

Crinia Tinnula (Wallum Froglet) Survey within the wetland west of ML1228 and ML1229.

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Prepared for Earth Commodities

By



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ABOUT US

AK Earth Environmental Consultants Queensland

With 25 year's experience in the Wide Bay/Burnett and Central QLD Region, AK EARTH delivers practical, expert advice and solutions to complex environmental issues. We provide services for Construction, Gas and Mining, Fauna spotting and catching, Ecological Monitoring and Management, Rural and Residential Land Owners and Water Management. Our highly qualified scientists and field staff offer extensive on-ground experience across the full spectrum of environmental sciences.

AK EARTH ensures fast tracked, practical and cost efficient solutions are provided to satisfy individual client's requirements to address complex legislative issues. This cumulative knowledge and experience is delivered via local professional service providers.

Our Range of Services Include:

- Ecological Surveys – Species Management Programs, Threatened Species –Endangered Vulnerable Near Threatened (EVNT) flora, fauna, habitat, and potential animal breeding places surveys.
- Fauna spotter catcher – State Wide Rehabilitation Permit (All Schedules under NCA 1992)
- Acid sulfate soil management, plans & testing.
- Preparation of Construction Environmental Management Plan.
- Development of an Environmental Management Systems to meet client standards and requirements including client audits and environmental reporting.
- Preparation of Site Management Plans.
- Obtaining relevant environmental permits , licences, approvals and authorities.
- Fire Management – pit, planned and hazard reduction burns.
- Commercial Vessel Operations - Commercial Skipper, 4.0 m and 5.5 m vessels available.
- Erosion Sediment Control Plans.
- Land stabilisation and rehabilitation.
- Waste management - regulated, general and recyclable.
- Chemical and hydrocarbon management.
- Cultural heritage monitoring – Qualified monitors available.
- Water, Noise, Vibration and Air quality monitoring.
- Contaminated site management.
- Vegetation Offsets.
- Staged clearing plans and tree felling co-coordination.
- Prepares timely reports to client project specifications.

SCOPE

This ecological survey report was compiled by AK Earth Environmental Consultants, for the following purposes;

1. Targeted *Crinia Tinnula* (Wallum Froglet) Survey, within the wetland immediately west of ML1228 and ML1229.

The ecological survey was conducted in accordance with Environmental Authority Permit Number EPVL00603713 condition GC9 and Earth Commodities environmental management plan, by AK Earth Environmental Consultants in March 2016.

Condition GC9 is as follows;

*An appropriately qualified person(s) must undertake a targeted survey within twelve (12) months of the effective date of this permit to detect the presence or absence of the Wallum froglet (*Crinia tinnula*) within the wetland area immediately to the west of ML1228 and ML1229. The targeted survey must occur during suitable conditions (i.e. following suitable rainfall events and during known breeding periods).*

Earth Commodities endorsed AK Earth to conduct, two (2) thorough aural/visual surveys within the main drainage lines of the wetland area immediately to the west of ML1228 and ML1229, shortly after heavy rainfall events, utilising 2 appropriately qualified personnel (2 ecologists) over a 2 day period.

For the purpose of this report, only the areas delineated within the wetland immediate to the west of ML1228 and ML1229 were surveyed for presence/absence of *Crinia tinnula* (Wallum Froglet) shortly after suitable rainfall events and monitored to obtain baseline water quality parameters of pH, conductivity, temperature and turbidity, on the 7th February 2016 (Transect 1- Sites 1 – 8) and 17th March 2016 (Transect 2 -Sites 1-8).

1.0 INTRODUCTION

For the purpose of conducting a targeted *Crinia Tinnula* (Wallum Froglet) Survey in October 2015, Earth Commodities engaged AK Earth Environmental Consultants to conduct two (2) thorough aural/visual surveys within the main drainage lines of the wetland area immediately to the west of ML1228 and ML1229, shortly after suitable rainfall events, utilising 2 appropriately qualified personnel (2 ecologists) over a 2 day period. (Refer Appendix A: ML1228 & ML1229 & HES Wetland)



Map 1: Locality Map – Earth Commodities Bundaberg



Map 2: Wetland Site - *Crinia tinnula* Survey

The targeted *Crinia Tinnula* (Wallum Froglet) Survey was conducted in accordance with the legislative requirements of the;

- Environmental Protection Act 1994 (EPA), and subordinate legislation (EP Act)
- Nature Conservation Act 1992 (NCA),
- Nature Conservation (Administration) Regulation 2006
- Nature Conservation (Wildlife Management) Regulation 2006.

Taking into account the Department of Science Information Technology Innovation and the Arts, “Targeted species survey guidelines for the Wallum froglet -*Crinia tinnula*”, October 2012 and utilising the Terrestrial Vertebrate Fauna Survey Field Data Sheets, for Amphibian Search November 2014. (Refer Appendix B: Targeted species survey guidelines for the Wallum froglet - *Crinia tinnula*).

For the purpose of this report, only the areas delineated within the wetland immediate to the west of ML1228 and ML1229 were surveyed for presence/absence of *Crinia tinnula* (Wallum Froglet) and monitored to obtain baseline water quality parameters of pH, conductivity, temperature and turbidity, shortly after suitable rainfall events on the 7th February 2016 (Transect 1- Sites 1 – 8) and 17th March 2016 (Transect 2 -Sites 1-8). These areas are described as;

Transect 1 (7/2/16) and Transect 2 (17/3/16)

- Site 1 : S25.00351 - E152.29870
- Site 2: S25.00306 - E152.29853
- Site 3: S25.00246 – E152.29767
- Site 4: S24 00189 – E152 29737
- Site 5: S25.00098 – E152.29716
- Site 6: S25.00055 – E152.29692
- Site 7: S24.599710 – E152.29665
- Site 8: S24.598980 – E152.29606

The complete extent of the wetland immediately west of ML1228 and ML1229 was traversed on foot by two suitable qualified ecologists, namely Kristan Hall and Dr Kevin Wormington (Refer Appendix C: CV’s of K Hall and K Wormington), after two suitable rainfall events on the 7/2/16 and 17/3/16.

Rainfall data derived from the Bureau of Meteorology (BOM) website indicates the following monthly rainfall totals within 20km of the survey area; (Refer Appendix D: BOM Daily Weather Observations Bundaberg).

- October 2015: 98.8mm of rain over 10 day period.
- November 2015: 108.6mm of rain over 10 day period.
- December 2015: 57.4mm of rain over 10 day period.
- January 2016: 301mm of rain over a 13 day period.
- February 2016: 115mm of rain over 17 day period.
- March 2016: 37.6mm of rain over 11 day period.

The areas traversed were recorded as Transect 1 being 2.54km approximately (Yellow line) and Transect 2 being 2.89km approximately (Orange line). (Refer Figure 1 below: Crinia tinnula Transects 1 & 2.)



Figure 1: Crinia tinnula Transects 1 & 2.

Under the *Vegetation Management Act (VMA) 1999*, the majority of the survey area is mapped remnant vegetation (RV) and essential habitat (EH) for the vulnerable listed crinia tinnula – wallum froglet. (Refer Appendix E: Vegetation Management Report (RV) Section 3.3 pg 8 & Section 5.2 pg13 and (EH) Section 3.6 pg 9).

The site is not mapped within a DEHP high risk area on the protected plants flora survey trigger map, therefore no threatened flora species survey is triggered. (Refer Appendix E: Vegetation Management Report Section 3.8 pg10 & Section 5.6 pg17). However high risk areas for protected plants exist within the surrounding areas.

The survey site is located in a “Wetland Protection Area – Map of Referable Wetlands”, and is mapped within a High Ecological Significant (HES) Wetland, under the Environmental Protection Act 1994. (Refer Appendix F: Map of Referable Wetlands - Wetland Protection Areas).

The survey site is located within District B under the Nature Conservation (Koala) Conservation Plan 2006.

The survey site is not mapped within a Fish Habitat Areas (FHA), tidal waters or in Queensland waterways for waterway barrier works.

2.0 METHODOLOGY USED FOR CRINIA TINNULA SURVEY

2.1 Desktop Assessment.

A comprehensive search of best management practices and guidelines for conducting targeted species surveys for the *Crinia tinnula* (Wallum froglet) was conducted and the following sources referenced.

- Department of Science, Information Technology, Innovation and the Arts, “Targeted species survey guidelines for the Wallum froglet - *Crinia tinnula*”, October 2012.
- Department of Science, Information Technology, Innovation and the Arts, Terrestrial Vertebrate Fauna Survey Field Data Sheets, for Amphibian Search November 2014.
- Memoirs of the Queensland Museum, Volume 49 Part 2 , Occurrence of the Wallum Froglet (*Crinia tinnula*) at Littabella National Park South East QLD, 7th January 2013.
- National recovery plan for the wallum sedgefrog and other wallum-dependent frog’s species, Environmental Protection Agency, Queensland Parks and Wildlife Service 2006.

On the 31/03/15, Earth Commodities forwarded written correspondence to the Department of Environment and Heritage to ensure the proposed survey methods would meet the Environmental Authority Permit Number EPVL00603713 condition GC9 being “*An appropriately qualified person(s) must undertake a targeted survey within twelve (12) months of the effective date of this permit to detect the presence or absence of the Wallum froglet (Crinia tinnula) within the wetland area immediately to the west of ML1228 and ML1229. The targeted survey must occur during suitable conditions (i.e. following suitable rainfall events and during known breeding periods).*”

A comprehensive list of EVNT species that could potentially be found in the area was sourced from the Australian Government, Department of the Environment website at www.environment.gov.au and the Queensland Government website at www.ehp.qld.gov.au.

The Department of Agriculture, Fisheries and Forestry website was utilised to depict if any stream order watercourses triggered for, referable wetlands, tidal waters or waterways barriers works were present in the site.

The Department of Infrastructure, Local Government and Planning website was used to identify wetland protection areas.

A GIS map of the site was produced to assist in identifying surrounding regional ecosystems, ecological significant area and landforms utilising the following layers;

- DCDB
- SPOT 5 satellite imagery and aerial photos
- Regional Ecosystem Mapping
- Map of Referable Wetlands
- Protected Plants Flora Survey Trigger Map
- Soils & Geological layers

Reiteration of positive identification of *Crinia tinnula* was conducted within the project team pertaining to biological attributes of adults and tadpoles and acoustic characteristics. Photographs and audio of all South-eastern frog calls was collated in readiness for the surveys. Seasonal timing consideration were taken into account as *Crinia tinnula* has been recorded breeding in all seasons following significant rainfall events, therefore surveys can be undertaken at anytime of the year shortly after heavy rainfall. (Source: Department of Science, Information Technology, Innovation and the Arts).

2.2 Site Inspections

The complete extent of the wetland immediately west of ML1228 and ML1229 was traversed on foot by two suitable qualified ecologists, namely Kristan Hall and Dr Kevin Wormington after two suitable rainfall events on the 7/2/16 being over 300mm plus in January 2016 and 17/3/16 being over 140mm in February March 2016.

Presence/absence monitoring by aural recordings and visual means by active searches, dip netting, photographs and water quality was conducted within Transects 1 being 2540m approximately (7/2/16) and Transect 2 being 2890m approximately (17/3/16) and within individual sites 1-8.

As calling males are more likely detected at night during most times of the year surveys times were staged for morning and evening. As is difficult to detect *crinia tinnula* in dense vegetation the aural survey technique was implemented at all 8 sites and during both transects.

During the morning, afternoon and evening within Sites 1-8 (Figure 2) on the 7/2/16 and 17/3/16, active searches, involved call back audio playing of *crinia tinnula* and other south eastern frog species calls over an external speaker, in conjunction with dip netting.

Shortly after suitable rainfall events on the 7th February 2016 and 17th March 2016, the areas delineated within the wetland immediate to the west of ML1228 and ML1229 were surveyed for presence/absence of *Crinia tinnula* (Wallum Froglet) and monitored to obtain baseline water quality parameters of pH, conductivity, temperature and turbidity, These areas are described as;

Transect 1 (7/2/16) & Transect 2 (17/3/16) and Water quality monitoring sites 1-8.

- Site 1 : S25.00351 - E152.29870
- Site 2: S25.00306 - E152.29853
- Site 3: S25.00246 – E152.29767
- Site 4: S24 00189 – E152 29737
- Site 5: S25.00098 – E152.29716
- Site 6: S25.00055 – E152.29692
- Site 7: S24.599710 – E152.29665
- Site 8: S24.598980 – E152.29606

In the field, an amphibian search, habitat, fauna and flora recording sheet will be used to collate the ecological survey data with relevant photographic and audio recording evidence. (Refer Appendix G: Example of Amphibian Search recording sheet.)

3.0 TARGETED THREATENED SPECIES AND HABITAT

Information on the following attributes was obtained to target threatened species and habitat that may occur in the area;

3.1 The Regional Ecosystem (RE) descriptions for the surrounding area

Least Concern Regional Ecosystem 12.2.7

Melaleuca quinquenervia or rarely M. dealbata open forest. Other species include Eucalyptus tereticornis, Corymbia intermedia, E. bancroftii, E. latisinensis, E. robusta, Lophostemon suaveolens and Livistona decora. A shrub layer may occur with frequent species including Melastoma malabathricum subsp. malabathricum or Banksia robur. The ground layer is sparse to dense and comprised of species including the ferns Pteridium esculentum and Blechnum indicum the sedges Schoenus brevifolius, Baloskion tetraphyllum subsp. meiotachyum, Baumea rubiginosa and Gahnia sieberiana and the grass Imperata cylindrica. Occurs on Quaternary coastal dunes and seasonally waterlogged sandplains usually fringing drainage system behind beach ridge plains or on old dunes, swales and sandy coastal creek levees.

Least Concern Regional Ecosystem 12.2.9

Banksia aemula low open woodland. Mallee eucalypts sometimes present, e.g. Eucalyptus latisinensis. Occurs on Quaternary coastal dunes and sandplains with deeply leached soils.

Least Concern Regional Ecosystem 12.2.11

Corymbia tessellaris +/- Eucalyptus tereticornis, C. intermedia and Livistona decora woodland. Other characteristic species include Melaleuca dealbata, Callitris columellaris, Petalostigma pubescens, E. exserta, Planchonia careya, Leptospermum neglectum and Acacia julifera. Melaleuca spp. and E. tereticornis dominate in swales. Vine forest species sometimes present as sub-canopy or understorey. Occurs on Quaternary coastal beach ridges and swales in the northern half of bioregion.

Least Concern Regional Ecosystem 12.2.12

Closed or wet heath +/- stunted emergent shrubs/low trees. Characteristic shrubs include Banksia spp. (especially B. robur) Boronia falcifolia, Epacris spp., Baeckea frutescens, Schoenus brevifolius, Leptospermum spp., Hakea actites, Melaleuca thymifolia, M. nodosa, Xanthorrhoea fulva with Baloskion spp. and Sporadanthus spp. in ground layer. Occurs on poorly drained Quaternary coastal dunes and sandplains. Low part of sand mass coastal landscapes where water collects from both overland flow and infiltration from adjoining sand dunes. (BVG1M: 29a). Vegetation communities in this regional ecosystem include:

12.2.12a: Palustrine wetland (e.g. vegetated swamp). Empodisma minus, Baumea rubiginosa, Epacris microphylla var. microphylla closed heathland with emergent low shrubs of Leptospermum

Least Concern Regional Ecosystem 12.2.15

Closed sedgeland in coastal swamps and associated water bodies. Characteristic species include Gahnia sieberiana, Empodisma minus, Gleichenia spp., Blechnum indicum, Lepironia articulata, Baumea spp., Juncus spp., and Eleocharis spp. Occurs on Quaternary coastal dunes and beaches. Low part of coastal landscape where water collects from both overland flow and infiltration from adjoining sand dunes

A Regulated Vegetation Management map was derived from the Department of Natural Resources and Mines at the time of reporting. (Refer Appendix E: Vegetation Management Report).

3.2 Endangered, Vulnerable or Near Threatened (EVNT) species targeted during survey.

In addition to the *Crinia tinnula* survey, Table 1 below has been derived from the Department of the Environments EPBC Act and cross referenced with EVNT species list Queensland Government website at www.ehp.qld.gov.au. Table 1 lists the EVNT species and usual species habitat that may occur within the area. This list was utilised to target key EVNT species that maybe present within the area of works.

Table 1 – EVNT species targeted during survey

Common Name	Scientific Name	Status EPBC Act	Usual Habitat
Birds			
Australasian Bittern	<i>Botaurus poiciloptilus</i>	Endangered EPBC	terrestrial freshwater wetlands and, rarely, estuarine habitats. The species favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds or cutting grass (<i>Gahnia</i>) growing over muddy or peaty substrate
Coxens fig Parrot	<i>Cyclopsitta diophthalma coxeni</i>	Endangered EPBC & NCA	Coxen's Fig-Parrot occupies habitats that occur from sea level to approximately 900 m above sea level Coxen's Fig-Parrot occurs in rainforest habitats including subtropical rainforest, dry rainforest, littoral and developing littoral rainforest, and vine forest .The fig-parrot was, in the past, probably most abundant in lowland subtropical rainforest
Red Goshawk	<i>Erythrotriorchis radiatus</i>	Vulnerable EPBC Endangered NCA	Nests are in tall trees within one km of and often beside, permanent water (river, swamp, pool), usually in fairly open, biologically rich forest or woodland.
Eastern curlew	<i>Numenius madagascariensis</i>	Critically Endangered EPBC & Vulnerable NCA	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms
Black-breasted button-quail	<i>Turnix melanogaster</i>	Vulnerable EPBC & NCA	The Black-breasted Button-quail is restricted to rainforests and forests, mostly in areas with 770-1200 mm rainfall per annum (Bennett 1985; Hughes & Hughes 1991; Marchant & Higgins 1993). They prefer drier low closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest
Amphibians			
Wallum Froglet	<i>Crinia tinnula</i>	Vulnerable NCA	Acid paperbark (<i>melaleuca</i> sp') swamps and drainage lines in wet heath. Also found in disturbed wallum habitats such as recently burnt heathlands, roadsides, quarries etc etc.
Mammals			
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Vulnerable EPBC & NCA	Stone cliffs and fertile woodland valley habitat within close proximity of each other
Northern Quoll	<i>Dasyurus hallucatus</i>	Endangered EPBC Least Concern NCA	diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert
Koala	<i>Phascolarctos cinereus</i>	Vulnerable EPBC & NCA	temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by <i>Eucalyptus</i> species
Grey Headed Flying Fox	<i>Pteropus poliocephalus</i>	Vulnerable EPBC	rainforests, open forests, closed and open woodlands, <i>Melaleuca</i> swamps and <i>Banksia</i> woodlands
Water mouse	<i>Xeromys myoides</i>	Vulnerable EPBC & NCA	Although the water mouse had been documented in three distinct locations (Northern Territory, central south Queensland, south-east Queensland) they require similiar habitat including mangroves and the associated saltmarsh, sedgeland, clay

			pans, heathlands and freshwater wetlands. The main habitat difference at each location is the littoral, supralittoral and terrestrial vegetation which differs in structure and composition. These differences dictate the species' nesting behaviour.
Reptiles			
Collared Delma	<i>Delma torquata</i>	Vulnerable EPBC & NCA	Eucalypt-dominated woodlands and open-forests, under rocks, isolated populations.
Yakka Skink	<i>Egernia rugosa</i>	Vulnerable EPBC & NCA	Open dry sclerophyll forest, woodland and scrub. The core habitat of this species is within the Mulga Lands and Brigalow Belt South Bioregions
Dunmall's Snake	<i>Furina dunmalli</i>	Vulnerable EPBC & NCA	Spotted Gum (<i>Corymbia citriodora</i>), Ironbark (<i>Eucalyptus crebra</i> and <i>E. melanophloia</i>), White Cypress Pine (<i>Callitris glaucophylla</i>) and Bullock open forest and woodland associations.
Plants			
	<i>Acacia attenuata</i>	Vulnerable EPBC & NCA	occurs on flat coastal lowland plains, at altitudes of lower than 30 m above sea level Across this range <i>A. attenuata</i> typically occurs in seasonally waterlogged areas of wet heathland or heathland margins, open forest and woodland communities, and specifically on sandy poorly drained soils or peat swamps which are infertile
Leafless-tongue orchid	<i>Cryptostylis hunteriana</i>	Vulnerable EPBC	The Leafless Tongue-orchid has been reported to occur in a wide variety of habitats including heathlands, heathy woodlands, sedgelands, <i>Xanthorrhoea</i> spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests (grassy sub-formation) Soils are generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils.
Wedge-leaf Tuckeroo	<i>Cupaniopsis shirleyana</i>	Vulnerable EPBC & NCA	dry rainforest vegetation types, including vine thicket communities on hillsides, stream beds and along riverbanks at altitudes up to 550 m above sea level. This species is also likely to occur on the margins of native vegetation in scrubby urbanised areas
	<i>Cycas megacarpa</i>	Endangered EPBC & NCA	woodland, open woodland and open forests, often in conjunction with a grassy understory
	<i>Cycas ophiolitica</i>	Endangered EPBC & NCA	hills and slopes in sparse, grassy open forest at altitude ranges from 80–400 m above sea level. it is more frequently found on shallow, stony, infertile soils, which are developed on sandstone and serpentinite
Pineapple Zamia	<i>Macrozamia pauli-guilielmi</i>	Endangered EPBC & NCA	<i>Macrozamia pauli-guilielmi</i> occurs in lowland (5–230 m altitude) open forest or woodland (wallum) dominated by banksias or eucalypts, or in shrub land or heath land, generally on stabilised sand dunes
Cycad	<i>Macrozamia lomandriodes</i>	Endangered EPBC	<i>Macrozamia lomandriodes</i> commonly grows in coastal and near-coastal ranges and may extend further inland in some districts (Jones 1993a). Plants are found on the gently undulating coastal plain on flats and very gently inclined hillslopes with variable aspect at elevations between 10-50 m above sea level.
Mt Berryman Phebalium	<i>Phebalium distans</i>	Critically Endangered EPBC & Endangered NCA	Semi-evergreen vine thicket on red volcanic soils, or in communities adjacent to this vegetation type

Source: <http://www.environment.gov.au> - Species Profile and Threats Database

Two (2) critically endangered ecological communities were listed under the EPBCA being the, Littoral Rainforest & Coastal Vine Thickets of Eastern Australia & the Lowland Rainforest of Subtropical Australia.

One (1) vulnerable ecological community was listed under the EPBCA being the Subtropical and Temperate Coastal Saltmarsh.

4.0 RESULTS OF TARGETED CRINIA TINNULA SURVEY.

Although extensive surveys were conducted, *Crinia tinnula* was not positively identified and or heard calling in the vicinity of the survey areas.

The active searches, call back audio playing (over an external speaker) and dip netting, was conducted during the morning, afternoon and evening within Transect 1 and Transect 2 (Figure 1) on the 7/2/16 and 17/3/16.

The areas traversed were recorded as Transect 1 being 2.54km approximately (Yellow line) and Transect 2 being 2.89km approximately (Orange line). (Refer Figure 1 below: *Crinia tinnula* Transects 1 & 2.)



Figure 1: *Crinia tinnula* Transects 1 & 2.



Figure 2: RE12.2.7 Transect 1 - 7/2/16.

A wildfire has occurred in January 2016, therefore most groundcover species were germinating and secondary and primary tree species were coppicing.



Figure 3: Transect 2: 17/03/16



Figure 4: Transect 2: 17/03/16 Water quality monitoring

The topography of the survey site ranged from 1% - 2% on land zone two (2), being quaternary coastal sand deposits and beach ridges, which included degraded sand dunes, sand plans, swales, lakes and swamps enclosed by dunes. The soils are predominantly Rudosols and Tenosols, Podosols and Organosols. (Source: DNRM Land zone descriptions)

No stream order watercourses traversed the ephemeral wetland and no Fish Habitat Areas or Referable Wetlands were present within the survey site.

The land use consisted of an adjacent sand mining quarry and surrounding protected areas of the Burrum Coast National Park.

The vegetation was mapped as the following remnant least concern regional ecosystems;

- RE12.2.7 - *Melaleuca quinquenervia* or rarely *M. dealbata* open forest.
- RE12.2.9 - *Banksia aemula* low open woodland. Mallee eucalypts sometimes present, e.g. *Eucalyptus latissinensis*.
- RE12.2.11- *Corymbia tessellaris* +/- *Eucalyptus tereticornis*, *C. intermedia* and *Livistona decora* woodland
- RE12.2.12 - Closed or wet heath +/- stunted emergent shrubs/low trees. Characteristic shrubs include *Banksia* spp. (especially *B. robur*) *Boronia falcifolia*, *Epacris* spp., *Baeckea frutescens*,

Schoenus brevifolius, Leptospermum spp., Hakea actites, Melaleuca thymifolia, M. nodosa, Xanthorrhoea fulva with Baloskion spp. and Sporadanthus spp. in ground layer.

- RE12.2.15 - Closed sedgeland in coastal swamps and associated water bodies. Characteristic species include Gahnia sieberiana, Empodisma minus, Gleichenia spp., Blechnum indicum, Lepironia articulata, Baumea spp., Juncus spp., and Eleocharis spp.

The wetland immediately west of ML1228 and ML1229 was notably described as RE12.2.7 being - Melaleuca quinquenervia open forest with the ecotones of RE12.2.9 - Banksia aemula low open woodland, RE12.2.12 - Closed or wet heath Banksia robur, Boronia falcifolia, Epacris spp., Baeckea frutescens, Schoenus brevifolius, Leptospermum spp., Hakea actites, Melaleuca thymifolia, M. nodosa, Xanthorrhoea fulva with Baloskion spp. and Sporadanthus spp. and RE12.2.15 - Closed sedgeland in coastal swamps and associated water bodies with species include Gahnia sieberiana, Empodisma minus, Gleichenia spp., Blechnum indicum, Lepironia articulata, Baumea spp., Juncus spp., and Eleocharis spp.



Figure 5: RE12.2.7 Immediately West of ML1229.



Figure 6: Ecotone between RE12.2.7 & RE12.2.9

The amphibian species recorded during the survey are listed as all common and therefore have a wide ecological range.

The amphibian fauna species recorded during the two (2) surveys are listed below.

Scientific Name	Common Name	Transect 1 07/02/16	Transect 2 17/03/16.	NCA Status	EPBA Status
Rhinella marina	Cane toad	x	x	introduced	introduced
Limnodynates terraereginae	Northern pobbledonk	x	x	common	
Litoria fallax	Eastern sedgefrog	x		common	
Platyplectrum ornatum	Ornate burrowing frog	x		common	

The Limnodynates terraereginae (Northern pobbledonk) and the Rhinella marina (Cane toad), were noticeably prolific in the area being 80% of the species recorded within the two transect sites.

Commonwealth and State Government databases have no recordings of Crinia tinnula within 20km of the HES wetland immediately west of ML1228 and ML1229. (Appendix H: Recorded Threatened Species 20km-STATE and Recorded Threatened Species-Commonwealth)



Figure 7: Evening RE12.2.7 -West of ML1228



Figure 8: Evening RE12.2.7 & RE12.2.9

The ephemeral wetland is mapped as essential habitat for *Crinia tinnula* under the *Vegetation Management Act (VMA) 1999*, and the site does contain the mandatory essential habitat factors for the species being as follows;

- *Essential Habitat: Permanent to ephemeral acidic freshwater with pH4.3-5.2, in Melaleuca quinquenervia swamps, sedgeland, wet and dry heathlands of Banksia robour and wallum Banksia aemula on coastal sandy lowlands.* (Refer Appendix E: Vegetation Management Report (RV) Section 3.3 pg 8 & Section 5.2 pg13 and (EH) Section 3.6 pg 9).

The two (2) critically endangered ecological communities were listed under the EPBCA being the, Littoral Rainforest & Coastal Vine Thickets of Eastern Australia & the Lowland Rainforest of Subtropical Australia and the Temperate Coastal Saltmarsh listed as a vulnerable ecological community under the EPBCA, were not located with the clearing footprint.

The Department of Agriculture, Fisheries and Forestry website depicted no stream order watercourses triggered for, tidal waters, fish habitat areas or waterways barriers works present in the site.

The Department of Infrastructure, Local Government and Planning website depicted that a Wetland Protection Areas (WPA) is within the survey area, mapped as a High Ecological Significance (HES) Wetland which extends northward. (Appendix F Map of Referable Wetlands - Wetland Protection Areas.)



Figure 9: Wetland Protection Areas West of ML 1228



Figure 10: HES Wetland Protection Area West of ML1229

No threatened flora species were located within the wetland immediately west *ML 1228 and ML 1229*.

No threatened fauna species in particular *Crinia tinnula* -(*Wallum froglet*) were located within the wetland immediately west *ML 1228 and ML 1229*.

5.0 Water Quality Monitoring Sites 1 - 8

In accordance with best ecological recording practices, only the wetland immediately west of ML1228 and ML1229 were monitored for the following water quality parameters being pH, turbidity, conductivity and temperature. These areas are described as Sites 1 – 8 below;



Figure 11: Water Quality Monitoring Sites 1-8.

5.1 Transect 1 – 07/02/16

Wetland West of ML1228 and ML1229	Location	pH	Temperature (oC)	Turbidity (NTU)	Conductivity (uS)
Site 1	S25.00351 E152.2987	5.72	26.2	12.3	623
Site 2	S25.00306 E152.2985	5.03	27.2	12.5	620
Site 3	S25.00246 E152.29767	5.73	26.3	15.3	610
Site 4	S24 00189 E152 29737	5.40	26.8	15.3	684
Site 5	S25.00098 E152.29716	5.55	26.7	16.3	890
Site 6	S25.00055 E152.29692	6.44	25.9	14.5	766
Site 7	S24.599710 E152.29665	5.99	25.8	15.6	862
Site 8	S24.598980 E152.29606	5.88	27.7	17.2	845

Wetland saturated with acidic tannin freshwater consistent with RE12.2.7.

5.2 Transect 2 – 17/03/16

Wetland West of ML1228 and ML1229	Location	pH	Temperature (oC)	Turbidity (NTU)	Conductivity (uS)
Site 1	S25.00351 E152.2987	4.72	27.2	13.3	766
Site 2	S25.00306 E152.2985	5.03	29.2	13.5	752
Site 3	S25.00246 E152.29767	5.43	30.1	15.3	785
Site 4	S24 00189 E152 29737	5.40	30.1	16.3	684
Site 5	S25.00098 E152.29716	5.40	29.8	16.3	890
Site 6	S25.00055 E152.29692	5.44	27.9	17.5	775
Site 7	S24.599710 E152.29665	5.42	28.8	17.6	820
Site 8	S24.598980 E152.29606	5.28	27.7	17.2	835

Wetland holding water however receding levels and ponding present during inspection.

As per the essential habitat criteria for *crinia tinnula*, *permanent to ephemeral acidic freshwater with preferred range between pH 4.3-5.2*.

The 16 pH results recorded within the survey areas of transect 1 and transect 2 ranged from pH 4.72 – 6.44. As expected the pH become slightly more acidic as the fresh waters receded in the ephemeral wetlands.

6.0 CONCLUSION

For the purpose meeting Environmental Authority Permit Number EPVL00603713 condition GC9 being “An appropriately qualified person(s) must undertake a targeted survey within twelve (12) months of the effective date of the permit to detect the presence or absence of the Wallum froglet (*Crinia tinnula*) within the wetland area immediately to the west of ML1228 and ML1229. The targeted survey must occur during suitable conditions (i.e. following suitable rainfall events and during known breeding periods)”. AK Earth conducted a targeted ecological survey in accordance with advice received from DEHP on the 31/03/15.

Therefore two (2) thorough aural/visual surveys within the main drainage lines of the wetland area immediately to the west of ML1228 and ML1229, shortly after suitable rainfall events, utilising 2 appropriately qualified personnel (2 ecologists) over a 2 day period were conducted, for presence/absence of *Crinia tinnula* (Wallum Froglet) and monitored to obtain baseline water quality parameters of pH, conductivity, temperature and turbidity.

The survey area was considered to meet all the essential habitat requirements for *Crinia tinnula*, being permanent to ephemeral acidic freshwater ranging between pH 4.3-5.2, within *Melaleuca quinquenervia* swamps, sedgeland, wet and dry heathlands of *Banksia robour* and wallum *Banksia aemula* on coastal sandy lowlands (Source: Meyer E, CSIRO Publishing 2012).

Water quality results depicted ranges of pH4.72 to 6.44, which are considered reasonably suitable for *crinia tinnula*, however the limited periods of inundation of the ephemeral wetland in conjunction with the high levels of competition from other amphibians (ie: cane toad and northern pobbletonk), may have a significant impact on the likelihood of occurrence of the vulnerable species.

Although the wetland immediately to the west of ML1228 and ML1229 meet the essential habitat criteria for *crinia tinnula*, no threatened fauna species were heard, identified or sighted at the time of the inspections within transects 1 and transect 2 and Sites 1-8.

7.0 APPENDICIES

Appendix A: ML1228 & ML1229 & HES Wetland

Appendix B: Targeted species survey guidelines for the Wallum froglet - *Crinia tinnula*

Appendix C: Curriculum vitae– K Hall and K Wormington

Appendix D: BOM Daily Weather Observations Bundaberg

Appendix E: Vegetation Management Report lot 120 AP17589

Appendix F: Map of Referable Wetlands - Wetland Protection Areas

Appendix G: Example of Amphibian Search recording sheet

Appendix H: Recorded Threatened Species 20km-STATE & Recorded Threatened Species - Commonwealth.

8.0 REFERENCES

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