expected to be negligible in comparison to the continuing effects of direct rainfall, evaporation and unchanged interaction with aquifers. The changes to pond hydrology at the KIWEF are expected to be limited to:

- *slightly altered wetting and drying regimes in ponds that will likely to be generally wetter due to an increase of surface water in-flows from the closure area via lined sediment basins; and*
- *water quality changes in the ponds are expected to be slightly fresher with improved general water quality, due to the reduction of leached contaminants, as a result of increased surface water in-flows and reduced infiltration via the fill aquifer to surface water bodies.*

The potential for groundwater impacts associated with existing emplaced material are most recently assessed in in association with the T4 Project. In particular Douglass Partners (2013) identified that the Closure Works would reduce the potential for impact associated with the contaminants found within the existing landfill "through longer particle travel times and reduced mobility of existing contamination compared to the existing case".

Capping designs were not assessed by ERM (2016) and instead a commitment was made that designs would be completed to address the closure requirements and consider the findings and mitigation requirements identified within the REF and the EPBC Act Referral which include the intent to limit hydro-salinity impacts to surrounding ponds. SMEC (2018) has now completed preliminary designs and undertaken hydro-salinity modelling of both the standard cap and modified cap as follows:

- **Cap Design - Assessment of a Standard Cap:** installation of a 500mm thick low permeability surface cap, similar to that used in prior stages (Areas 1 and 3), has been modelled to assess effects on wetland water levels and salinity. The model has identified only minor changes to Deep Pond, with negligible effects elsewhere.
- **Design Refinement- Assessment of a Modified Cap:** the model was used to assess the effects of a modified design over part of the Area 2 works. This method relies on a low permeability layer to prevent infiltration, positioned below a thick vegetation layer (ie minimum 500mm thickness) referred to as an evapotranspiration layer. It is slightly favoured over standard cap in that a greater portion of surface water is retained within the vegetation layer, reducing changes in water balances in surrounding ponds. The model confirmed slightly better outcomes in respect of hydro-salinity, compared to a standard cap.

The rationalised cap is still required to address the requirements of the Surrender Notice and in doing so would continue to limit surface water filtration through underlying fill material. The changes are not considered to have an adverse impact on contamination migration and would continue to provide the identified benefits. The hydro-salinity implications of the modified cap design on GGBF survival and chytrid protection are discussed in Section 3.1.

5.3 Additional biodiversity assessment

5.3.1 Assessment approach

As discussed previously, under Clause 29 of the BC (ST) Regulations, the former planning provisions continue to apply (and Part 7 of the new BC 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.

HCCDC has confirmed that the Area 2 Closure Works are intended to commence by 24 February 2019 and as such the TSC Act remains applicable as described in ERM (2016). Therefore, there is a requirement to address Section 5A of the EP&A Act to assess the significance of any perceived impact associated with the proposed

changed activities on threatened species, populations and ecological communities. The assessment will also address the *EPBC Act Policy Statement 1.1 – Significant Impact Guidelines* (Department of Environment, 2013).

The objectives of the biodiversity assessment are as follows:

- Investigate and describe flora and fauna, vegetation and habitat with specific focus on the areas identified as a change in scope from the original REF;
- Identify significant ecological values such as threatened species, populations and ecological communities and important habitats that may occur within the modified Closure Works area. This task is associated with an updated background review to identify any new species or ecological communities listed under the BC Act, since completion of the original REF that are relevant to the Proposal, or any new observations / records of previously listed species;
- Document potential direct and indirect impacts to significant ecological values associated with the area affected by the modified Closure Works. This is to include an assessment of the potential severity of impacts on threatened species, populations and ecological communities or their habitats in accordance with Section 5A of the EP&A Act; and
- Identify additional mitigation measures specific to the modified Closure Works, where these are deemed to be required to provide advice for avoiding, minimising and managing potential biodiversity impacts.

The changes proposed to the activity have been described previously and are identified as:

- Implementation of a Modified cap within the area identified as the Low Area;
- Capitalise on existing capping materials within Borrow Sites across Kooragang Island, including: Peninsula Borrow Pit; K7 Pre-load Area; and HRRP Borrow Pit; and
- New access to the Peninsula Borrow Pit via an upgraded existing haul road and other additional access tracks (the upgraded haul route).

The biodiversity assessment focuses on these areas by describing the existing and potential flora and fauna with reference to previous assessments completed for the original REF, background review and the results of a site inspection.

5.3.2 Background review

A background review of existing information was undertaken to identify the presence of any newly listed species and communities since the original REF that may be of relevance to this assessment. This review focused on a 10 kilometre (km) radius of the Closure Works area and searched data from the following sources:

- NSW BioNet;
- EPBC Act Protected Matters Search Tool;
- Register of Declared Areas of Outstanding Biodiversity Value; and
- Bionet Vegetation Classification Database.

The output of the review was used to develop a list of threatened species, populations and communities as well as important habitat for migratory species and Areas of Outstanding Biodiversity Value (AOBV) with a likelihood of occurrence in the Closure Works area and locality.

NSW Biodiversity Conservation Act, 2016

The original REF (ERM, 2016) and associated flora and fauna impact assessment identified a list of threatened flora and fauna species that have been recorded from a 10 km radius of the KIEWF assessment site. This list of species was assessed against the habitat types identified within the Closure Works area to identify the species from the list that have a moderate to high likelihood of occurring in the capping project area. A thorough

assessment of significance was then conducted for the species considered to have at least a moderate likelihood of occurring on the site, irrespective of the survey results.

This assessment identified eight threatened flora and fauna species that have been previously recorded within the locality and that are likely to occur within the Closure Works area. These included:

Flora

- Horned Pondweed (*Zannichellia palustris*), an aquatic plant.

Fauna

- Green and Golden Bell Frog (*Litoria aurea*).
- Eastern Grass Owl (*Tyto capensis*).
- Australasian Bittern (*Botaurus poiciloptilus*).
- Black Bittern (*Ixobrychus flavicollis*).
- Black-tailed Godwit (*Limosa limosa*).
- Blue-billed Duck (*Oxyura australis*).
- Freckled Duck (*Stictonetta naevosa*).

For the purposes of this Addendum REF, the list of species assessed in the original REF has also been adopted and assessed within this report. Further to this, a new search of the BioNet (Atlas of NSW Wildlife) was conducted to identify any new species that have been listed since completion of the original REF and that could be considered to potentially occur in the Closure Works area. From this search, two additional species were identified that were not previously assessed as they were not listed at the time of the original REF, this includes Mahoney's Toadlet (*Uperoleia mahonyi*) and the White-bellied Sea Eagle (*Haliaeetus leucogaster).*The following sections describe the likelihood of occurrence and identifies the need or otherwise for an assessment of significance for of these species newly listed species.

Mahony's Toadlet (Uperoleia mahonyi)

Current observations indicate Mahony's Toadlet inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached (highly nutrient impoverished) white sand. Commonly associated with acid paperbark swamps, Mahony's Toadlet also is known to occur in wallum heath, swamp mahogany-paperbark swamp forest, heath shrubland and Sydney red gum woodland. Recent studies suggest intact vegetation adjacent to and within water bodies is an important habitat feature for this species.

Known records are associated with shallow ephemeral/semi-permanent water bodies with limited flow of water. Aquatic vegetation at breeding sites includes sedges (*Shoenoplectus* spp., *Baumea* spp. and *Lepironia articulata*) and Broadleaf Cumbungi (*Typha orientalis*). This species is considered unlikely to occur in the disturbed areas assessed for this proposal, and unlikely to occur in Deep Pond adjacent to the Peninsula borrow site as none of the habitats within the modified Closure Works area are suitable for this species. Mahony's Toadlet is not assessed further.

White-bellied Sea Eagle (Haliaeetus leucogaster)

Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).

Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead

branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.

Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.

The freshwater habitat presented at Deep Pond adjacent to the Peninsula borrow pit site could potentially be used by this species for feeding. Therefore, a significance assessment has been included for this species.

Protected Matters (EPBC Act)

The Closure Works the subject of the original REF (ERM, 2016) were referred to the Commonwealth in 2015. This referral included a search of the Protect Matters Search Tool (PMST) around a 10 km radius of the site and identification and assessment of protected matters. For the purposes of this Addendum REF, the list of species assessed in the original REF has also been adopted and assessed within this report. Further to this, a new PMST review was conducted to identify any new matters that have been listed since completion of the original REF and that could be considered to potentially occur in the modified Closure Works area.

From this search, one additional ecological community has been identified that was not assessed previously as this community was not listed at the time of the original REF, and may this Coastal Swamp Oak (*Casuarina glauca*) forest of New South Wales and South East Queensland ecological community. The presence of this community within the modified Closure Works area was targeted during the field survey.

A summary of the updated search results is shown in Table 2, which also compares the data against the referral and identifies any new matters not previously assessed.

Table 2: Results from the PMST review and assessment of outputs from the referral

MNES	Referral 2015	Protected matters search 2018	Additional MNES
World Heritage Properties	None	None	
National Heritage Places	None	None	
Wetlands of International Importance	1	1	
Great Barrier Reef Marine Park	None	None	
Commonwealth Marine Areas	None	None	
Listed Threatened Ecological Communities	3	5	Coastal Swamp Oak (*Casuarina glauca*) forest of New South Wales and South East Queensland ecological community (potential to occur) Hunter Valley Remnant Woodlands and pen Forest (not expected)
Listed Threatened Species	63	63	This list has excluded marine birds. There are no additional listed species identified.
Listed Migratory Species	73	73	

Relevant previous investigations

KIWEF including Area 2 has undergone extensive prior assessment with the REF in March 2016 (ERM, 2016). A Referral was completed in December 2015 (ERM, 2015) and a Preliminary Documentation Package completed in July 2018 (Ramboll, 2018) under the Commonwealth EPBC Act. These assessments have reported a large volume of current ecological data gathered from multiple site surveys and long-term monitoring

programs. These reports are of particular relevance to Area 2 and the immediate adjoining areas associated with the assessed borrow sites and therefore have been reviewed, and includes:

- Revised Capping Strategy KIWEF Flora and Fauna Impact Assessment (GHD 2010).
- Stockpiled Soil Assessment Kooragang Island Waste Emplacement Facility – Area K7 (Douglas Partners 2016). This report presents an assessment of the stockpiled soil located in area K7 in 2016. The stockpile of soil is related to a preload trial pads, called Trial Pad 2, constructed as part of investigations for the proposed Terminal (T4). This report provides and aerial photo sequence the K7 stockpile showing its construction in 2011 up until 2016 (5 years) at which point the site was shown to be heavily vegetated.
- Area 1 and Area 3 Closure Works for Remediation of the former BHP Kooragang Island Waste Emplacement Facility: Summary of the Impact and Benefit to the GGBF and its habitat. University of Newcastle April 2018. The purpose of this report is to review occupancy of GGBF within the remediated Phase 1 Closure Works footprint in the context of the broader population across the proposed Port Waratah Coal Services Terminal Four development site (T4 site) using the results of spatial and temporal amphibian surveys conducted over the last four years.
- Research Program on the GGBF on Kooragang Island. Annual report (2016-2017). Report outlines the methods and results of GGBF monitoring on Kooragang Island including the T4 (Area 2) site summarising data from 2010 to 2017.
- KIWEF Area 2 Closure Works: Area 2 Hydro-Salinity Model (SMEC, 2018). This report provides a summary of continuous long-term monitoring of groundwater and surface waters within Area 1 and 3 for use in the calibration of a numerical model capable of predicting effects of the works in Area 2.
- Modelling of prior stages (Areas 1 and 3, undertaken by SMEC in 2013) predicted minor changes in downstream wetlands, summarised as being slightly wetter (i.e. higher water levels) and fresher, with no significant changes that would materially affect the function of the habitat. Post-construction water quality monitoring observations following completion of the Area 1 and 3 Closure Works is not inconsistent with the model predictions. The model for the Area 2 Modified Cap design, predicts relatively minor hydrological and salinity changes in Deep Pond as a result of the proposal, which are described as providing slightly wetter and fresher conditions on completion, similar to observations of earlier stages. The modelling has concluded that Deep Pond will retain a mildly saline character that is indicated to be suitable habitat conditions for GGBF, without substantial change in hydro-salinity or hydrology following the completion of the Area 2 works.

5.3.3 Site inspection

Methods

An inspection and brief survey of the four locations identified as potential material source borrow sites was conducted on 27 July 2018. The survey aimed to identify the existing flora and fauna and habitat within each site, and describe each site with reference to the specie and habitats previously described and reported over the broader Area 2.

The survey focused on:

- The Peninsula Borrow Pit and Peninsular and Wedge access track;
- The K7 Pre-load Area,
- HRRP Borrow Pit; and
- The Wedge (Lot 7);

Results

Peninsula Borrow Pit site and the Peninsular and Wedge access track.

The Peninsula Borrow Pit site is comparable with much of Area 2 in being historically developed by fill material and having an absence of remnant or indigenous vegetation. GHD (2010) describes large portions of Area 2 as

cleared grassland consisting of introduced weeds and grasses dominated by Red Natal Grass (*Melinis repens*) and Fennel (*Foeniculum vulgare*) with occurrences of Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*), Coastal Morning Glory (*Ipomoea cairica*) and Castor Oil Plant (*Ricinus communis*). This description is characteristic of the Peninsula Borrow Pit site with the addition of Aster (*Aster subulatus*) which is a flat weed abundant across the borrow site. The northern and eastern perimeter of the borrow site consists of a dense stand of introduced African Olive (*Olea europa*) with fewer Lantana (*Lantana camara*), Groundsel Bush (*Baccharis halimifolia*), and Pampas Grass (*Cortaderia selloana*). Vegetation on the haul road comprises weeds, mainly Aster (*Aster subulatus*) and Cotton Bush (*Gomphocarpus physocarpus*).

Wedge Area (Lot 7)

The Wedge is also comparable with much of Area 2 in being historically developed by fill material and having an absence of remnant or indigenous vegetation. The site is heavily exists as cleared grassland consisting of introduced weeds and grasses dominated by Rhodes Grass (*Chloris gayana*), Red Natal Grass (*Melinis repens*) and Fennel (*Foeniculum vulgare*) with occurrences of Bitou Bush (*Chrysanthemoides monilifera subsp. rotundata*), Coastal Morning Glory (*Ipomoea cairica*) and Castor Oil Plant (*Ricinus communis*). Around 50 % of the Wedge area is covered by *Acacia saligna* ranging from 1-4 metres in height and may have previously been planted here, there is also a large Date Palm (*Phoenix dactylifera*).

HRRP Borrow Pit site

The HRRP borrow pit area is also comparable with much of Area 2 in being historically developed by fill material and having an absence of remnant or indigenous vegetation. The site is dominated by Golden Wattle (*Acacia saligna)* ranging from 1-5 metres creating a dense low canopy over the majority of the HRRP Borrow Pit area. There are scattered immature Swamp Oak (*Casuarina glauca*). The groundcover is dominated by Rhodes Grass (*Chloris gayana*), Red Natal Grass (*Melinus repens*), *Verbena bonariensis*, Fireweed (*Senecio madagascariensis*) with occasional *Juncus acutus*.

K7 Pre-load area

Douglas Partners (2016) identify the K7 site as a soil stockpile site developed in 2011 for the purposes of pre-load trials. This report provides an aerial photo sequence of the stockpile showing its construction in 2011 at which point it is a bare hill. The aerial photo clearly shows the site in 2011 as soil stockpile denuded of vegetation and also shows the extent of vegetation growth on the stockpile by 2016. The inspection conducted in July 2018 confirmed the findings of the Douglass Partners (2016) assessment in that the stockpile is presently covered in dense vegetation which is dominated by the exotic Golden Wattle (*Acacia saligna)*. These trees comprise a low canopy 3-4 metres tall with a groundcover below of dense tall exotic grasses and weeds. The source of the Golden Wattle (*Acacia saligna)* is not described in this previous report, however it is possible that the site was seeded to provide a fast growing cover of vegetation. However, as Golden Wattle (*Acacia saligna)* has been used extensively throughout Area 2 and other parts of the T4 site for revegetation it is also possible that the species has self-seeded and successfully colonised disturbed bare areas. Common species covering the ground include Rhodes Grass (*Chloris gayana*), Red Natal Grass (*Melinus repens*), and Kikuyu (*Cenchrus clandestinus*).

Photo 1. Peninsula Borrow pit site looking north west

Photo 2. Eastern perimeter of borrow site has been colonised by African Olive (*Olea* spp) and Golden Wattle

Photo 3. Stands of Golden Wattle in the wedge area

Photo 4. Wedge area showing disturbance and dominance by exotics grasses and introduced fennel

Photo 5. HRRP borrow site looking north into dense stand of Golden Wattle

Photo 6. K7 Hill looking west

5.3.4 Assessment of impacts

HCCDC proposes to remove fill from the four borrow sites as described in Chapter 2. The existing environment at each of these locations is very similar and comparable with much of Area 2 in being historically developed by fill material and having an absence of remnant or indigenous vegetation. GHD (2010) describes large portions of Area 2 as cleared grassland consisting of introduced weeds and grasses and this description also fits the situation evident at the borrow sites. The non-indigenous Golden Wattle (*Acacia saligna*) is common at three of these sites (the Wedge, HRRP Borrow Pit and K7 pre-load area) and indicative of deliberate planting or seeding as most plants are of similar age and height.

There are no native plant communities and no listed threatened ecological communities. Swamp Oak (*Casuarina glauca*) is present at the HRRP site as a small number of scattered immature individuals within the Golden Wattle (*Acacia saligna*) community, however the species presence here is not representative of a naturally occurring swamp oak vegetation community and is not consistent with the endangered ecological community listing under the BC Act (i.e. Swamp Oak Floodplain Forest of the NSW, North Coast and Sydney Basin and South East Corner Bioregions) nor the EPBC Act listed Coastal Swamp Oak (*Casuarina glauca*) Forest of NSW and South East Queensland.

Further to this, there is no standing water, open or vegetated wetlands within the borrow sites and no potential habitat for the GGBF or migratory birds listed under the EPBC Act.

Threatened ecological communities

The inspection of the additional Closure Works areas confirmed there are no threatened ecological communities listed under either the BC Act or EPBC Act located within the assessed. Search of the PMST identified an additional endangered ecological community now listed under the EPBC Act that was not assessed in the REF, namely Coastal Swamp Oak (*Casuarina glauca*) forest of New South Wales and South East Queensland ecological community. This community was listed in March 2018.

A survey of the borrow pit sites confirmed the Swamp Oak community is absent and therefore no further assessment is required. While there are scattered immature Swamp Oak (*Casuarina glauca*) present at the proposed HRRP borrow site, these do not however constitute part of the naturally occurring Swamp Oak community and are scattered within the *Golden Wattle (Acacia saligna)* planted community.

The presence of scattered individuals and small fragments of regrowth Swamp Oak across the Closure Works was also noted by ERM (2016) and assessed under the TSC Act at the time. This assessment found that Swamp Oak (*Casuarina glauca*) occurred in all of the vegetation types present within the Closure Works area, except within permanently inundated areas (ERM 2016) and that it exists either as individual trees or as small dense stands. The ground cover is limited within the dense stands of trees and where present, it is composed of the same species present in the exotic grassland areas. The assessment concluded that all of the Swamp Oak present has colonised the highly modified site, and does not represent remnant vegetation.

In further assessing the presence of the state-listed Endangered Ecological Community (EEC), ERM (2016) considered that Swamp Oak were recorded on areas of previously capped landfill waste, which is approximately 5-6 m above the water level of Deep Pond. This raised area is artificial and well above the surrounding natural coastal floodplain formation and was therefore not considered part of the EEC. The soil, on which the Swamp Oak is growing, is mixed landfill material and capping material and is not representative of the soil types that characterise this EEC. This community was considered absent from the Closure Works area.

A description of the recent community listing under the EPBC Act also associates this community with unconsolidated sediments, including alluvium deposits, and where soils formed during the Quaternary period as a result of sea-level rise during the Holocene period. These are most typically hydrosols, which are saturated with water for long periods of time (typically grey-black clay-loam and/or sandy loam soils). Occurrence of Swamp Oak trees on rocky headlands or other consolidated substrates are not considered to be part of the nationally listed ecological community (Department of Environment and Energy, 2018). In the context of the findings of the ERM (2016) assessment it is evident that the growth medium is not representative of the soil

types that characterise this nationally listed EEC. This community is therefore considered absent from the Closure Works area.

Threatened species

The original REF assessed the potential significance of impacts from the capping works on seven threatened fauna species (TSC Act), one threatened flora species (TSC Act) and four national listed threatened species (EPBC Act). This Addendum REF has reconsidered the significance assessment on these same species using Section 5A of the EP&A Act with due consideration to the four locations identified as potential borrow sits for sourcing capping soil material for the Closure Works. An updated search of the BioNet and PMST was completed and confirmed that no additional threatened species or ecological communities needed to be assessed.

The modified Closure Works assessed in this report includes the upgrade of a short section of the Peninsular and Wedge access track. This access track is located up slope from Deep Pond, and the proposal will not have a direct impact on the potential habitat of GGBF. Potential run-off and indirect impacts would be managed through appropriate management measures such as sediment controls.

The other additional Closure Works areas do not contain aquatic habitat and consist of disturbed open grassland and weeds with dense areas of panted or self-establishing Golden Wattle (*Acacia saligna)* (a non-indigenous Wattle species, commonly used in revegetation of disturbed areas). These sites provide sub-optimal foraging areas that may be used temporarily for roosting by migratory birds, or as movement areas for transient frogs such as the GGBF. The assessment of significance reached the same conclusion as the original REF in that the modified Closure Works are not expected to result in a significant impact to a listed threatened species or migratory species.

The GGBF was identified in the original REF as a species of concern, targeted surveys were conducted to inform the ecological impact assessment and have been reported in GHD (2010) and University of Newcastle 2017 and 2018). An assessment of significance was prepared that addressed Section 5A of the EP&A Act and determined that a significant impact was unlikely. This conclusion has since been supported through the surface and groundwater water modelling work described in SMEC (2018) and from previous post-construction monitoring of the GGBF population in Area 1 and 3 as reported by the University of Newcastle (2018).

The outcome of repeated targeted surveys and monitoring work generated by the University of Newcastle for the GGBF population on Kooragang Island over the last 8 years has been a comprehensive map of the known breeding sites. None of the proposed borrow sites assessed in the Addendum REF comprise known breeding habitat for this species. Access to the Peninsula Borrow Pit is from the east and via a haul road that flanks the northern perimeter of Deep Pond. A short section of this road (up to 20 metres) will need to be upgraded to accommodate plant movements. Deep Pond is identified in University of Newcastle (2017) as pond K105 and is known habitat for GGBF. The University of Newcastle (2017) describes K105 as having lower densities than smaller wetlands with more vegetation cover. Nonetheless the four ponds adjacent to the northern rail corridor which includes Deep Pond are described as '*home to the majority of the bell frogs on the island*' (UoN 2017). Deep Pond (K105) has patches of reed stands (*Typha, Schoenoplectus, Bulboschoenus, Juncus*) around its edge interspersed with open rocky areas that are less suitable for GGBF.

An assessment of impact significance for the GGBF is provided in Appendix B. The proposed upgrade of the Peninsular and Wedge access track, if completed with the recommended sediment control measures and pre-clearing fauna survey measures outlined in the Addendum REF and GGBF Management Plan (Golder 2011), is considered unlikely to impact on known habitat for GGBF within Deep Pond.

Listed and Migratory Bird species

An assessment of impact significance for listed migratory bird species is provided in Appendix B and concluded that the modified Closure Works are considered unlikely to significantly impact on an area of important habitat for a listed migratory bird species.

An assessment of significance pursuant to the Significant Impact Guidelines (DoE 2013) was completed for the 17 migratory species with a moderate or high likelihood of occurrence by the Closure Works area and is included in Appendix B. It is concluded that the project is unlikely to result in a significant impact on migratory species listed under the EPBC Act.

5.3.5 Recommendations

GHD (2010) identified the presence of three noxious weeds listed under the then *Noxious Weeds Act 1993*, including Bitou Bush (*Chrysanthemoides monilifera subsp rotundata*), Crofton Weed (*Ageratina adenophora*) and Pampas Grass (*Cortaderia selloana*). These species were all confirmed within, or along the edges of the material borrow sites. Additional weeds identified from this assessment include African Olive (*Olea europaea*), Lantana (*Lantana camara*) and Groundsel Bush (*Baccharis halimifolia*).

The *NSW Biosecurity Act 2015* (BA Act) came into effect on 1 July 2017 and replaced the *Noxious Weeds Act* 1993 and each of these species described are listed in the BA Act. Bitou Bush is also listed as a Weed of National Significance (WoNS).

In accordance with the BA 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.

The original REF outlined a proactive approach to removing and minimising the spread of weeds that may occur as a result of the transportation of plant and material across the Closure Works area. These mitigation measures should also apply for the additional Closure Works areas and are particularly important given the proposed removal and stockpiling of topsoil for later reuse. It is recommended that existing mature weeds are removed from each site prior to excavation to prevent the collection and spread to other areas.

6. Summary of mitigation measures

The environmental safeguards and management measures outlined in ERM (2016) remain applicable to the overall proposal. As the works in ARTC land are limited in scope, revised and specific mitigation measures for these works have been provided in Section 4.5. Minor amendments to control measures are proposed for the remainder of the Proposal and are provided in Table 1. These safeguards and management measures will assist in minimising any potential adverse impacts arising from the proposed works on the surrounding environment.

Table 1: Summary of mitigation measures

Sequence of Work Activities	Controls/Mitigation Measures
Tender and award	· Establish all required approvals under EPBC Act, EPA Act, POEO Act and other agency and neighbours (traffic, access, monitoring data); · Integrate above requirements into EMP describing the series of specific management plans for construction and site management for inclusion in tender specifications. · Tender documents shall prescribe that Principal Contractor(s) shall have demonstrated capability to develop and implement suitable EMP systems, procedures and measures for the works. (Environmental Management System has been accredited under the NSW Government Environmental Management Systems Guidelines (EMS Guidelines) or equivalent).
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.
Pre-earthworks planning meeting/toolbox talk	· Principal Contractor to incorporate Principal's EMP requirements as necessary and undertake all necessary environmental inductions prior to proceeding with works. · A primary focus of inductions should be the GGBF, hygiene protocols, installing and maintaining temporary fencing and erosion and sediment control.
Site Establishment	· Implement hygiene protocol as required for the Closure Works area (NSW Threatened Species Management Information Circular No.6 (April 2008)). · Temporary frog exclusion fencing to surround the proposal 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 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)). · Flocculants or other chemicals proposed to be used on site are required to be known and verified as being safe in sensitive environments and particularly in relation to amphibians. · 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.

Sequence of Work Activities	Controls/Mitigation Measures
	· 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	· 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). · The use of imported topsoil is to be avoided where possible. · Upon completion of the works, the works areas must be rehabilitated with local native vegetation species. · 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.

Sequence of Work Activities	Controls/Mitigation Measures
	· 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. · 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: · Collected sediment is to be removed from the controls as necessary to ensure they remain effective. · Collected sediment is to be combined with planting medium for reuse on the site – if appropriate. · 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.

7. Summary and conclusion

The activity as outlined in ERM (2016) was subject to assessment under Part 5 of the EP&A Act). This addendum has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed modification to the activity originally considered.

The following factors, listed in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000*, have also been considered to assess the likely impacts of the Closure Works as modified on the natural and built environment including works in ARTC lands.

Table 1: Consideration of Clause 228(2) of the EP&A Regulation

Factor	Impact
Any environmental impact on a community? The Proposal would have an acceptable risk profile in relation to sociocultural factors such as short term effects of audible noise at nearest sensitive receivers.	Nil Negligible noise, air quality and visual impacts of a temporary nature.
Any transformation of a locality? The Proposal would involve capping and revegetation aimed at returning the site to its current vegetated state and as such will have no transformative impact on the locality.	Nil
Any environmental impact on the ecosystems of the locality? In general, improvements in water quality and extended wetting due to the proposal would provide ecological benefits. Any negative changes would not be of a magnitude that would significantly impact on flora, fauna and ecological communities. The proposal would also provide significant benefits to the environment in general by limiting the potential for contaminated material from the fill leaching into the surrounding environment.	Positive; Localised positive effects by improved water quality in the medium to long term. Short term disturbance of on-site foraging habitat.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? There would be no change in the aesthetic, recreational, scientific or other environmental quality in the locality from the Proposal. The Proposal will contribute to scientific information through further monitoring of GGBF populations in the locality and provide a greater understanding of the hydro-salinity regime of the site through water quality monitoring.	Nil
Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations? The Proposal will not affect a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations. Given the engineered landform that currently exists there is limited potential for any significant items to be present.	Nil
Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act* 1974)? The Proposal would involve the clearing of previously disturbed land mapped as grassland. GHD (2010) reported that the KIWEF site is unlikely to provide important habitat for ground-dwelling or arboreal mammal species as there are no forests or hollow-bearing trees with hollows of diameter > 10 cm. Impacts to foraging habitat are noted but will be limited to the duration of construction.	Positive; Short term, low level and localised negative impacts and long term benefits.

Following completion, the proposal area will be revegetated to return similar ground cover and habitat structure.	
Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? Based on the EPBC Act and TSC Act assessments undertaken, the proposal is unlikely to have a significant impact on MNES, or NSW listed flora and fauna providing that the range of mitigation measures and management strategies recommended to reduce impacts are successfully implemented. The Closure Works provide benefits to the environment by: · limiting the potential for contaminated material from emplaced fill leaching into surrounding habitats; · improvements in water quality due to the Closure Works would provide ecological benefits to protected species; · potential negative effects during Closure Works and revegetation would not be of a magnitude that would significantly impact on flora, fauna or ecological communities; · it is highly unlikely that the proposed works would disrupt the breeding cycle of any species; and · areas of appropriate foraging and breeding habitat would be retained within and adjacent to the Closure Works area.	Positive; Short term, low level and localised negative impacts and long term benefits.
Any long-term effects on the environment? The proposed works are predicted to result in long term environmental improvement through limiting the potential for contaminated material from emplaced fill leaching into the surrounding environment and associated improvements in water quality.	Positive; Short term, low level and localised negative impacts and long term benefits.
Any degradation of the quality of the environment? The proposal is proposed to be undertaken to rehabilitate a previously degraded man made landform (a waste emplacement facility) to minimise environmental risks from historical contamination associated with the KIWEF Landfill. No further degradation of the quality of the environment is likely to result from the Proposal.	Positive; Short term, low level and localised negative impacts and long term benefits.
Any risk to the safety of the environment? Minor, short term environmental effects resulting from the Proposal including risk to water quality with increased risk of sedimentation, oil, chemical and waste spills during construction. The risk of long term changes to hydro-salinity regimes and associated impacts to the habitat value of proximate water bodies has been assessed and considered minor with no significant adverse impacts. These strategies are considered to reduce the level of risk to an acceptable level. The proposed works will provide long term improvement in safety and risk associated with existing contamination.	Positive; Short term, low level and localised negative impacts and long term benefits.
Any reduction in the range of beneficial uses of the environment? The Proposal would not result in a reduction in the range of beneficial uses of the environment. Construction activity would allow surrounding port related uses to continue. Following capping, the site could be considered for suitability as potential GGBF offset area subject to separate assessment and approval requirements.	Positive
Any pollution of the environment? The proposed Closure Works are predicted to result in long term environmental improvement through limiting the potential for contaminated material from emplaced fill leaching into the surrounding environment and associated improvements in water quality.	Positive Short term, low level and localised negative impacts and long term benefits.

Any environmental problems associated with the disposal of waste? Waste within the KIWEF has the potential to cause environmental effects and may have in the past. The low rates of waste generation associated with the works directly, together with the identified safeguards for managing the inherent site materials, will not result in significant impacts associated with the Proposal.	Negative Short term, low level and localised negative impacts.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply? The Proposal would not increase demands on resources that are, or are likely to become, in short supply. The Proposal seeks to re-use capping and topsoil to the extent possible while achieving the performance expectations of the Surrender Notice.	Nil
Any cumulative environmental effect with other existing or likely future activities? No increase in long term cumulative effects will result from the proposed works. Short term construction emissions of noise levels at sensitive receivers are predicted to be minor in nature. No loss of habitat is predicted to result from the Proposal in the medium to long term (with ground disturbance in capped areas limited to about one year) and, as such, the Proposal do not contribute to cumulative loss of habitat.	Short-term, minor, negative
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions? The Proposal are located within a coastal area, but would not result in any impact on coastal processes and coastal hazards.	Nil

The proposed modification is considered to constitute a reduced overall environmental impact than previously assessed by ERM (2016) through the avoidance of importation of some capping materials, rationalised capping footprint and modified capping methodology within the low areas. The improved understanding of GGBF population dynamics and response to previous Closure Works provides confidence that the closure of Area 2 will not result in long term negative impacts to this species and should provide benefits from a breeding and movement perspective.

While the direct impacts of the project would remain largely consistent with the findings of ERM (2016), the Closure Works as now proposed would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Part 5.1 of the EP&A Act. The Closure Works are subject to assessment under Part 5 of the EP&A Act and as such consent from Newcastle City Council is not required.

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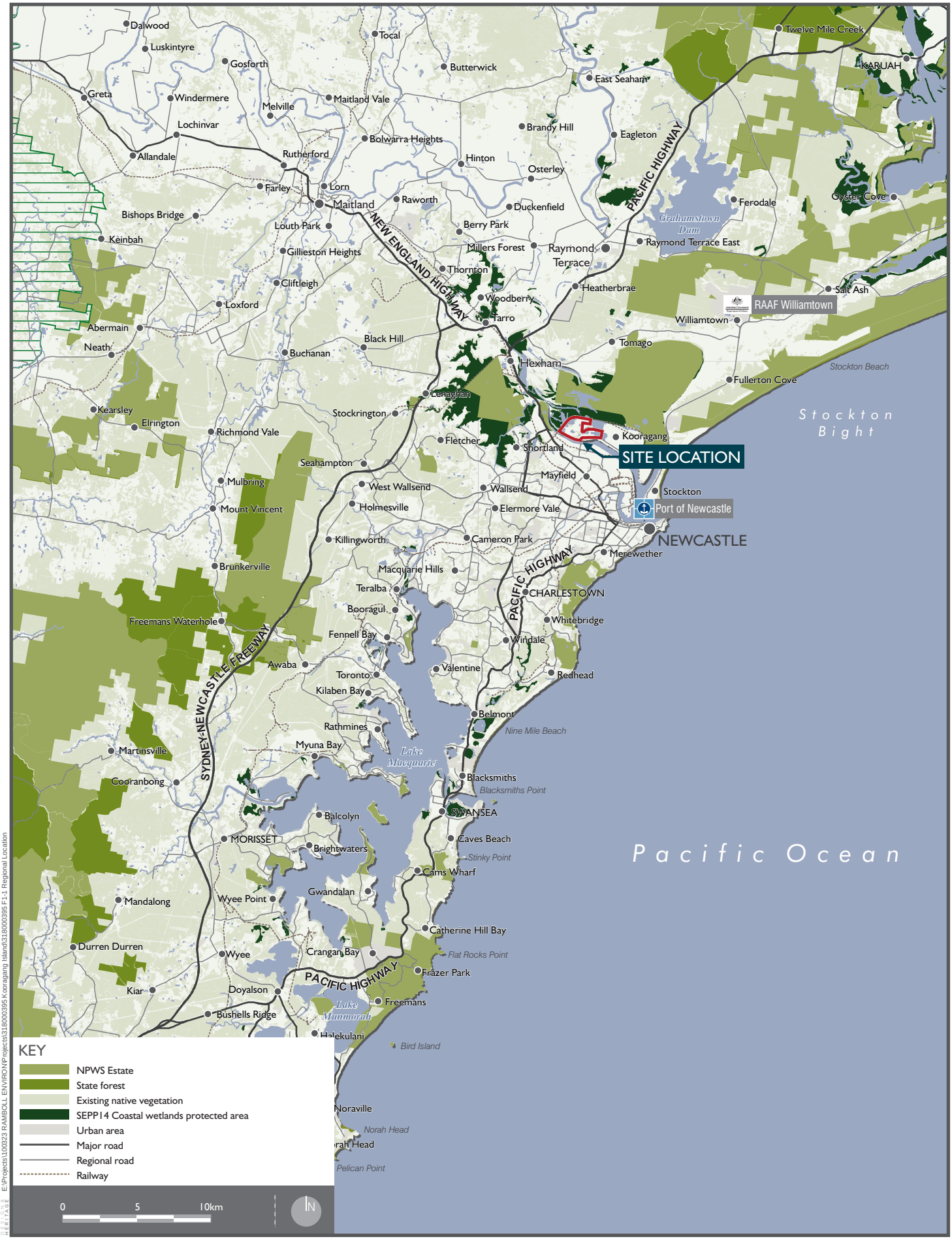
Appendix A. Preliminary Documentation Package Figures



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Project	318000395
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FIGURE 1-1 Regional Location

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

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FIGURE 1-2 Project Locality

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

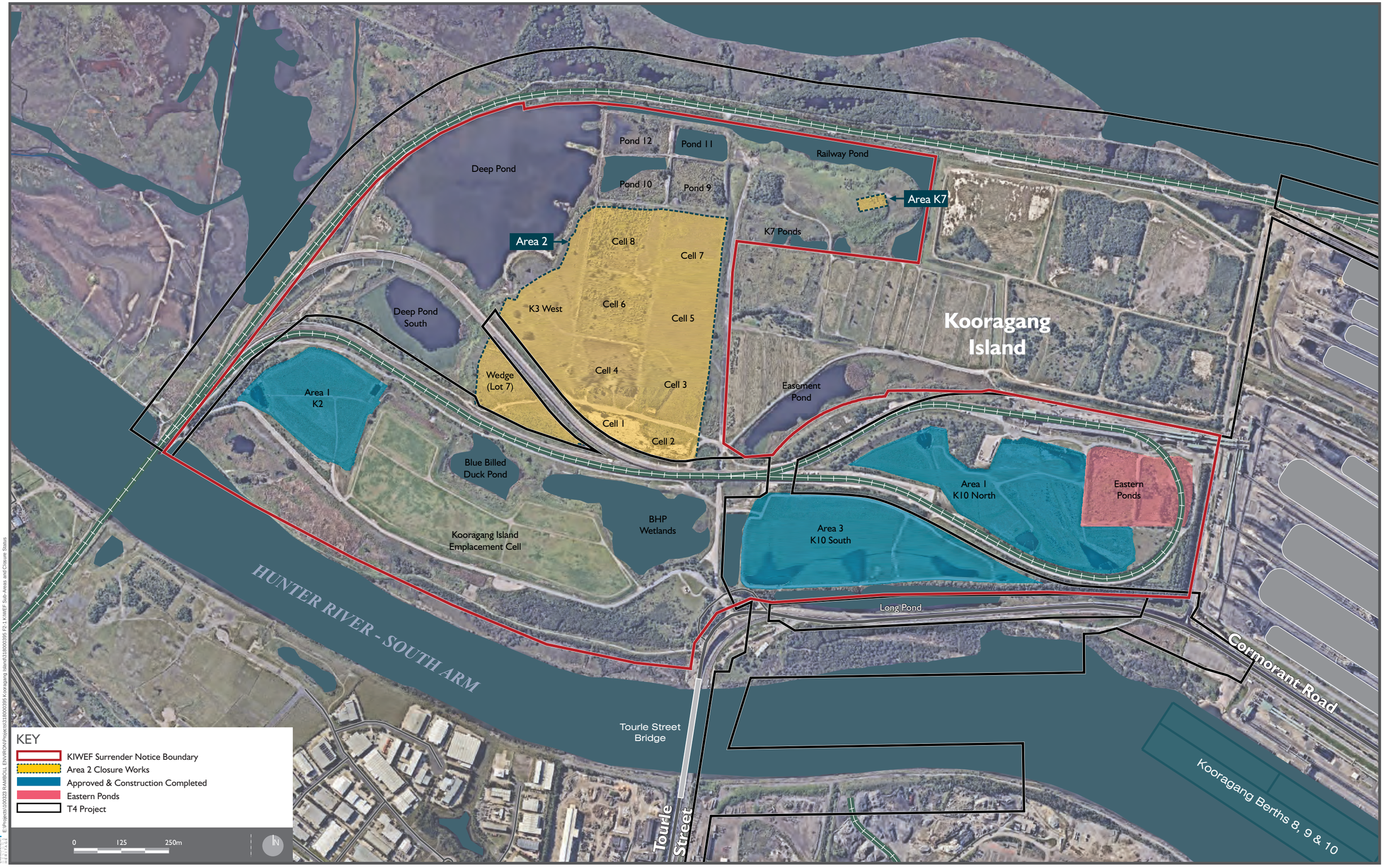

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FIGURE 2-1 KIWEF Surrender Notice Closure Status

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KIWEF Area 2 Closure Works
Hunter Development Corporation

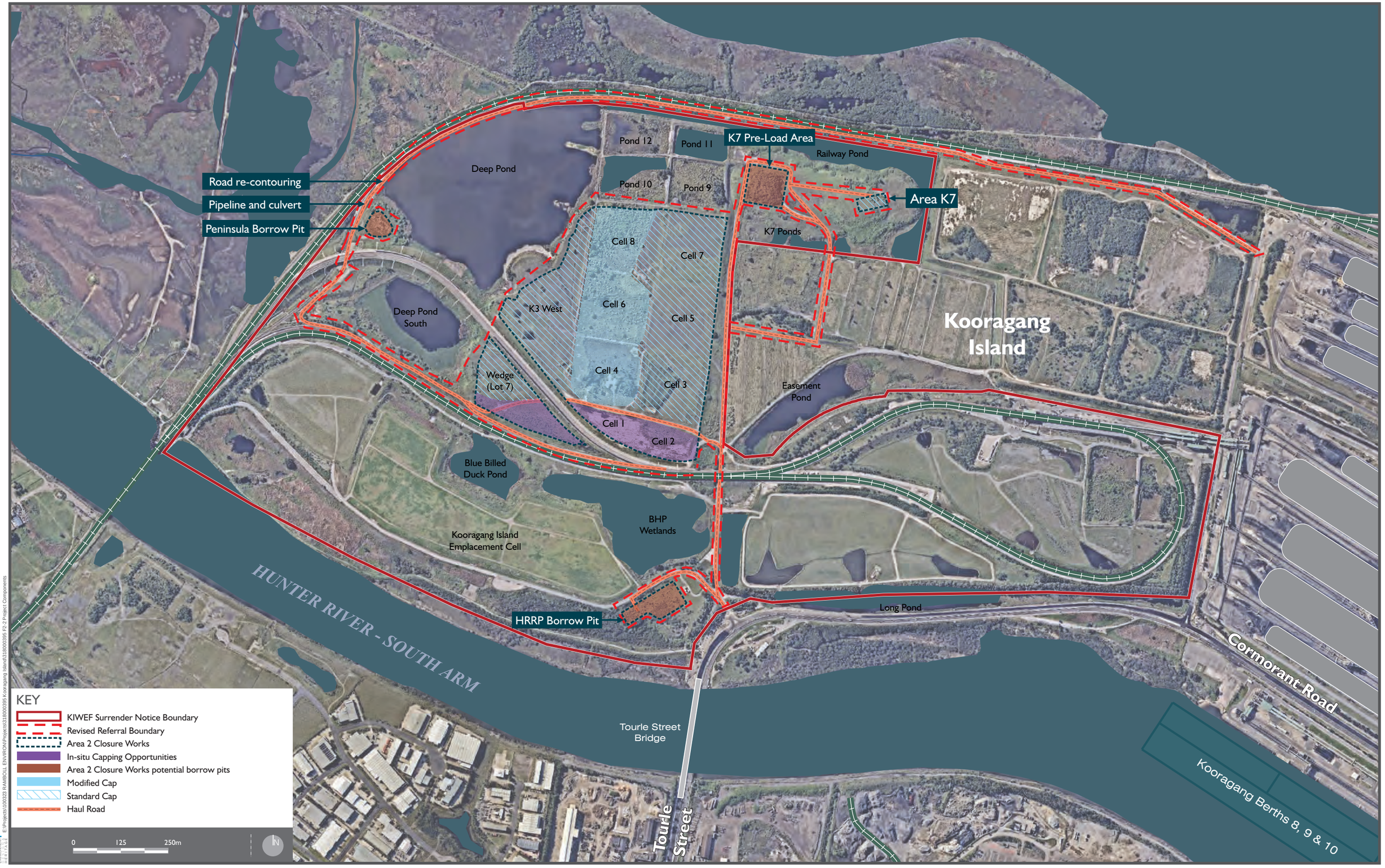

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FIGURE 2-2 Project Components

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FIGURE 2-4 Variation Components

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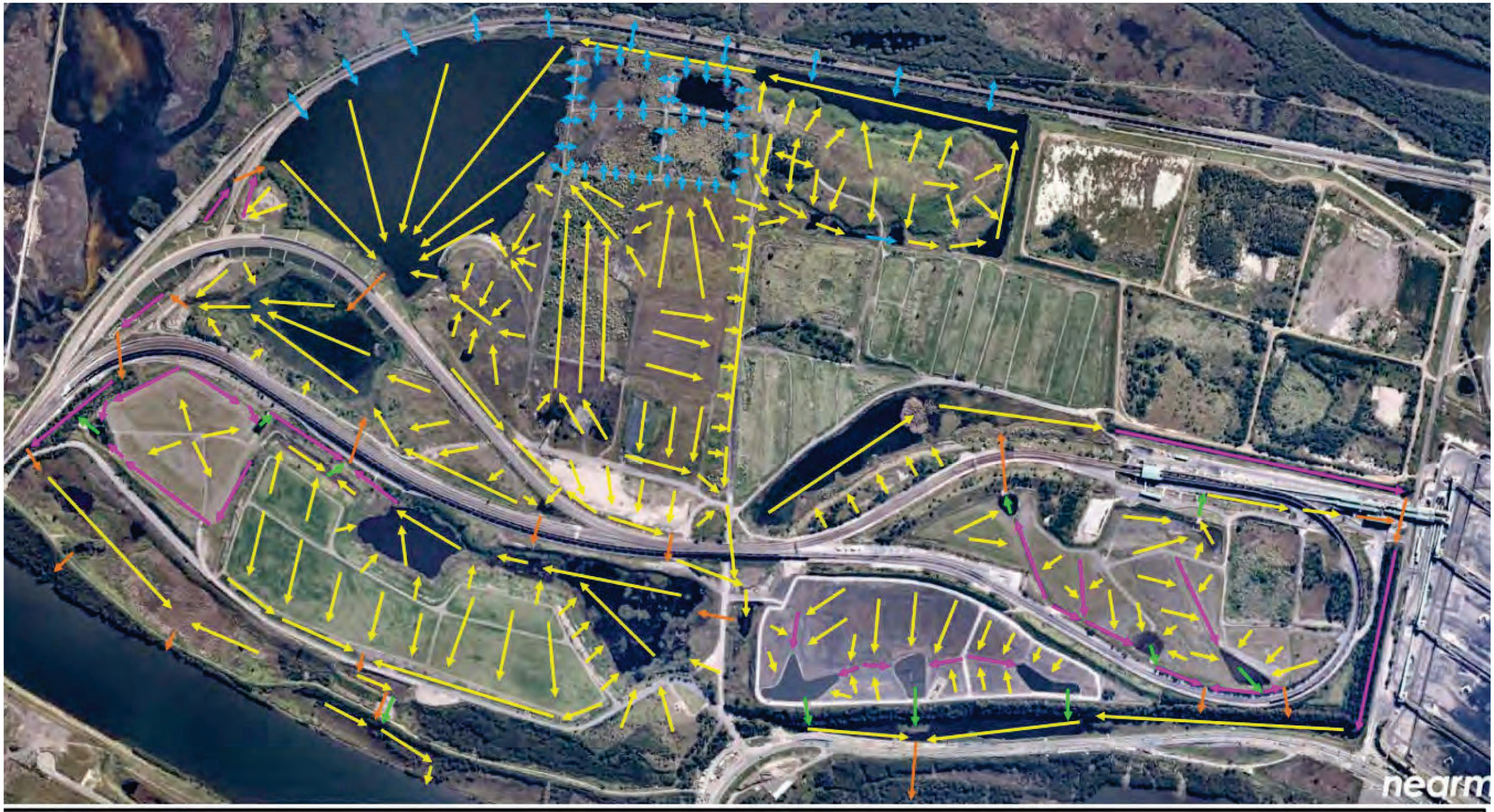
KIWEF Area 2 Closure Works
Hunter Development Corporation



Source: SMEC, 2018

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FIGURE 6-2 Surface Water Flow Paths Across the KIWEF

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KIWEF Area 2 Closure Works
Hunter Development Corporation

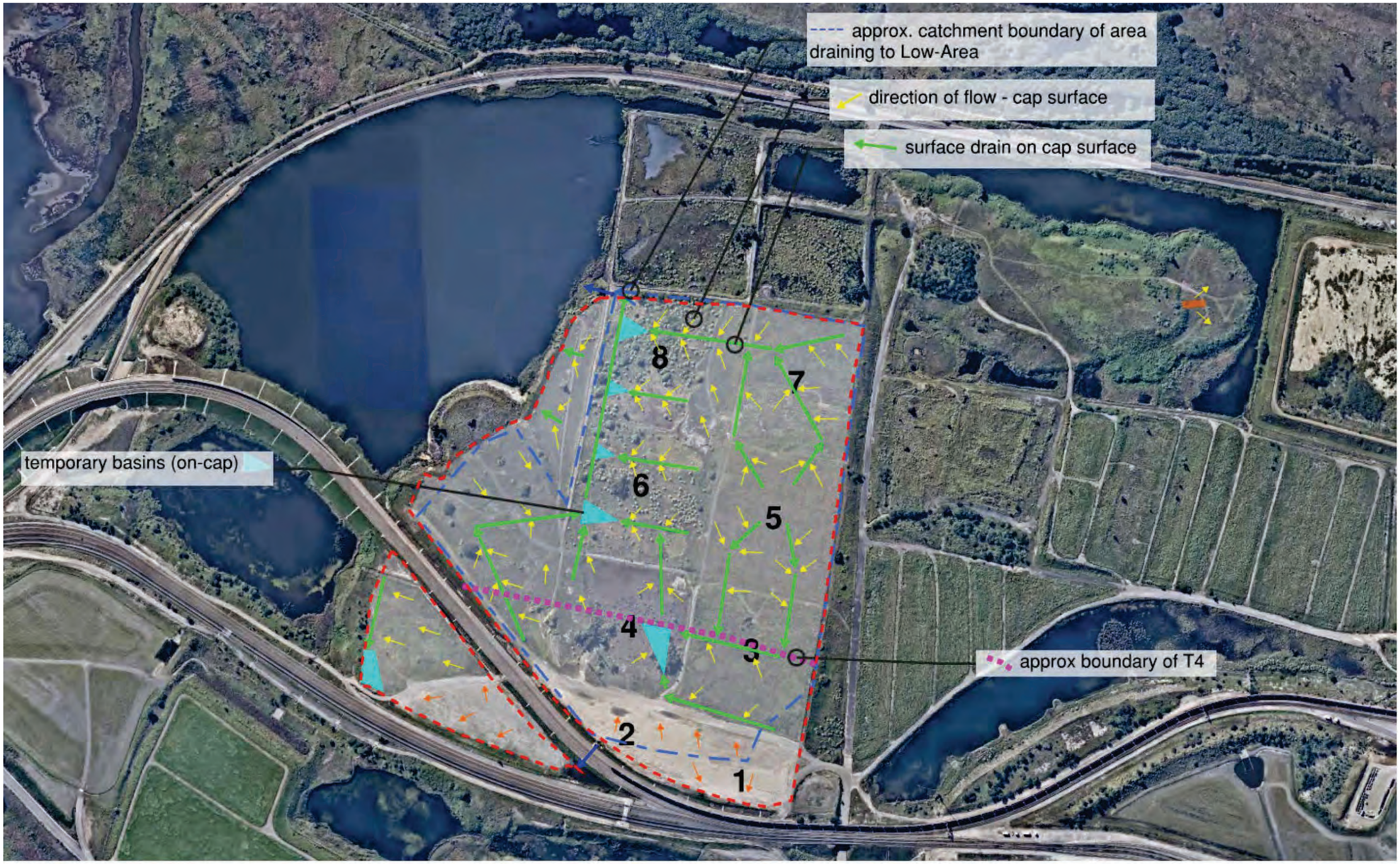

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FIGURE 6-6 Closure Site Drainage Design

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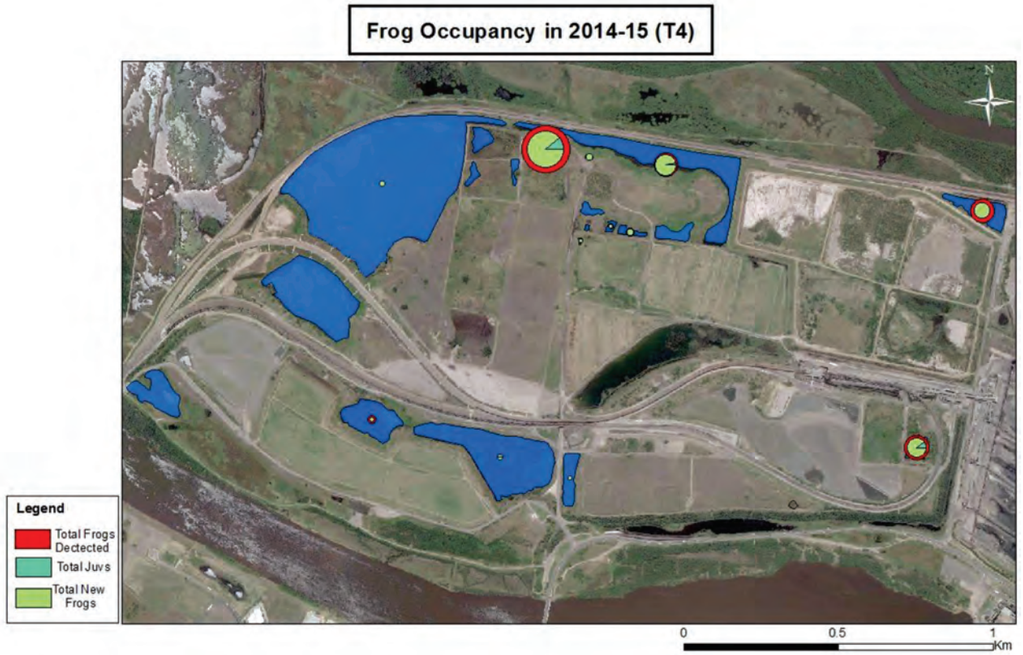
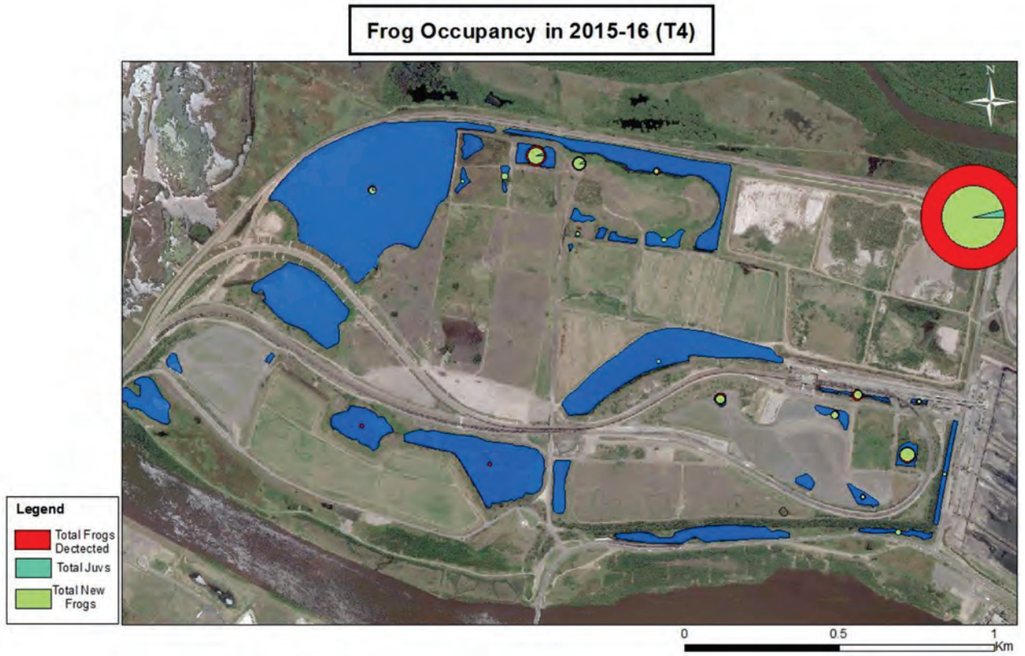
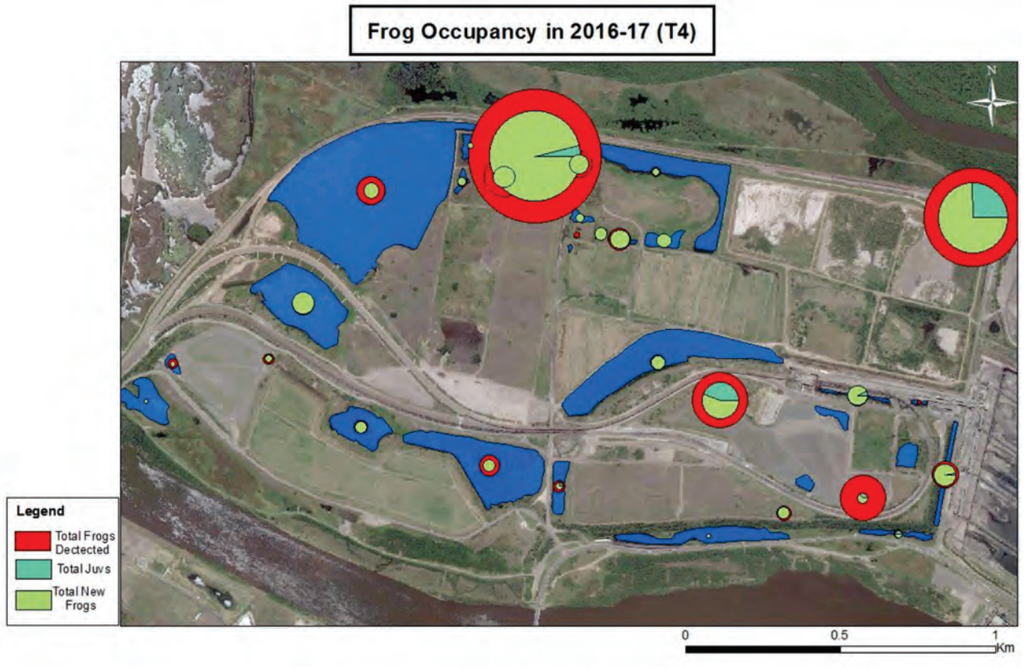
KIWEF Area 2 Closure Works
Hunter Development Corporation







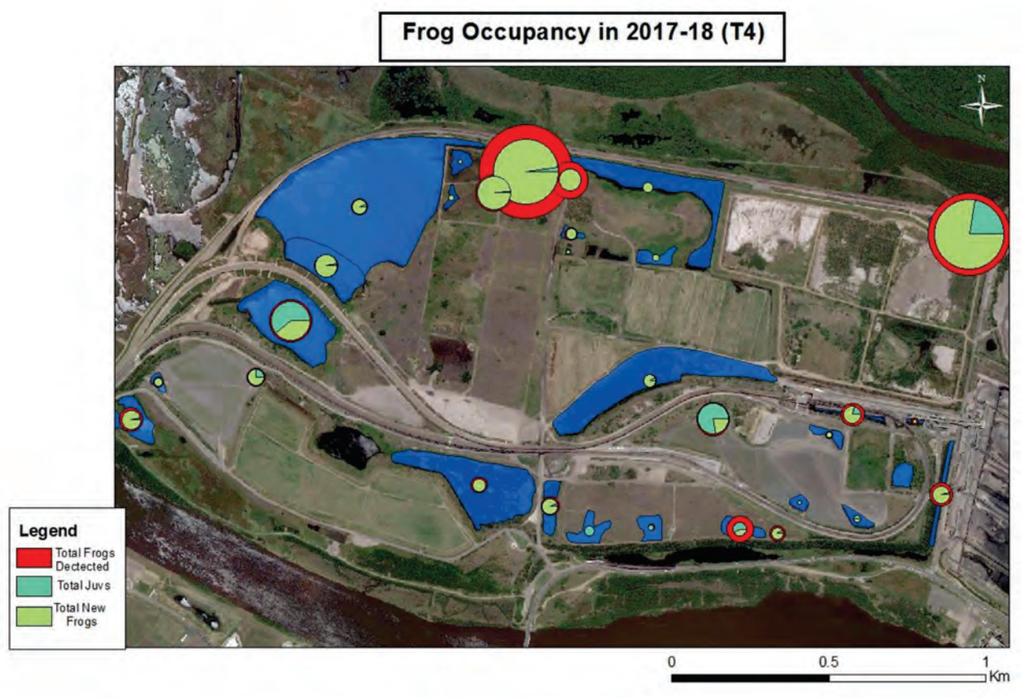


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FIGURE 6-7 Green and Golden Bell Frog Occupancy

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KIWEF Area 2 Closure Works
Hunter Development Corporation

Appendix B. Assessment of Significance

B.1 *Environmental Planning and Assessment Act 1979* assessment (7-part test)

B.1.1 Horned Pondweed (*Zannichelia palustris*)

1) in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on the potential habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

2) in the case of an Endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the Endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

3) in the case of an Endangered ecological community or Critically Endangered ecological community, whether the action proposed:
a) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction
b) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

4) in relation to the habitat of a Threatened species, population or ecological community:
a) the extent to which habitat is likely to be removed or modified as a result of the action proposed
b) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
c) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on the habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

5) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts on the pond would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

6) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A targeted strategy for management these species has been developed under the Saving Our Species program. The proposal will not involve clearing of habitat for this species and is therefore consistent with this strategy.

7) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

No, there will be no clearing of native vegetation and the scope of work is not consistent with any of the listed key threatening processes.

Conclusions

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on the habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

B.1.2 Eastern Grass Owl (Tyto capensis)

1) in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The Grass Owl roosts by day on the ground in a 'form' (trampled platform) under tussocks of tall grass or sedges/reeds (DEC, 2005b). The species forages in open, treeless habitats or marshy ground supporting tussocks of grass, low heath or recently harvested cane fields/paddocks (DEC, 2005b). The Grass Owl preys on rodents and Grass Owl populations generally increase in response to increases in rodent numbers.

Breeding habitat for the Grass Owl is generally on the ground in trampled grass amongst vegetation less than 2 m tall (with a greater than 90% projected canopy) (DEC, 2005b). The assessed borrow pit sites do not contain potential breeding habitat for this species and may only be used on occasion for hunting as part of a larger home range area. The proposed activity would involve the disturbance of a portion of potential habitat (i.e. disturbed grassland) for this species although are unlikely to disrupt foraging. Also these sites do not provide roosting and breeding habitat.

2) in the case of an Endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the Endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

3) in the case of an Endangered ecological community or Critically Endangered ecological community, whether the action proposed:
d) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction
e) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

4) in relation to the habitat of a Threatened species, population or ecological community:
a) the extent to which habitat is likely to be removed or modified as a result of the action proposed

b) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

c) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

There will be no clearing of native vegetation. The borrow sites currently exist as cleared low grassland and weeds with scattered dense stands of tall Acacia saligna. The habitat is only marginal as a potential feeding / hunting area for this species which may hunt widely over most of Kooragang Island. The proposal will not isolate or modify an area of important habitat.

5) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

There will be no clearing of native vegetation and no removal of habitat that would be considered critical for this species. The borrow sites currently exist as cleared low grassland and weeds with scattered dense stands of tall Acacia saligna. The habitat is only marginal as a potential feeding / hunting area for this species which may hunt widely over most of Kooragang Island. The proposal will not isolate or modify an area of important habitat and will not impact potential breeding habitat.

6) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A targeted strategy for management these species has been developed under the Saving Our Species program. The proposal will not involve clearing of habitat for this species and is therefore consistent with this strategy.

7) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

No, there will be no clearing of native vegetation and the scope of work is not consistent with any of the listed key threatening processes.

Conclusions

There will be no clearing of native vegetation and no removal of habitat that would be considered critical for this species. The borrow sites currently exist as cleared low grassland and weeds with scattered dense stands of tall Acacia saligna. The habitat is only marginal as a potential feeding / hunting area for this species which may hunt widely over most of Kooragang Island. The proposal will not isolate or modify an area of important habitat and will not impact potential breeding habitat. The proposed activity will not have a significant impact on this species.

B.1.3 Australasian Bittern (Botaurus poicilioptilus) and Black Bittern (Ixobrychus flavicollis)

1) in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Threats to the Australasian Bittern and black Bittern include drainage of wetlands for agriculture, salinisation of wetlands and overgrazing of wetland vegetation (Garnett and Crowley, 2000; Garnett, 1992 in Smith et al., 1995).

Vegetation and aquatic habitat associated with Deep Pond offers known and potential foraging, roosting and breeding habitat resources for the Australasian Bittern and Black Bittern. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section. The disturbance would only be temporary.

The temporary disturbance of a portion of the haul road adjacent to potential habitat for the Australasian Bittern and Black Bittern is unlikely to disrupt the lifecycle of these species such that a local viable population of these

species would be placed at risk. This is good opportunity to avoid all impact to the waterway if completed using the mitigation measures outlined in the REF.

2) in the case of an Endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the Endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

3) in the case of an Endangered ecological community or Critically Endangered ecological community, whether the action proposed:

a) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction

b) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

4) in relation to the habitat of a Threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed

c) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

d) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on the habitat of these species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for these species.

5) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of these species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for these species.

6) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A targeted strategy for management these species has been developed under the Saving Our Species program. The proposal will not involve clearing of habitat for this species and is therefore consistent with this strategy.

7) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

No, there will be no clearing of native vegetation and the scope of work is not consistent with any of the listed key threatening processes.

Conclusions

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

B.1.4 Black-tailed Godwit (*Limosa limosa*)

1) in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Vegetation and aquatic habitat associated with Deep Pond offers potential foraging, and roosting habitat resources for this species. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

The temporary disturbance of a portion of the haul road adjacent to potential habitat is unlikely to disrupt the lifecycle of this species such that a local viable population of these species would be placed at risk.

2) in the case of an Endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the Endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

3) in the case of an Endangered ecological community or Critically Endangered ecological community, whether the action proposed:
a) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction
b) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

4) in relation to the habitat of a Threatened species, population or ecological community:
a) the extent to which habitat is likely to be removed or modified as a result of the action proposed
c) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
d) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on the habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

5) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

6) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A targeted strategy for management these species has been developed under the Saving Our Species program. The proposal will not involve clearing of habitat for this species and is therefore consistent with this strategy.

7) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

No, there will be no clearing of native vegetation and the scope of work is not consistent with any of the listed key threatening processes.

Conclusions

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

B.1.5 Blue-billed Duck (*Oxyura australis*) and Freckled Duck (*Stictonetta naevosa*)

1) in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Vegetation and aquatic habitat associated with Deep Pond offers potential foraging, and roosting habitat resources for these species. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for these species is very small adjacent to the haul road in this short section. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

The temporary disturbance of a portion of the haul road adjacent to potential habitat is unlikely to disrupt the lifecycle of this species such that a local viable population of these species would be placed at risk.

2) in the case of an Endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the Endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

3) in the case of an Endangered ecological community or Critically Endangered ecological community, whether the action proposed:
a) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction
b) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

4) in relation to the habitat of a Threatened species, population or ecological community:

a) the extent to which habitat is likely to be removed or modified as a result of the action proposed

b) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

c) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on the habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

5) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

6) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

A targeted strategy for management these species has been developed under the Saving Our Species program. The proposal will not involve clearing of habitat for this species and is therefore consistent with this strategy.

7) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

No, there will be no clearing of native vegetation and the scope of work is not consistent with any of the listed key threatening processes.

Conclusions

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

B.1.6 Green and Golden Bell Frog (Litoria aurea)

1) in the case of a Threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Known and potential Green and Golden Bell Frog habitat is located within the project disturbance areas, particularly Deep Pond which sits adjacent to the haul road and access to the Peninsula borrow pit. The remaining borrow pit sites are not aquatic habitat and comprise exotic grasses and weed dominated sites growing over previous compacted fill. These sites provide only very marginal foraging areas for this species and are not breeding habitat as identified in long-term monitoring conducted by University of Newcastle (2017 and 2018).

Vegetation and aquatic habitat associated with Deep Pond is known foraging and breeding habitat for this species (UoN 2017). The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

The temporary disturbance of a portion of the haul road adjacent to potential habitat is unlikely to disrupt the lifecycle of this species such that a local viable population of these species would be placed at risk. There is a small risk of direct mortality during the upgrade of the road, however this risk was considered in the REF and mitigation measures developed to deal directly with minimising direct mortality.

The disturbance at the borrow sites and along the haul road may temporarily impact a small portion of the Green and Golden Bell Frog habitat noted at the T4 site although is unlikely to disrupt the lifecycle such that a local viable population of this species would be placed at risk of extinction.

2) in the case of an Endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the Endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable

3) in the case of an Endangered ecological community or Critically Endangered ecological community, whether the action proposed:
a) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction

b) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable

4) in relation to the habitat of a Threatened species, population or ecological community:
a) the extent to which habitat is likely to be removed or modified as a result of the action proposed

c) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
d) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

A comprehensive study of the habitat features of waterbodies on Kooragang Island by Hamer (2002) and more recently UoN (2017 and 2018) has shown that the Green and Golden Bell Frog occupies a wide range of waterbodies (i.e. various size, structure and water chemistry), however, is more likely to occupy waterbodies

that are within 50 metres (m) of other occupied waterbodies and shallower well vegetated ponds are preferred over deep ponds.

Known and potential Green and Golden Bell Frog habitat is located within the project disturbance areas, particularly Deep Pond which sits adjacent to the haul road and access to the Peninsula borrow pit. The remaining borrow pit sites are not aquatic habitat and comprise exotic grasses and weed dominated sites growing over previous compacted fill. These sites provide only very marginal foraging areas for this species and are not breeding habitat as identified in long-term monitoring conducted by UoN (2017 and 2018).

The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section. The disturbance would only be temporary and can be managed effectively. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

5) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Critical Habitat, as defined by the TSC Act, has not been declared for the Green and Golden Bell Frog (DEC, 2005a). According to the Draft Recovery Plan for the Green and Golden Bell Frog (DEC, 2005a), the declaration of critical habitat in NSW is not considered a priority for the Green and Golden Bell Frog as other mechanisms provide for its protection. There is no critical habitat as listed on the National Parks and Wildlife Service (NPWS) Critical habitat register (NPWS, 2006) or Department of the Environment and Heritage (DEH) Register of Critical Habitat (2006b) located in the Project site or surrounds.

The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on critical habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species.

6) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

The Draft Recovery Plan for the Green and Golden Bell Frog Litoria aurea (Recovery Plan) (DEC, 2005a) lists a number of threatening processes relevant to the Green and Golden Bell Frog, including habitat loss and/or modification and disturbance as well as fragmentation and isolation of habitat. The proposed activity will involve upgrade of a short section of the haul road to provide access to the Peninsula Borrow Pit. The access road sits up slope from Deep Pond, and there will be no direct impact on aquatic habitat of this species. Potential run-off and indirect impacts would be managed through sediment controls.

The remaining areas to be used a source material identified as borrow sites do not contain aquatic habitat suitable for this species and are not located between known breeding sites and are therefore not likely to be used for movements.

7) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

No, there will be no clearing of native vegetation and the scope of work is not consistent with any of the listed key threatening processes.

Conclusions

The disturbance at the borrow sites and along the haul road may temporarily impact a small portion of the Green and Golden Bell Frog habitat noted at the T4 site although is unlikely to disrupt the lifecycle such that a local viable population of this species would be placed at risk of extinction.

B.2 *Environment Protection and Biodiversity Conservation Act 1999* significance assessment

B.2.1 Ramsar Wetland

One Ramsar Wetland, Hunter Estuary Wetlands (ID No 24) occurs within close proximity to the site and was identified in the REF as occurring at is closest point approximately 260 meters to the north of the northern site boundary. The potential impacts to the Ramsar wetland was assessed in the REF and referral and these changes discussed in this REF amendment do not involve additional works outside of the original site and are not directly, or indirectly impacted on the wetland.

B.2.2 Endangered Species

Eastern Curlew (*Numenius madagascariensis*) and Curlew Sandpiper (*Calidris ferruginea*)

Both species typically forage where intertidal mudflats are present and has occasionally been recorded in Deep Pond. It is unlikely that the habitat adjacent to the haul road is important for these species given that it is not intertidal and that few records are present. The proposal will not remove habitat for these species as wetlands will not be cleared or modified.

1. lead to a long-term decrease in the size of a population

It is unlikely that the habitat within the borrow sites and haul road is important for the species given that it is not intertidal and that the species is only occasionally recorded.

reduce the area of occupancy of the species

Both species are migratory, occupying a very large range and breeding in the northern hemisphere. Temporary construction disturbance may cause the species to avoid small areas of sub-optimal foraging habitat, however there is other, much larger and more optimal areas of foraging habitat present within the vicinity. The area of occupancy for this species will not be significantly altered.

fragment an existing population into two or more populations

Both species are highly mobile migrating over considerable distance. The proposal will have no fragmentation effects for these species.

adversely affect habitat critical to the survival of a species

The habitat within Deep Pond provides suboptimal foraging resources, given that it is not intertidal and few individuals have been observed occasionally utilising the habitat. The habitat within and directly adjacent to the haul road is not considered critical habitat.

disrupt the breeding cycle of a population

The populations of these species breeds in the northern hemisphere and therefore will not be affected by the proposal.

modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The wetland area of Deep Pond will not be cleared or directly modified as a result of the removal and transportation of the capping material.

result in invasive species that are harmful to a endangered species becoming established in the endangered species' habitat

Weeds are very prevalent with the wetlands margins and cleared borrow sites, including priority weed species that require control.

Appropriate controls will be implemented to vehicles and equipment to avoid the introduction and spread of these species. The management of invasive species would be managed under the construction environmental management plan and during operation of the road using best practice methods.

introduce disease that may cause the species to decline

The activities associated with removal and transportation of the capping material is not expected to introduce any diseases that may cause the species to decline.

interfere substantially with the recovery of the species

The main potential impact to this species is possible disturbance to the wetland edge of Deep Pond during upgrade of the haul road. This is a temporary impact and considered negligible and manageable. The species recovery is not likely to be significantly affected by the proposal.

Conclusion

There will be no significant impact to this species, given that the habitat for this species will not be cleared or modified. Any indirect impacts as a result of the proposal are expected to be managed.

Australasian Bittern (Botaurus poiciloptilus)

This species inhabits terrestrial and estuarine wetlands, preferring dense vegetation including sedges, rushes and reeds. There is potential to use Deep Pond adjacent to the haul road access to the Peninsula Borrow site. The remaining areas assessed are not aquatic habitat suited to this species.

1. lead to a long-term decrease in the size of a population

The proposal is not likely to cause any mortality of the species and given the temporary nature of the construction works and their associated disturbance, no long term impacts are anticipated for the population.

reduce the area of occupancy of the species

Vegetation and aquatic habitat associated with Deep Pond is potential foraging and breeding habitat for this species. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

The temporary disturbance of a portion of the haul road adjacent to potential habitat is unlikely to disrupt the lifecycle of this species such that a local viable population of these species would be placed at risk. There is a small risk of directly mortality during the upgrade of the road, however this risk was considered in the REF and mitigation measures developed to deal directly with minimising direct mortality.

fragment an existing population into two or more populations

The proposal will not remove any habitat suitable for this species and there will be no changes to the connectivity of existing habitats for the species.

adversely affect habitat critical to the survival of a species

Vegetation and aquatic habitat associated with Deep Pond is potential foraging and breeding habitat for this species. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section and not considered critical habitat. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

disrupt the breeding cycle of a population

The wetlands adjacent to the works area are small in size and are likely to represent a small proportion of the territory required for individual birds, therefore it is anticipated that any temporary displacement that occurs will not significantly affect breeding.

modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section. The disturbance would only be temporary and modify or destroy habitat that would lead to a decline in this species or local population. Large areas of suitable habitat will remain.

result in invasive species that are harmful to a endangered species becoming established in the endangered species' habitat

Weeds are very prevalent with the wetlands margins and cleared borrow sites, including priority weed species that require control.

Appropriate controls will be implemented to vehicles and equipment to avoid the introduction and spread of these species. The management of invasive species would be managed under the construction environmental management plan and during operation of the road using best practice methods.

introduce disease that may cause the species to decline

The Project is not expected to introduce any diseases that may cause the species to decline. All Vehicles will be required to be clean on arrival and pass through a wheel wash on entry and exiting the site and this will limit the potential spread of disease.

interfere substantially with the recovery of the species

The main potential impact to this species is possible disturbance to the wetland edge of Deep Pond during upgrade of the haul road. This is a temporary impact and considered negligible and manageable. The species recovery is not likely to be significantly affected by the proposal.

Conclusion

There will be no significant impact to this species, given that the habitat for this species will not be cleared or modified. Any indirect impacts as a result of the proposal are expected to be managed.

B.2.3 Vulnerable species

Green and Golden Bell Frog (*Litoria aurea*)

1. lead to a long-term decrease in the size of an important population of a species

The Green and Golden Bell Frog Population within Kooragang Island can be considered an important population and part of the Key Population in the Lower Hunter, for which there is a draft Management Plan (OEH, 2007). The proposal may directly impact a small number of individuals during clearance of terrestrial habitats, however this is not considered sufficient to cause a long term decrease in the population.

Vegetation and aquatic habitat associated with Deep Pond is potential foraging and breeding habitat for this species. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section and not considered critical habitat. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

reduce the area of occupancy of an important population

The Green and Golden Bell Frog Population within Kooragang Island can be considered an important population and part of the Key Population in the Lower Hunter, for which there is a draft Management Plan (OEH, 2007). The removal of borrow material for the identified source locations will temporarily remove an area of potential disturbed foraging habitat for adult Green and Golden Bell Frog. After the works are completed these areas will be revegetated, therefore the loss of habitat is considered a temporary impact.

It is not expected that the temporary clearance of foraging habitat will significantly reduce the area of occupancy for this species.

fragment an existing important population into two or more populations

The borrow sites are not located in an important linkage to other areas of habitat for the species that has been identified by UoN (2017). No fragmentation of the current population is expected.

adversely affect habitat critical to the survival of a species

Habitat critical to the survival of a species refers to areas that are necessary for activities such as:

- Foraging, breeding, roosting, or dispersal
- For the long-term maintenance of the species including the maintenance of other species essential to the survival of the species, such as pollinators
- To maintain genetic diversity and long-term evolutionary development
- For the reintroduction of populations or recovery of the species.

The habitat within the borrow sites is not considered critical habitat for the species according to the long-term monitoring data presented in UoN 2017. Deep Pond is known habitat and a small portion of the current haul road sitting adjacent to Deep Pond will be upgraded. The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section and not considered critical habitat. The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF.

disrupt the breeding cycle of an important population

The proposed upgrade of the haul road may involve the disturbance of a portion of the shoreline of Deep Pond if undertaken without mitigation. However, the potential habitat resources (i.e. ponds and associated vegetation) for this species is very small adjacent to the haul road in this short section and not considered critical habitat.

The disturbance would only be temporary. The haul road sits up slope from the pond, and there will be no direct impact on the waterway. Indirect impacts can be managed appropriately in line with the recommendations in the REF. It is anticipated that there will be no significant changes to the breeding habitat as a result of this proposal; and the breeding cycle of this species will not be disrupted.

modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

It is likely that the temporary loss of a small proportion of foraging habitat will not cause any decline for the species and frogs will be able to utilise other areas.

result in invasive species that are harmful to a vulnerable species becoming established in the Vulnerable species' habitat

Weeds are very prevalent with the wetlands margins and cleared borrow sites, including priority weed species that require control. Appropriate controls will be implemented to vehicles and equipment to avoid the introduction and spread of these species. The management of invasive species would be managed under the construction environmental management plan and during operation of the road using best practice methods.

introduce disease that may cause the species to decline

The Project is not expected to introduce any diseases that may cause the species to decline. Chytrid fungus has been linked to declines in the Green and Golden Bell Frog, however the pathogen is considered widespread on Kooragang island (DECC 2007) and therefore it is unlikely that the proposed works will cause any further spread. Nevertheless, hygiene procedures will be implemented as discussed in the REF in order to prevent any spread of the disease.

interfere substantially with the recovery of the species

The draft *National Recovery Plan for the Green and Golden Bell Frog* identifies the following objectives for recovery of this species:

Identify key populations for protection.
Implement conservation and management strategies for key populations.
Research the species to augment biological and ecological data to enable conservation management.

A Green and Golden Bell Frog Management Plan has been prepared for the capping project and long-term monitoring is being conducted by the University of Newcastle to inform mitigation during the remediation project. This project aligns with the recovery plan in that it is actively managing a key population and funding research.

Conclusion

Key impacts are limited to possible mortality of a small number of individuals during clearance of weedy terrestrial areas. There are likely to be no significant impacts to this species or the population of this species.

B.2.4 Listed migratory species

Impacts are considered in the context of Deep Pond and the potential for impacts from upgrading of the haul road and truck movements from the borrow site to Area 2

The species listed below have either been recorded, or are considered to have the potential to occur, within or adjacent to the haul road associated with the Deep Pond. These species are typically associated with the wetland areas, including the margins and transitional habitats. They are not anticipated to occur in the landfill areas associated with the material borrow sites.

There will be no direct loss of habitat for these migratory species and impacts will be restricted to indirect and temporary impacts that can be managed appropriately through sediment control

The following species have either been recorded in the study area or considered to have a moderate to high likelihood of occurring

- Common Sandpiper (Actitis hypoleucos)
- Grey-tailed Tattler (Heteroscelus brevipes)
- Great Egret (Ardea alba)
- Broad-billed Sandpiper (Limicola falcinellus)
- Cattle Egret (Ardea ibis)
- Bar-tailed Godwit (Limosa lapponica)
- Sharp-tailed Sandpiper (Calidris acuminata)
- Black-tailed Godwit (Limosa limosa)
- Red Knot (Calidris canutus)
- Eastern Curlew (Numenius madagascariensis)
- Curlew Sandpiper (Calidris ferruginea)
- Whimbrel (Numenius phaeopus)
- Pectoral Sandpiper (Calidris melanotos)
- Ruff (Philomachus pugnax)
- Red-necked Stint (Calidris ruficollis)
- Pacific Golden Plover (Pluvialis fulva)
- Great Knot (Calidris tenuirostris)
- Grey Plover (Pluvialis squatarola)
- Double-banded Plover (Charadrius bicinctus)
- Marsh Sandpiper (Tringa stagnatilis)
- Latham's Snipe (Gallinago hardwickii)

The original REF assessed the potential impact of construction noise, light and vibration disturbance from machinery. The REF stated that these impacts are likely to be most acute for Deep Pond whilst heavy machinery is operated in the K3 area and within K5 Cell 8. The amendments to the project include identifying a number of material borrow sites. The impact of construction noise and light is still applicable to this additional activity, as all borrow sites are within close proximity to the capping area.

The REF identified that noise impacts of construction works have the potential to disturb migratory birds sufficiently so that some areas of foraging habitat are avoided. This impact is most likely to affect species foraging or roosting on the shoreline in the shallow sediments or those species which utilise the areas of emergent vegetation on the eastern edge of Deep Pond.

'Important habitat' for a migratory species is defined in the *significant impact guidelines 1.1* EPBC Act (DoE, 2013) as being:

- *Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species*
- *Habitat that is of critical importance to the species at particular life-cycle stages*
- *Habitat utilised by a migratory species which is at the limit of the species range*
- *Habitat within an area where the species is declining.*

The REF reported that the overall capping project area is not considered to contain 'important habitat' for these migratory species as defined by DoE (2013) given:

- *There is no significant or unique habitat within the area of proposed disturbance that is expected to support an ecologically significant proportion of the population of any migratory species.*

- *There is limited habitat within the area of proposed disturbance that would be considered of critical importance to any migratory species at particular life-cycle stages. The wider Kooragang Nature Reserve, Hexham Swamp and Hexham Swamp Nature Reserve is within proximity to the project and these habitats are known to provide 'important habitat' for several migratory bird species*
- *There is no habitat within the project area used by a migratory species that is at the limit of the species' range.*
- *For Latham's Snipe, the small area adjoining the New England Highway is not expected to support at least 18 individuals of this species (DEWHA, 2009).*

These conclusions are consistent with the land identified and assessed in this REF amendment as material borrow sites

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- **substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species**

Deep Pond, is considered to contain important habitat for several migratory species as, on occasion, the habitat includes greater than 0.1% of the global population, including; Sharp-tailed Sandpiper (Calidris acuminata), Curlew Sandpiper (Calidris ferruginea); and Marsh Sandpiper (Tringa stagnatilis) (Herbert 2007).

Important habitat will not be substantially modified due to the upgrade of the Haul Road

- **result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or**

The proposed works are unlikely to increase the prevalence or introduce any invasive species to the habitats on which the migratory species relies. According to the REF mitigation strategy *all Vehicles will be required to be clean on arrival and pass through a wheel bath on entry and exiting the site and this will limit the potential spread of weeds or pathogens*.

The terrestrial areas of the site are dominated by exotic weeds; however, the proposed works are unlikely to increase the spread into wetland areas.

- **seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.**

According to the REF flora and fauna assessment

The only migratory species recorded in high number are the Sharp-tailed Sandpiper (Calidris acuminata), Curlew Sandpiper (Calidris ferruginea); and Marsh Sandpiper (Tringa stagnatilis). These species may utilise the Deep Pond shoreline to rest, forage and roost within the site. Construction impact may cause the migratory species to avoid areas of Deep Pond primarily due to the effect of noise disturbance. This is not likely to significantly disrupt the lifecycle of any of the migratory shorebirds.

Conclusion

The proposal will not significantly affect wetland and shorebird migratory species, given that the wetland habitats and margins will not be removed or modified. Impacts will be limited to the temporary disturbance caused by upgrade of a short section of the haul road and will be temporary.