

GoldLinQ
Gold Coast Rapid Transit
Wetland Management Plan

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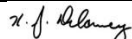

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EXECUTIVE SUMMARY

This Wetland Management Plan (WMP) has been prepared by Cardno (Qld) Pty Ltd on behalf of GoldlinQ in relation to the development of a maintenance depot of the Gold Coast Rapid Transit (GCRT) project. The maintenance depot is an industrial facility required to maintain and repair LRVs which will be located near Baratta Street in Southport. The depot site is located within 100m of a wetland associated with Loders Creek. GoldlinQ wish to appropriately manage activities associated with the maintenance depot to reduce potential impacts to this wetland area.

Loders Creek wetland is in an urban area and is highly degraded and modified upstream and downstream of the site. Nonetheless the wetland still maintains fauna habitat opportunities, connectivity values and potentially supports two threatened frog species. Overall the Loders Creek wetland is considered to have moderate ecological value.

As part of the planning and approvals process of the GCRT project numerous studies and targeted surveys have been undertaken, development approvals have been, and are being, obtained for the construction of the depot. Site-specific construction documents have been developed for the construction of the depot and its surrounds and these documents address the Development Approval conditions imposed by regulators. This WMP presents the outcomes of previous reporting which relates to the depot and which has an influence on the management of the wetland ecosystem. The WMP also specifies additional requirements for the management of the wetland for the next five years.

The objectives of the WMP are provided below.

- To ensure no negative impacts are caused to the wetland ecosystem by the construction and operation of the depot.
- To improve the resilience of the wetland through the rehabilitation works undertaken as part of the GCRT project, including works within and around the depot.
- To monitor the health of the wetland and pro-actively respond to potential impacts caused by the depot, to ensure the on-going health of the wetland ecosystem.
- To assist with the continued rehabilitation works within the wetland by providing information, access and other resources where practicable.

These wetland management objectives are to be achieved through a framework of risk identification and nomination of management strategies. The main improvements to the wetland which can be offered by the maintenance depot component of the GCRT include:

- a considered depot design cognisant of environmental values (NB: the design and layout of the depot has incorporated recognised ecological values through modifications to the development footprint, minimising disturbance to a former landfill, designing a stormwater treatment system to high standards, establishing a noise barrier to the wetland, and rehabilitating areas of land surrounding the wetland and depot);
- appropriate management of on-site impacts during construction to limit potential downstream impacts to the wetland system;
- rehabilitation works to stabilise land and significantly increase native vegetative cover; and
- provision of resources to the continued management and monitoring of the wetland system beyond the depot's construction.

1 INTRODUCTION

This Wetland Management Plan (WMP) has been prepared by Cardno (Qld) Pty Ltd on behalf of GoldlinQ in relation to the development of a maintenance depot of the Gold Coast Rapid Transit (GCRT) project. GCRT is a light rail system that is intended to link the Gold Coast Railway at Helensvale with the Griffith University/University Hospital precinct and the centres of Southport, Surfers Paradise, Broadbeach, and ultimately Burleigh Heads.

The maintenance depot, which forms part of 'Zone 2' of the GCRT will be located on Lot 218 WD5245 and Lot 393 CP860178 at Baratta Street, Southport within the Gold Coast City Council (GCCC) Local Government Area ("the site") (refer **Figure 1**). The depot is an industrial facility required to maintain and repair LRVs.

A wetland associated with Loders Creek is located approximately 50m to the north of the proposed maintenance depot. The following wetland management related issues are addressed herein.

- Section 2 provides the background to the project and a summary of studies and reports relating to the wetland.
- Section 3 describes the ecological values of the wetland.
- Section 4 provides the management objectives for the wetland ecosystem.
- Section 5 provides an analysis of the risks and threats to the wetland, the management actions undertaken during design and required during construction and operation of the depot, and the resources and reporting requirements of the WMP.

2 PROJECT BACKGROUND

The GCRT project will be delivered as a Public Private Partnership (PPP) between the Queensland Government, the GCCC, the Commonwealth of Australia and the GoldLinQ Consortium. GoldLinQ has been appointed to design, build, operate and maintain the GCRT system on the Gold Coast. The GoldLinQ Consortium consists of McConnell Dowell Constructors (Aust) Pty Ltd, Bombardier Transportation Australia Pty Ltd and KDR Gold Coast Pty Ltd. McConnell Dowell have been specifically commissioned to construct the GCRT system including the maintenance depot, and KDR will operate the GCRT system following construction.

It is relevant to note that as part of the planning and approvals process for the GCRT project:

- numerous studies and targeted surveys have been undertaken;
- development approvals have been, and are being, obtained for the construction of the depot; and
- site-specific construction documents have been developed for the depot and its surrounds which address the requirements of Development Approval conditions imposed by the Department of Environment and Resource Management (DERM) and other regulators.

This WMP also presents the findings of a targeted on-site assessment of the wetland ecosystem specifically undertaken in February 2012 for the development of this WMP, as well as incorporating the wetland-specific findings of previous studies and integrating the relevant management measures nominated in approved construction documents. Provided below is an outline of the previously produced reports relating to the depot which have an influence on the management of the wetland ecosystem.

- *A Concept Design and Impact Management Plan Volume 7 Technical Report – Ecological Assessment* was undertaken by GHD in 2007. This report provides a preliminary assessment of the terrestrial and aquatic ecological values of the corridor and proposed route alignments (which include the current depot site). This report incorporated a review of past studies and anecdotal evidence from surveys. The report recognised the wetland (amongst other features) as a sensitive ecological area which offers habitat and resources for threatened species. The mitigation measures outlined in the GHD report have been incorporated into site-specific management plans developed for the depot (refer below). Measures include minimising the development area, bank stabilisation, revegetation and maintenance of the local hydrology of the area.
- In October 2011 Biodiversity Australia T/A NatureCall undertook a flora and fauna survey in Zone 2 including the wetland area. The one-day survey did not record any threatened species however the accompanying report (entitled *Zone 2 Flora and Fauna Survey October 2011*) concludes that the wetland to the north of the depot offers suitable habitat for two threatened frog species and resources for Koala.
- The Design and Construction (D&C) Management Plan Construction Environmental Management Plan (“the CEMP”) developed for GoldlinQ outlines the environmental management framework and processes that will be used by the D&C Contractor throughout the D&C stages of the Project. The CEMP provides a management framework

and procedures to ensure the D&C Contractor establishes and maintains best practice controls to manage potential environmental impacts during D&C of the Project.

- A series of *Environmental Protection Instructions* have been developed by McConnell Dowell and GoldLinQ which specifically relate to the construction works to be undertaken at the depot site, and specific environmental controls required for:
 - disturbance to aquatic flora and fauna (Doc. No L025-003-2367);
 - disturbance to terrestrial flora and fauna (Doc. No. L025-002-2367);
 - soil erosion, sedimentation and surface run-off (Doc. No. L025-001-2367); and
 - presence of infectious plant, disease, weeds and pests (Doc. L025-012-2367).

A *Species Management Program: Wallum froglet (Crinia tinnula) and the Green-thighed frog (Litoria brevipalmata)* (Doc. No. L025-022-2367) has been developed and approved by DERM to address potential tampering with a threatened animal species breeding place under Section 332 of the *Nature Conservation Act 1992*.

- *GCRT Landscape Design* currently being developed by Cardno SPLAT (2012) which provides detailed landscape design drawings for the entire alignment, including the depot and its immediate surrounding area. Accompanying this design is the *GCRT Rehabilitation Management Plan*, currently being developed by Cardno SPLAT (2012), which will provide specifications for the rehabilitation works which GoldlinQ will undertake within the natural areas associated with all zones of the GCRT system. The *GCRT Rehabilitation Management Plan* will be designed to complement the works noted on the following dot point which will be undertaken in the near future. The areas which will be rehabilitated as part of the GCRT project are presented on **Figure 2** herein.
- GCCC (Community Services / Parks and Recreation) has formally issued two requests for tender for restoration projects within and to the north of the Depot site (a 4ha area in and around the wetland of interest) and for the adjoining upstream sections of Loders Creek (a 12.5ha area). Tender specifications are referred to as 'Southport Reserve (Loders Creek) Restoration Project' and the 'Southport Reserve Revegetation Project', and were issued in 2011. The areas proposed for revegetation are shown on **Figure 2** herein.
- A number of environmental approvals have been obtained from the state for the depot development under the *Nature Conservation Act 1994* and the *Vegetation Management Act 1999*. A comprehensive database of all applicable planning and environmental legislation and Codes has been compiled in the GoldlinQ's Approvals Management Strategy. The approval conditions will be incorporated into CEMP and/or construction site based management plans. The CEMP requires as an objective, that 100% compliance with fauna and flora approval conditions is achieved.

2.1 MAINTENANCE DEPOT

The depot facility is required for the maintenance and repair of LRVs on the GCRT system. The facility is required to be operational 24 hrs a day in order to service the network. The facility includes:

- a two storey depot building which will include facilities for vehicle maintenance and repairs, the building will also include office space for operations personnel and the Operations Control Centre (the maintenance building Stage 1 includes stabling for 14 Light Rail Vehicles (LRVs), with the capacity to increase to 21 within the 15-year Franchise period);
- a stabling yard immediately to the north and west of the depot building which is to be used to store and maintain the LRVs and includes a wash bay, the yard will be illuminated at night;
- a car park near the entrance of the facility, which will also be illuminated at night;
- a bio-retention basin required to treat the stormwater run-off from the site which will be located north of the noise barrier and directly upslope of the wetland;
- an automatic LRV washing facility and storage facilities for fuel, track sand and waste; and
- landscaping and rehabilitation works which will be undertaken around the depot facility and to the west of the stabling yard (refer **Figure 2**).

3 ECOLOGICAL VALUES

Zone 2 of the GCRT project is located in the north western section of the greater project corridor between Smith Street and Wardoo Street in Southport (refer **Figure 1**) and is in close proximity to Loders Creek. Within Zone 2, the maintenance depot will be located over two adjoining allotments. The majority of the depot will be positioned on the eastern allotment (i.e. Lot 393 CP860178, 7.7ha) which supports an existing GCCC Depot site. Part of the stabling yard will fall within the western allotment (i.e. Lot 218 WD5245, 8.8ha) which was formerly used as a GCCC landfill. From aerial photography, the landfill appears to have been decommissioned around 1990. The former landfill site has been used for GCCC storage and impounding purposes and is surrounded by cleared open areas and a highly modified section of Loders Creek.

The maintenance depot site is designated as 'Public Open Space' and 'Community Purposes' within the GCCC Planning Scheme and is located within an urban area surrounded by residential and industrial land, a state controlled road (Smith Street) and a main road (Wardoo Street). Loders Creek borders the depot site to the north and the Loders Creek wetland area (refer **Figure 2**) is the subject of this WMP.

This section of Loders Creek is a permanent freshwater watercourse with associated pooling wetland areas. Parts of the wetland and watercourse (downstream from the end of Baratta Street to Wardoo Street) have been subject to weed control and revegetation and appear to be in a reasonable condition as a result. Further downstream Loders Creek is channelised through residential areas, and approximately 2.5km downstream it becomes tidally affected before draining into the Broadwater. A significant decline in the condition and values of Loders Creek occurs upstream from the end of Baratta Street, due to a lack of ongoing maintenance, weed control and from considerable upstream modifications including diversion of the creek underground near the former landfill (refer Plates 1 – 4 below).

Review of historical aerial photography (refer **Appendix A**) depicts the upstream and downstream modifications to Loders Creek and modifications to the depot site. Vegetation clearance and residential development commenced in the area in the 1960s. Extensive clearing intensified in the 1970s including clearance to establish the GCCC depot site and the landfill. A considerable area within and around Loders Creek was also cleared, potentially for flood mitigation purposes.

The section of Loders Creek bordering the north of the depot site is dominated by a Broad-leaved paperbark (*Melaleuca quinquenervia*) community with an understory of sedges and ferns, the community is analogous with Regional Ecosystem (RE) 12.3.6 (*Melaleuca quinquenervia*, *Eucalyptus tereticornis*, *Lophostemon suaveolens* woodland on coastal alluvial plains). The vegetation surrounding wetland and riparian areas is comprised of Eucalypt dominated open forest and is analogous with RE12.11.23 (*Tall open forest of Eucalyptus pilularis* open forest on metamorphics and interbedded volcanic).



Plate 1. Modified upstream section of Loders Creek, a large culvert channels water underground near the former landfill.



Plate 2. Culvert outflow near the former landfill site. Landfill is located on the right and cleared floodplain on the left.



Plate 3. Section of Loders Creek directly north of the depot, highly infested with exotic species including Declared pest plants.



Plate 4. Riparian section of Loders Creek near Baratta Street which has been the subject of rehabilitation works. The Creeks' condition improves significantly where active management has occurred.



Plate 5. Wetland area associated with Loders Creek which provides habitat for frogs and other native fauna.

3.1 FAUNA HABITAT VALUE

The Loders Creek wetland area and surrounds have the potential to provide habitat for a range of native fauna due to the range of habitats present in the area (i.e. stagnant wetland areas, permanent freshwater creek, and the surrounding open forest supporting mature canopy specimens and remnant vegetation). Aquatic insects, crustaceans, fish and amphibians would inhabit and utilise the wetland and riparian systems. Foraging resources, habitat and refuge is provided for native birds, mammals and reptiles.

No observations of evidence of Koalas (*Phascolarctos cinereus*) were observed (i.e. direct sightings, scratches, scats) during the February 2012 survey. However a study by GHD undertaken as part of an ecological assessment for the Gold Coast Health and Knowledge Precinct in 2010 recorded Koalas near Olsen Avenue / Smith Street intersection. A spotter-catcher associated with the GCRT anecdotally reported that scratch marks indicative of those made by Koala were present on a Tallowood (*Eucalyptus microcorys*) near this same intersection. This area is located approximately 1.2km to the west of the wetland relevant to this report. These individuals are likely to be associated with the larger habitat areas at Coombabah lakes and Coomera 5km or more north of the site. The wetland and the larger vegetated areas near Olson Avenue where Koala sightings have been observed, are not recognised by DERM (pursuant to the *SEQ Koala Conservation State Planning Regulatory Provision 2010* mapping) as being within a Koala Assessable Development Area or as having any type of Koala Habitat Values.

Due to the presence of suitable food species in the Loders Creek wetland, and recorded and anecdotal reports of the species in the broader locality, koalas have the potential to move through the wetland however this is unlikely due to the presence of busy main roads and considerably modified urban areas. However considerable barriers are present which hinder the safe movement of Koala into and away from the wetland area including the presence of busy main roads (Smith Street motorway), large tracts of cleared and urbanised land, and an increase in the presence of dogs from residential areas.

Previous studies of the wetland area indicate that it supports breeding populations of two threatened frog species under the *Nature Conservation Act 1992*. The *Near Threatened* species Green-thighed frog (*Litoria brevipalmata*) and the *Vulnerable* species Wallum froglet (*Crinia tinnula*) have previously been known to utilise the area. The *Concept Design and Impact Management Plan Volume 7 Technical Report – Ecological Assessment* reports that two breeding ponds north of the depot supports the only known population of Green-thighed frog in the Gold Coast region, and also provides an important local habitat for the Wallum froglet. DERM's Essential Habitat records show these two locations as previous recordings of the Green-thighed frog. Other local studies recognise anecdotal evidence of the species' presence by a well-renowned amphibian expert (Dr. Jean-Marc Hero) who is associated with Griffith University campus near the site.

A targeted survey for the two threatened frog species was undertaken as part of the wetland assessment. The survey was undertaken over three nights during a two week period in February 2012. Two of these nights presented ideal conditions for detecting frogs (i.e. following periods of heavy rainfall). Call-broadcasting (whereby pre-recorded calls of the species were played in an attempt to illicit a response from the target frog species) was undertaken alongside the recognised breeding sites and at other locations nearby where the species had been previously recorded for use as a 'reference site'. Five common native frog species and one exotic toad were heard over the three nights, these were:

- Great brown broodfrog (*Pseudophryne major*);
- Copper-backed broodfrog (*Pseudophryne raveni*);
- Striped marsh frog (*Limnodynastes peronii*);
- Eastern sedge frog (*Litoria fallax*);
- Graceful tree-frog (*Litoria gracilentia*); and
- Cane toad (*Rhinella marina*).

No definitive calls were heard from the two targeted threatened species at either the breeding sites or the reference sites. The Wallum froglet and Green-thighed frog may either no longer be present in the area (including the nearby reference sites), or conditions were not suitable for these species to call. Green-thighed frog is known to call rarely and sporadically. They have a low rate of calling days each year which is dependent on both rainfall and pond levels¹. Considerable competition was present from the other common and exotic frog species using the ponds. Wallum froglet are rarely found in the same location as other related species (i.e. *Litoria fallax*) but this is known to occur in disturbed habitats, such as the site.

3.2 CORRIDOR VALUES

The wetland is surrounded to the north, east and south by cleared land, residential housing, main roads and the GCCC depot. The wetland and its associated patch of remnant vegetation provides a refuge for fauna which can withstand modified and urbanised areas including highly mobile fauna species such as birds, flying foxes, microbats, and fauna capable of using small culverts and underpasses (i.e. amphibians, reptiles). The patch of vegetation offers a tenuous linkage to other patches of retained vegetation in the broader landscape in an east-west and a north-south direction, but with considerable barriers to fauna movement intersecting these links (i.e. Smith Street, Wardoo Street) and significant areas of developed residential and industrial land.

¹Lemckert et al. The biology of the threatened Green-thighed frog *Litoria brevipalmata* (Anura Hylidae) in the central and mid-north coastal areas of New South Wales.

Nonetheless the remnant area associated with Loders Creek wetland is recognised to be of 'Regional Significance' (not 'State Significance') under the Biodiversity Planning Assessment Map and it is mapped as a 'Bushland Mosaic' by the *GCCC Nature Conservation Strategy*.

3.3 OVERALL ECOLOGICAL VALUE

With reference to the definition of a 'high ecological value' wetland, at the National level the wetland of concern to the north of the depot site is not listed as:

- a listed wetland under the Ramsar Convention on Wetlands; or
- a Directory of Important Wetlands in Australia.

At the state level, the wetland is not recognised as having high ecological value on any state Registers. On regulatory mapping it is recognised as:

- a 'Wetland Management Area' but not one of 'High Ecological Significance' pursuant to the *Sustainable Planning Regulation 2009's* Map of Referable Wetlands (refer Appendix B); and
- an 'area of high ecological significance' pursuant to the *Queensland Coastal Plan* map (refer Appendix B).

With reference to the Queensland Coastal Plan map, mapped areas incorporate both terrestrial and aquatic environments, and not only wetlands. The mapped area appears to be based upon regional ecosystem and regrowth mapping and has incorporated all remnant areas around the wetland, including the terrestrial areas classified as RE12.11.23. DERM has produced an accompanying information sheet to the Queensland Coastal Plan mapping (entitled "Queensland Coastal Plan – Nature Conservation") which acknowledges that some ecological values are difficult to map spatially in an accurate or effective manner, particularly for application at the property level. DERM specify that the policies requiring protection of AES do not apply if a field assessment demonstrates the mapping is incorrect and the development will not impact on any relevant ecologically significant areas (only basic site assessments are required under the Qld Coastal Plan to demonstrate values are not present where those values are readily identifiable).

Inspection of Loders Creek revealed that upstream and downstream conditions are highly modified, support minimal or no native fringing vegetation, and substantial weed infestations (particularly upstream). A small section of Loders Creek (from the end of Baratta Street to Wardoo Street) which has been the subject of rehabilitation works provides a more bio-diverse riparian ecosystem and offers a range of habitats and resources to native fauna. This section of Loders Creek also provides linkage to two breeding ponds with appropriate habitat to support two threatened frog species (refer **Figure 2**). The potential for the area to support these threatened species is the element of this wetland system which has the highest ecological value. However overall, given the disjunct corridor values of the associated remnant patch, the degraded conditions upstream and downstream, and the small area of wetland that is in a reasonable condition, the Loders Creek wetland is not considered to have 'high ecological value'.

3.4 DESIGN RESPONSES TO ECOLOGICAL VALUES

It is relevant to note that the two allotments of relevance to the depot incorporate only a portion of the wetland, and the depot is proposed to occur outside of wetland/riparian areas. Further, many other stakeholders contribute to the health and resilience of the wetland including GCCC, local and state roads, and numerous industrial sites and residential land which directly adjoin the upstream sections of Loders Creek.

Potential impacts caused by the depot will result from on-site activities which could have downstream impacts. The management options for the wetland are restricted to areas under the control of GoldlinQ noting that ultimately the wetland will be located outside of the area managed by GoldlinQ for the GCRT. Nonetheless, the design of the depot has incorporated measures and investigation recommendations to avoid and minimise impacts to the wetland, including those detailed below.

3.4.1 DEPOT DESIGN

The incorporation of sustainable development principles into the GCRT project is an overarching principle that includes whole-of-life costs, community acceptance, environmental impacts and the efficient use of resources. As such, the depot has been designed as an industrial building which integrates sustainability features including:

- the use of low-embodied energy materials;
- the use of renewable materials; and
- optimised passive design features including light, shading and natural air movement for ventilation.

The D&C Contractor has identified project attributes to assist designers in avoiding potential impacts by adapting their design. Examples include:

- Realigning the track into the GCRT depot to the southern boundary of the existing Gold Coast City Council (GCCC) Southport depot site. This reduces the grade, allows an increase in LRV speed at this location and reduces the impact of GCRT on the Loders Creek environment and residents in Baratta Street.
- The Depot and stations have also been designed to accept the expansion of service through future Stages of the GCRT Project, without the need for major construction re-work or re-design.

3.4.2 DEVELOPMENT FOOTPRINT

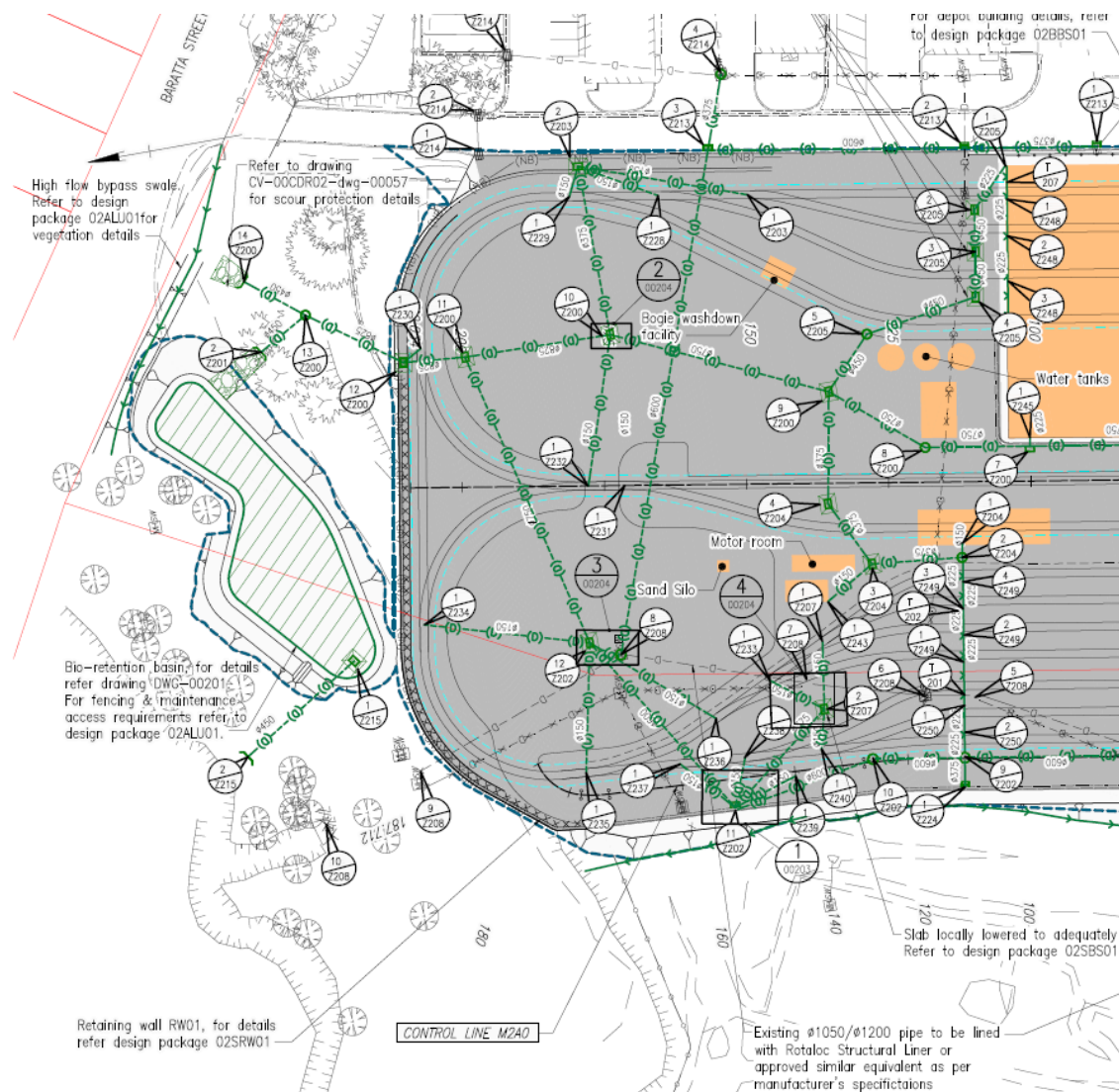
The GCRT depot facility is set back from Loders Creek, and a rehabilitated buffer will be established between the construction footprint and the riparian area. The footprint of the depot incorporates cleared areas, a former landfill and areas which support the existing GCCC depot. One of the original proposed footprints required clearance of a small area of *Endangered* remnant vegetation at the northern end of the depot for the purposes of constructing a stormwater bio-retention basin. The location and shape of the bio-retention basin was re-designed in order to enable the retention of mature Eucalypt trees around the basin.

3.4.3 STORMWATER TREATMENT

Due to the proximity of the wetland, a Bio-retention Basin has been designed to meet the following stormwater system design criteria. 'Music modelling' was undertaken to understand the requirements of the treatment train from the depot.

1. Reduce the peak 1.5 year ARI event discharge between pre & post development. This was modelled dynamically comparing pre & post development scenarios during 1 year & 2 year ARI events. The storage provided by the bio-retention basin was sufficient to attenuate flows during these events to not increase the peak discharge in the post development scenario.
2. Pollution Reduction Targets. Numerous iterations of bio-retention basin sizing were modelled and optimised, taking into considerations issues such as impacts to nearby trees, sewer manholes and maintenance access. Design resulted to pollution outputs for:
 - Total Suspended Solids;
 - Total Phosphorus;
 - Total Nitrogen; and
 - Gross Pollutants.

The Bio-retention basin is designed to capture any oil/hydrocarbons in the event of a spill (NB: an adequate maintenance response regime must be implemented to remedy the basin after a spill event).



Bio-retention basin and noise barrier design following iterations (taken from Arup Drawing No. GCRT-CV-02CDR01-DWG-00103 entitled Zone 02 – Rail Siding – Civil Drainage General Arrangement).

3.4.4 ACOUSTIC BARRIER

The impacts of noise from both construction and operation of the depot has resulted in the design and prioritised construction of a 4 – 5.5m high acoustic barrier between the depot and the wetland. The noise barrier height and design reflects recommendations from the *Concept Design Operational Noise & Vibration Assessment (March 2011)* and the *Baseline Noise Monitoring Report (Oct 2011)*. Further, lighting designers have provided comment at internal reviews and interdisciplinary design meetings and as a result, exterior lighting at the depot will be designed to avoid light pollution by preventing upward light projection.

3.4.5 REHABILITATION

An area of rehabilitation will be undertaken in the area within and upstream of the wetland and areas associated with the depot (as shown on **Figure 2**). A total area of 21.8ha will be rehabilitated which includes a 12.5ha area being managed by GCCC where rehabilitation works are to commence shortly. Varying levels of rehabilitation apply to the rehabilitation areas, ranging from assisted natural regeneration, revegetation to fabrication. Fabrication is required in highly modified areas such as the landfill and the areas lining the rail system which must achieve vegetation set-back requirements.

The rehabilitation will result in a significant and positive change to the area surrounding the depot and the Loders Creek wetland. It will result in a considerable increase in native vegetative cover and diversity in an area which currently supports cleared land, a former landfill and a weed-infested watercourse.

4 MANAGEMENT OBJECTIVES

The Loders Creek wetland is located to the north of the construction and eventual operational footprint of the GCRT. The management objectives for the wetland must therefore be focused on managing potential on-site impacts which could have an impact on downstream features. The wetland management objectives are as follows.

1. **To minimise the potential for negative impacts are caused to the wetland ecosystem by the construction and operation of the depot.**
2. **To improve the resilience of the wetland through the rehabilitation works undertaken as part of the GCRT project within and around the depot.**
3. **To monitor the health of the wetland and pro-actively respond to potential impacts caused by the depot, to ensure the on-going health of the wetland ecosystem.**
4. **To assist with the continued rehabilitation works within the wetland by providing information, access and other resources where practicable.**

These overall wetland-related objectives are reflected within the various management plans that have been prepared on behalf of GoldlinQ for the GCRT project. The relevant performance criteria that have been specified to ensure that the wetland management objectives will be achieved during construction and operational phases of the GCRT project are provided below along with details of the report they originate from.

GoldlinQ Environmental Management Plan (CEMP) GCRT-DC-PLA-00017

- *Achieve audit score of >90% and achieve no major non-compliances;*
- *No prosecutions, breaches or fines or notices;*
- *No serious environmental incidents;*
- *20 minor environmental incidents and zero repeat minor environmental incidents, where incident should have been prevented through planning (ie does not include hydrocarbon spills from plant/machinery);*
- *Corrective actions derived from Incident investigations closed out within 2 week of falling due;*
- *< 5 exceedences per month against noise limits;*
- *< 5 exceedences per month against vibration limits;*
- *< 20 exceedences per year against water limits;*
- *< 10 exceedences per year against air limits;*
- *100% compliance with Cultural Heritage Management Plan;*
- *No illegal handling of wastes;*
- *100% compliance with fauna and flora approval conditions.*

Environmental Protection Instruction: Soil Erosion Sedimentation & Surface Run-off (Doc. L025-001-2367)

- *Minimise impacts to surface water bodies and drainage channels.*
- *Minimise the potential for erosion of the site and migration of sedimentation to adjoining properties, waterways, drains and water logged areas.*

- *Reduce the occurrence and extent of soil erosion during construction activities.*
- *Minimise the extent (spatially and temporally) of disturbed land areas during construction.*
- *Manage stripped topsoil in order to minimise erosion potential and maximise reuse opportunities.*
- *Progressively stabilise and revegetate disturbed areas.*
- *Manage erosion and sediment in accordance with the Urban Stormwater Quality Planning Guidelines (2010) and Best Practice Erosion and Sediment Control (IECA, 2008).*

Environmental Protection Instruction: Disturbance to Terrestrial Flora and Fauna (Doc. L025-002-2367)

- *Minimise the impact on local flora and fauna, particularly any endangered or protected species, by construction operations.*
- *Minimise the clearing of native vegetation and habitat for native fauna.*
- *Minimise the impact on riparian ecosystems and water quality.*

Environmental Protection Instruction: Disturbance to Aquatic Flora & Fauna (Doc. L025-003-2367)

- *Minimise the effect on aquatic flora and fauna by construction activities.*
- *Minimise the impact on riparian ecosystems.*
- *Minimise the impact on water quality through effective sediment and erosion control and acid sulphate soil management.*

Environmental Protection Instruction: Presence of Infectious Plant, Disease, Weeds and Pests (Doc. L025-012-2367)

- *Prevent and minimise the introduction and dispersal of weeds into the marine environment.*
- *Prevent and minimise harm to all aquatic fauna species.*
- *Minimise the introduction and spread of weeds and pests.*
- *Minimise the introduction of diseased and/or infectious plants into the area and the endangered regional ecosystem in particular.*
- *Manage infestation of noxious weed species on construction sites.*

Environmental Protection Instruction: Species Management Program for Wallum froglet (Crinia tinnula) and Green-thighed frog (Litoria brevipalmata) (Doc. L025-022-2367)

- *Assist the construction team to minimise impacts to the frogs in the Loders Creek Area.*
- *Provide the Stakeholder Management Team with a well considered plan, which will allow the community and relevant stakeholders to be effectively consulted.*

GCCC's rehabilitation tender specifications for the 16.5ha area upstream and immediately to the north of the depot (i.e. *Southport Reserve (Loders Creek) Restoration Project* and the *Southport Reserve Revegetation Project*) aim to achieve the following objectives respectively.

- *To protect and enhance biodiversity through the restoration of Loder's Creek. An improvement to the structure, function and integrity of vegetation will improve habitat, connectivity and water quality.*

- *To protect and enhance biodiversity through the revegetation and stabilisation of the cleared areas (marked on the map). The revegetation is also aimed to link two remnants thus providing the ability of flora and fauna to move more easily throughout the local area.*

5 WETLAND MANAGEMENT

The wetland management objectives have been integrated into the design of the depot, and will continue to be achieved through the construction and operation of the depot. Risks and threats to the conservation of the wetland which may result from the depot's construction and operation have been identified in **Table 1: Design and Construction(D&C)** and **Table 2: Operation and Management (O&M)** below. This WMP is a living document which will be reviewed annually (refer Section 5.1 herein), as conditions change or new risks arise they will be added to Tables 1 and 2 herein, and associated management actions nominated to mitigate each risk.

NB: Sections 5.1 and 5.2 after the Tables provide a commitment of resources by GoldlinQ to undertake the necessary management actions, and details on monitoring and reporting required.

Table 1: Risks, Threats and Management Actions during Depot Design and Construction (D&C)

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
<p>Depot Design</p> <p>Inappropriate design of the depot results in intrusion into, and/or impact upon the wetland system.</p>	<ul style="list-style-type: none"> ■ Consideration and incorporation of design recommendations nominated in the Ecological Assessment undertaken by GHD (<i>Concept Design and Impact Management Plan Volume 7 Technical Report – Ecological Assessment</i>) including aligning works within cleared areas, minimising clearance widths and protection of the wetland. ■ Commissioning requisite specialist studies and investigations (i.e. contaminated land, noise, ecological surveys etc) and incorporating recommendations into the depot design (refer Section 3.4). The depot has been deliberately designed in a manner which is responsive to the values of the adjacent waterway and associated remnant vegetation patch by: <ul style="list-style-type: none"> ○ locating the works area outside of the nearby waterway and wetland; ○ confining the depot within an already developed area; ○ designing a high standard stormwater treatment system which avoids removal of remnant vegetation associated with the waterway; ○ incorporating a noise barrier between the wetland and depot to minimise potential impacts; and ○ incorporating extensive rehabilitation in areas surrounding the depot. 	<p>GoldlinQ have been responsible for considering and incorporating design recommendations of the <i>Concept Design and Impact Management Plan Volume 7 Technical Report – Ecological Assessment</i> and specialist investigations.</p> <p>Design drawings for the depot reflect ecological values of the wetland.</p> <p>NB: These design actions are complete with conclusion and approval of depot design.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
Depot Construction		
<p>Intentional / unintentional mismanagement of the wetland during construction phase. Resulting impacts could include:</p> <ul style="list-style-type: none"> ▪ bank destabilisation and sedimentation of the watercourse; ▪ contamination from chemical or fuel spills and wastewater disposal; ▪ reduction in groundwater volumes and levels from dewatering of excavations; ▪ pollution of groundwater through leachate migration or seepage; and ▪ impact on aquatic habitat areas and wetlands from increased turbidity and nutrient levels from runoff. 	<p>GoldlinQ have incorporated the construction recommendations of the <i>Concept Design and Impact Management Plan Volume 7 Technical Report – Ecological Assessment</i> and producing the GCRT CEMP and an accompanying series of Environmental Protection Instructions specifically for construction of the depot.</p> <p>Control measures for erosion and sediment via adherence to an Erosion and Sediment Control Plan which includes specifications for timing of works, runoff control structures, clean stormwater diversion, appropriate stockpile location and bunding, and rapid re-stabilisation of exposed areas. Listed below are some of the specific controls nominated in the <i>Environmental Protection Instruction: Soil Erosion Sedimentation & Surface Run-off (Doc. L025-001-2367)</i>.</p> <ul style="list-style-type: none"> ▪ Prevent sediment laden run-off entering adjoining areas, watercourses, drains and dams. ▪ Plan works to minimise time between clearing and construction activities. 	<p><i>Concept Design and Impact Management Plan Volume 7 Technical Report – Ecological Assessment</i></p> <p>GoldlinQ have prepared a CEMP and an accompanying series of Environmental Protection Instructions (refer below)</p> <p>Approved construction documents to be followed by GoldlinQ throughout construction phase.</p> <p><i>Environmental Protection Instruction: Soil Erosion Sedimentation & Surface Run-off (Doc. L025-001-2367)</i></p> <p>Approved EPI to be followed by GoldlinQ throughout construction phase.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<ul style="list-style-type: none"> ▪ Minimise disturbance to riparian areas (i.e. vegetated areas along waterways). No-go areas to be clearly identified and communicated to clearing contractors and plant operators to avoid incidental damage. ▪ Where possible avoid exposing large areas during the wet season. ▪ Revegetate exposed areas as soon as practicable. ▪ Maintain all physical site control measures for the full period of construction and until landscaping and rehabilitation is in place and established sufficiently to provide a stable land surface. ▪ Conduct water quality monitoring within Loders Creek upstream and downstream of the depot site at regular intervals nominated in the CEMP and which includes field and laboratory tested parameters such as salinity, pH, nitrogen, ammonia and more. ▪ Baseline monitoring will occur monthly for 6 months prior to construction including two-event based events during significant rainfall events of >25mm in 24hrs. Monitoring will occur fortnightly during construction activities with the potential to impact waterways, and monthly for 3 months post construction to assess the effectiveness of rehabilitation. ▪ Undertaking groundwater quality monitoring of boreholes to ensure compliance with site-specific groundwater quality objectives. ▪ Construction of all stormwater collection (i.e. trenches, piping) and treatment measures (i.e. bio-retention basin) must be in accordance with the requirements of the <i>Stormwater Management Plan and design specifications</i>. Stormwater discharge which does not comply with the 	

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<p>water quality release criteria nominated in the stormwater plan shall be prevented from being discharged offsite and further erosion and sediment control measures implemented.</p> <ul style="list-style-type: none"> Clearing and/or earthwork activities will be planned to be carried out only during dry weather conditions and during periods of low flow creek conditions, and completed and stabilised as quickly as possible. 	
	<p>Protection of terrestrial flora and fauna through adherence to construction phase environmental management instructions (i.e. <i>Environmental Protection Instruction: Disturbance to Terrestrial Flora and Fauna (Doc. L025-002-2367)</i> which includes the following.</p> <ul style="list-style-type: none"> Protection measures for native vegetation outside the works area using exclusion fencing and in accordance with <i>AS 4970-2009 for Protection of trees in development sites</i>. Engaging a licensed fauna spotter during clearing activities and detailed survey for fauna habitats prior to clearance. Undertaking clearance works during dry weather and using sequential and directional felling. Filling of excavated areas each day (where possible) to prevent trapping fauna. Where this is not possible, daily inspection will take place to remove trapped fauna. Directing lighting away from the wetland areas and vegetated areas. Compliance monitoring including daily site inspections by Site Supervisor or Environmental Advisor, spotter-catcher survey, and 	<p><i>Environmental Protection Instruction: Disturbance to Terrestrial Flora and Fauna (Doc. L025-002-2367)</i></p> <p>Approved EPI to be followed by GoldlinQ throughout construction phase.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<p>weekly inspection by an Environment team member.</p> <ul style="list-style-type: none"> Compliance with all environmental approval conditions. <p>Protection of aquatic flora and fauna through adherence to construction phase environmental management instructions (i.e. <i>Environmental Protection Instruction: Disturbance to Aquatic Flora and Fauna</i> (Doc. L025-003-2367) which includes the following.</p> <ul style="list-style-type: none"> Prevent the spillage of fuels, oils, and other hazardous substances by adhering to EPI's for <i>Storage, Maintenance and refueling of Machinery</i> (L025-007-2367) and <i>Storage & Handling of Hazardous Substances</i> (L025-008-2367). Clearly demarcate protected aquatic habitats outside of the works area using exclusion fencing, present these protected areas on all related plans, and ensure work personnel are aware of the protected areas. Avoid the spread of pests and disease through adherence to <i>Environmental Protection Instruction: Presence of Infectious Plant, Disease, Weeds and Pests</i> (Doc. L025-012-2367) and <i>Environmental Protection Instruction: Species Management Program for Wallum froglet (Crinia tinnula) and Green-thighed frog (Litoria brevipalmata)</i> (Doc. L025-022-2367). Regular compliance monitoring of works by Site Supervisor (daily) and Environmental Advisor (at least weekly). Compliance with all environmental approval conditions. 	<p><i>Environmental Protection Instruction: Disturbance to Aquatic Flora & Fauna</i> (Doc. L025-003-2367)</p> <p><i>Environmental Protection Instruction: Presence of Infectious Plant, Disease, Weeds and Pests</i> (Doc. L025-012-2367)</p> <p><i>Environmental Protection Instruction: Species Management Program for Wallum froglet (Crinia tinnula) and Green-thighed frog (Litoria brevipalmata)</i> (Doc. L025-022-2367)</p> <p><i>Storage, Maintenance and refueling of Machinery</i> (L025-007-2367) and <i>Storage & Handling of Hazardous Substances</i></p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
		<p>(L025-008-2367).</p> <p>Approved EPI to be followed by GoldlinQ throughout construction phase.</p>
	<p>Protection of the wetland from introduction of weeds, pests and disease through adherence to the relevant construction phase environmental management instruction (i.e. <i>Environmental Protection Instruction: Presence of Infectious Plant, Disease, Weeds and Pests</i> (Doc. L025-012-2367) which includes the following measures.</p> <ul style="list-style-type: none"> ▪ Ensuring Weed Hygiene Declaration Forms are received for new plant working on site. ▪ Instigating inspections of vehicles, plant and equipment for weed material, washing down vehicles where necessary. ▪ Lawful disposal of weed material at waste disposal facilities, and avoiding stockpiling weed-infested material. ▪ Ensuring plant and material sourced from within a Fire Ant Restricted Area is inspected and declared free of Fire Ants by DEEDI. ▪ Ensuring the crib facilities are kept clean to deter vermin, and undertaking pest control annually. ▪ Sourcing plants for revegetation from nurseries with disease management plans in sourcing from nurseries that have DEEDI 	<p><i>Environmental Protection Instruction: Presence of Infectious Plant, Disease, Weeds and Pests</i> (Doc. L025-012-2367)</p> <p>Approved EPI to be followed by GoldlinQ throughout construction phase.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<p>approved management plans and certificates if outbreaks such as Myrtle rust have occurred.</p> <ul style="list-style-type: none"> ▪ Cleaning and disinfection (using benzalkonium chloride) of all boots, tyres and tracks of all plant and equipment working in or near frog habitat. 	
	<ul style="list-style-type: none"> ▪ Development and adherence to a Rehabilitation Plan for improving the health and increasing the cover of native vegetation in the areas surrounding the depot, viaduct and wetland. Rehabilitate cleared area with appropriate native species. 	<p><i>GCRT Landscape Design Cardno SPLAT (2012) and the GCRT Rehabilitation Management Plan.</i></p> <p>Approved Rehabilitation Plan to be followed by GoldlinQ throughout construction phase.</p>
<p>Accidental release of contaminants caused by site excavation and construction works in general.</p>	<p>Designing the layout of the depot buildings and stabling areas to avoid major excavation of the landfill site. The D&C Contractor's design achieves safety and environmental benefits through the use of piling and concrete slab, which will minimise exposure to landfill matter and reduce truck movements from disposal.</p> <p><u>Contaminated Land</u> GoldlinQ have identified in the CEMP that disturbance and exposure of contaminated soils, including asbestos and radioactive material at the landfill or depot site is a potential environmental impact. A contaminated</p>	<p><i>Environmental Protection Instruction: Soil Erosion Sedimentation & Surface Run-off (Doc. L025-001-2367)</i></p> <p>Approved EPI to be followed by GoldlinQ throughout construction phase.</p> <p>Contaminated land</p>

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Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<p>specifications for the stormwater system and Bio-retention basin must be adhered to including the incorporation of an adequate maintenance response regime for the Bio-retention basin following normal operating processes and abnormal spill events.</p> <p>As specified in the <i>Environmental Protection Instruction: Soil Erosion Sedimentation & Surface Run-off (Doc. L025-001-2367)</i>:</p> <ul style="list-style-type: none"> capture all construction site runoff using erosion/sediment control structures, and treat prior to release; water from dewatering activities is to be tested and treated prior to discharge to ensure the quality of receiving waters does not deteriorate. Install contaminated stormwater treatment devices such as scour protection at stormwater outlets (in accordance with relevant standards) to remove pollutants prior to discharge into Loders Creek. Avoid dewatering at sites of ASS or PASS. If it is required for more than 24 hours, the excavation will be isolated with sheet piles or similar. Where de-watering is required appropriate monitoring and treatment of ASS or PASS groundwater will be undertaken. A construction EPI has been developed by GoldlinQ for ASS/PASS management and control. 	<p>and management recommendations to be implemented by GoldlinQ during construction and operation.</p> <p>Approved EPI requirements to be followed by GoldlinQ throughout construction phase.</p>
<p>Noise and light generated from the construction and operation of the depot could affect fauna utilising the wetland.</p>	<ul style="list-style-type: none"> A rail siding noise barrier will be constructed along the northern boundary of the depot. The noise barrier height and design reflects recommendations from the <i>Concept Design Operational Noise & Vibration Assessment (March 2011)</i> and the <i>Baseline Noise Monitoring Report (Oct 2011)</i>. 	<p>GoldlinQ to construct a rail siding noise barrier in accordance with the construction drawings Zone 02 – Rail Siding Noise Barrier.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<ul style="list-style-type: none"> ▪ The barrier will be one of the first structures to be established after vegetation removal is complete. The barrier will extend 4-5.5m above ground and reduce the impact of construction and operational noises from the depot to the wetland (and neighbouring properties). ▪ Design of depot lighting to avoid upward light projection and potential light pollution as per advice from lighting designers at internal reviews and interdisciplinary design meetings. 	<p>GoldlinQ to implement lighting recommendations to avoid light pollution.</p>
<p>Inappropriate management of environmental emergencies including fire, flood, major rainfall events, spills etc.</p>	<p>As detailed in Section 5.1.4.2 of the CEMP, a preliminary environmental risk assessment for the GCRT has been completed and a preliminary Environmental Risk Register has been developed to identify the key risks associated with GCRT project activities. The register also details appropriate prevention and mitigation measures to be implemented. Example environmental incidents include fire, flood or major rainfall event, large fuel or chemical spill, noise or vibration that exceeds approval criteria, unearthing of unknown historical heritage, major fish kill, and major service damage (water, sewer pipe failure). GoldlinQ's approach and response to environmental incidents is through:</p> <ul style="list-style-type: none"> ▪ Mandatory environmental and incident management site induction and awareness training. ▪ Actively promoting and reinforcing GoldlinQ's Zero Harm safety and environmental culture through toolbox talks, demonstrations and flow charts for action. ▪ Encouraging participation of staff and contractors in identifying and reporting hazards, incidents and near-misses, as well as providing suggestions for reducing potential for incidents. ▪ Ensuring incidents are fully investigated and opportunities for 	<p>CEMP (Section 5.1.4.2)</p> <p>GoldlinQ to adhere to the CEMP specifications for management of environmental incidents.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<p>improvements to our work practice and response procedures are identified and implemented.</p> <ul style="list-style-type: none"> ▪ Maintaining records of incidents and actions and ensuring information is provided to the Project Director and relevant authorities. ▪ Implementing corrective actions and any further preventative actions deemed necessary. 	
<p>Inappropriate storage and handling of hazardous substances results in releases downstream.</p>	<p>The CEMP (Section 3.5.10) provides the management measures to appropriately store and handle hazardous substances, including the following.</p> <ul style="list-style-type: none"> ▪ A dangerous goods and hazardous materials register will be maintained at all construction compounds, together with material safety data sheets. This information will be accessible to all site personnel. The register will be included in the final CEMP. ▪ Dangerous goods storage areas will be clearly signposted and secured from unauthorised access. Fuels and chemicals will be stored in sealed containers in a bunded area. Design of fuel storage areas will comply with relevant Standards. ▪ Waste generated from the clean-up of spills must be safely disposed of to an appropriately licensed facility. ▪ Should it become necessary to store large quantities of a dangerous goods, emergency services and adjacent land users will be notified in accordance with a site Emergency Response Plan. ▪ In the event of a major accident, relevant government agencies and local emergency services will be notified immediately. ▪ Spill response and containment equipment will be present at all construction compounds and site personnel will be trained in the use of this equipment. 	<p>CEMP (Section 3.5.10)</p> <p>GoldlinQ to adhere to the CEMP specifications for management of hazardous substances.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
<p>Inappropriately experienced personnel are placed in charge of managing the WMP.</p>	<p>The Project Environment Management Team structure for D&C includes the following full-time, Gold Coast-based personnel:</p> <ul style="list-style-type: none"> ▪ An Environment and Sustainability Manager; ▪ A Senior Environmental Officer; ▪ An Environmental Advisor; and ▪ A Graduate Advisor. <p>Section 3.2 of the CEMP details a comprehensive environmental management framework for the project that includes the establishment of an experienced Environmental Management Team supported by an Environment and Sustainability Integration Team (ESIT), a high-level group with extensive practical experience. The ESIT will be made up of senior environment and sustainability professionals, the State and other relevant stakeholders. The group will provide sustainability guidance and challenge the environment team on the implementation of environmental best practice throughout the Project.</p>	<p>CEMP (Section 3.2)</p> <p>GoldlinQ to adhere to the established environmental management framework nominated in the CEMP.</p>

Table 2: Risks, Threats and Management Actions during Depot Operation and Management (O&M)

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
<p>Change in management and procedures from construction to operational phases resulting in impacts to wetland.</p>	<p>Consistency is provided between the construction and operational phases of the depot via the appointment of GoldlinQ to design, build, operate and maintain the system.</p> <p>It is crucial that transition from Design and Construction (D&C) phase, to Operation and Management (O&M) phase is seamless to ensure continuity of all aspects of the Environmental Management System and delivery frameworks and this is recognised and addressed in the CEMP (Section 5.1.7).</p> <p>Undertaking a comprehensive handover of environmental issues and management measures to the O&M Safety, Quality and Environment (SQE) Director to ensure continuity of environmental management. The comprehensive handover of environmental management will be the responsibility of the Environment and Sustainability Management team. It is anticipated that the Senior Environment Officer from D&C will be on hand during testing and commissioning stages and at the start-up of operations to assist with implementation of environmental management objectives and to facilitate the establishment of the O&M EMS, in collaboration with the Safety, Quality and Environment Director. By retaining key construction environment management staff after the completion of works and into the testing and transition stages of GCRT project, it will ensure a smooth handover to the operations team and continued effective management of environmental issues throughout the life of the GCRT project.</p>	<p>CEMP (Section 5.1.7)</p> <p>GoldlinQ to ensure a comprehensive handover to O&M is undertaken, and wetland management measures are adequately incorporated as detailed in Section 5.1.7 of CEMP.</p>

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
	<p>The Project Environmental Management Handover Summary Report will include, as a minimum, the following information and supporting documents.</p> <ul style="list-style-type: none"> ▪ Copies of all environmental approvals and conditions; ▪ Brief overviews of environmental issues and details of mitigation works completed; ▪ Status of all ongoing rehabilitation works and the timing for completion; ▪ Non-conformances raised, the number of internal or external audits conducted and any corrective or remedial actions taken; ▪ Site inspection checklists and reports; ▪ Complaints reports related to environmental issues; ▪ Meeting records with government agencies and GCCC; ▪ Incident Reports; ▪ Hazard and emergency reports; ▪ Internal and external audit reports. <p>Following acceptance of all documentation by the O&M SQE Director, a handover meeting will be held with senior members of the O&M teams to ensure a smooth transition from construction activities to operations activities.</p> <p>The OEMP will take effect from the commencement of operational service and will be the responsibility of the SQE Director. Further details on the transition period of the Project are described in the Mobilisation Plan.</p>	
Degradation of wetland system from lack of ongoing maintenance and involvement	The wetland will be located outside of the area of control of GoldlinQ and many upstream users also impact upon the wetland values. As one of the wetlands' stakeholders GoldlinQ is contributing to the health of the system	GoldlinQ to assist in the rehabilitation of the wetlands where

Risks and Threats to Wetland	Management Actions (and associated assumptions)	Resources for Implementation
from stakeholders.	<p>through extensive rehabilitation works in highly degraded areas. These works will extend into the operational phase of the GCRT.</p> <p>GoldlinQ will contribute to the ongoing improvement of the wetland by working collaboratively with GCCC and other interested parties to assist in the rehabilitation of the wetlands. This may include the provision of information, access and assisting where practicable in the rehabilitation efforts of the wetland north of the depot.</p>	practicable.

5.1 RESOURCES FOR IMPLEMENTATION

GoldLinQ, the Consortium commissioned to design, build, operate and maintain the GCRT system on the Gold Coast, will be the responsible entity for implementing the management actions required to manage the wetland. GoldLinQ will discharge these responsibilities to the Consortium members McConnell Dowell Constructors (Aust) Pty Ltd, Bombardier Transportation Australia Pty Ltd and KDR Gold Coast Pty Ltd for the various components of the projects design, construction, operation and management.

GoldlinQ Consortium commit to the objectives and management actions nominated herein for the life of this WMP and demonstrate this commitment by dedicating the following management and financial resources.

5.1.1 Management Resources

As demonstrated in Tables 1 and 2 there are a number of actions which GoldlinQ have already undertaken in order to design the maintenance depot in a manner sensitive to the wetland.

Tables 1 and 2 demonstrate the resources dedicated to date in order to developing reports and plans associated with managing potential environmental impacts to the wetland. Tables 1 and 2 also demonstrate that GoldlinQ are committed to adhering to the management plan requirements during both the construction and the operation of the depot.

From here, the requirements of this WMP will be implemented through dedication of the following ongoing management resources.

1. The WMP will be encompassed within the suite of environmental control documents managed by the Environment and Sustainability Management team during D&C and the succeeding O&M environment team.
2. Suitably qualified staff member/s within the Environment and Sustainability Management Team will be nominated to implement the requirements of the WMP and review the WMP on a regular basis as specified in Section 5.2.
3. The requirements of the WMP will form part of the detailed handover from the construction to operational phases of the depot. During this handover the responsibility of implementing the WMP will also be incorporated into the roles of similarly qualified environmental staff members.
4. GoldlinQ commit to the ongoing improvement of the wetland by working collaboratively with GCCC, stakeholders and other interested parties to assist in the rehabilitation of the wetlands. This may include the provision of information, access and assisting where practicable in the rehabilitation efforts of the wetland north of the depot.

5.1.2 Financial Resources

Significant expenditure has occurred to date by GoldlinQ in order to survey and assess the wetland values, and to prepare existing plans, management reports and approval applications and construction management documents. Owing to the incorporation of environmental impact management into the general operations of the GCRT project, expenditure relating to management of the wetland will continue as part of GoldlinQ's established operations. As an example, and with Reference to Table 1, a measure of the construction EPI for *Soil Erosion Sedimentation & Surface Run-off* (Doc. L025-001-2367) is to "conduct water quality monitoring within Loders Creek upstream and downstream of the depot site at regular intervals nominated in the CEMP". This task, as with the majority listed on Tables 1 and 2 (such as establishing erosion control measures, maintenance tasks for the stormwater retention basin, adequate environmental handover to O&M etc) will be overseen by the environmental staff nominated on the project under the management framework described in the CEMP. Similarly, the financial costs of established operational procedures such as these have been designed into the cost of the project.

An indication of future costs to continue to manage the wetland (outside of general operational procedures already incorporated into the cost of the project as described above) is provided below in the form of an indicative fee proposal based on environmental consultancy fees. Indicative scope and fees are provided below.

The indicative fees include the costs to:

- monitor the wetland condition on a quarterly basis;
- provide third party audit the implementation of the various management requirements; and
- provide annual reporting for the life of the WMP.

Table 3: Indicative Cost associated with monitoring, auditing and annual reporting of the wetland

Task	Approximate Time Requirement	Indicative Fee
Quarterly on-site assessment of wetland by an experienced Ecologist (or similar)	4 days / year Travel and disbursements	\$5,600
Audit of management plan implementation (including: liaison with environmental teams charged with construction / operation phases, compilation of various monitoring results (i.e. water, contaminated land, rehabilitation etc) review of nominated performance requirements and assessment of achievement or otherwise). Issue of results report to GoldlinQ	4 days / year	\$4,800

Task	Approximate Time Requirement	Indicative Fee
Annual review of the WMP, compilation of audit results and the on-site monitoring results, and preparation of an Annual Report (detailed in 5.2 below).	5 days / year	\$6,000
Indicative Cost/ annum (for monitoring, audit and annual reporting of wetland management results)		\$16,400/annum
Cost over life of WMP (i.e. 5 years)		\$82,000

The fees provided indicate the likely financial commitment which GoldlinQ will meet in order to regularly monitor, audit and report upon the wetland system. As discussed, the many general operational procedures relating to wetland management which have already been incorporated into the cost of the project would be incurred in addition to the above stated fees.

5.2 MONITORING, REPORTING AND DOCUMENT CONTROL

The operational timeframe of this WMP is five (5) years. The WMP is a living document and must be reviewed at least annually during its lifetime by a suitably qualified and experienced environmental officer, or whenever an environmental issue arises which may impact upon the wetland ecosystem.

An adaptive management approach is to be employed in respect of the works forming part of this WMP. An adaptive management approach involves an integrated process of monitoring and reviewing to identify any alterations to the construction and operation of the depot that may be required to ensure the objectives of the WMP are achieved. The specific purpose of adaptive management is to facilitate modification/adaptation of work practices and management strategies specified herein to enable the achievement of the overall objectives of the plan including any associated approval conditions issued by the various regulators.

5.2.1 Monitoring

Section 4.1 of the CEMP provides monitoring framework for the project and the Environmental Protection Instructions provide specific monitoring actions for aquatic and terrestrial habitats. The CEMP also details water monitoring procedures to detect changes to water quality in the wetland. The established monitoring programs range from those involving formal sample collection, analysis and measurement to those involving a more qualitative assessment, such as visual observations. During D&C, the following monitoring programs will be undertaken (as a minimum):

- noise and vibration monitoring;
- surface and groundwater quality monitoring;
- contaminated land monitoring; and
- site rehabilitation and ecology monitoring.

As part of the wetland management measures an additional assessment of the wetland system will be undertaken on a quarterly basis. This assessment is deemed necessary to ensure that the other management controls are working effectively as anticipated and not impacting on the wetland health. This will involve a detailed quantitative and qualitative assessment of wetland's health including assessment of any changes to native and exotic flora and fauna, photographic monitoring of the ecosystem from a number of established photo points and an amphibian survey undertaken over 1 evening each quarter to track for the presence or absence of frogs, and particularly the threatened species discussed herein. The results of this monitoring are reported upon in a quarterly Technical Memorandum and summarised in the Annual Report (refer below).

5.2.2 Document Control and Reporting

As per Section 4.1.2 of the CEMP, internal system audits (as it relates to environmental elements) will be completed by the D&C Environment Team on a quarterly basis. The WMP will be incorporated into the suite of environmental management documents related to the project will become a component of the quarterly internal audit.

The Annual Report, prepared specifically for the wetland, will provide a summary of:

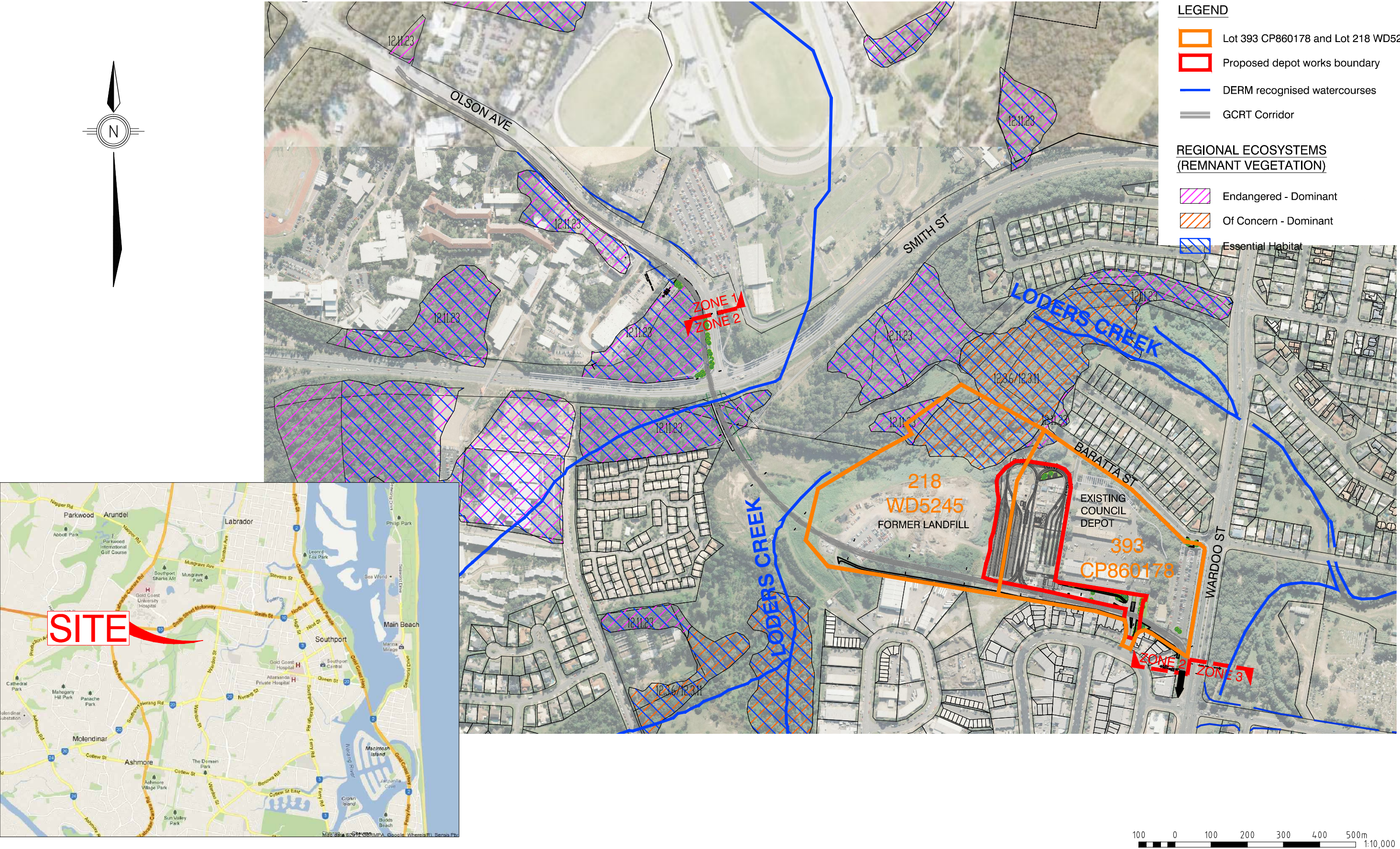
1. the construction or operational activities undertaken at the depot site in the preceding 12 months;
2. the rehabilitation works carried out in the preceding 12 month period within and around the depot;
3. the results of monitoring activities undertaken at the wetland including:
 - surface and groundwater quality monitoring (in accordance with the CEMP);
 - contaminated land monitoring (as per CEMP);
 - stormwater and Bio-retention basin monitoring (as per CEMP);
 - the monitoring results of rehabilitation works against relevant performance indicators nominated in the Rehabilitation Management Plan; and
 - quarterly monitoring specific to the wetland (refer 5.2.1).
4. the nature of any corrective actions or adaptive management measures that have been taken, or which are proposed; and
5. an outline of rehabilitation works and activities planned for the following 12 month period.

Upon reaching the fifth year, the final report will confirm whether all the specified construction, rehabilitation and ongoing monitoring works have been carried out and relevant performance criteria have been achieved.

FIGURES

Figure 1 **Locality Plan**

Figure 2 **Loders Creek, Wetland and the Depot**



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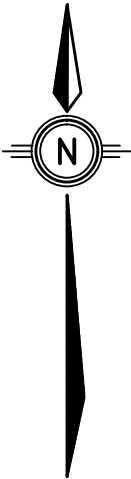
Rev: 0 | Drawn: J.M | Checked: K.S | Date: 28/02/2012

GoldlinQ








CAD FILE: I:\7508-01_GCRT\Acad\Wetland management plan\Figure 1 - Locality plan.dwg
XREFS: DCDB; X-00-C-DSHT-Zone_dividers; X-00-C-SCAD-North; X-02-R-DRAI-Alignment; X-02-R-DRAI-CL_S02RCL; X-00-C-SROA-Road Names 500; X-02-C-DROA-12D; XCA00 DWG SUB-PRECINCTS; X-C-SCAD-North and South; X-02-R-DRAI-CL_N02RCL; GCRT-CV-02B501-SKT-0001[G]Site Plan; X-01-R-DRAI-Alignment; X-02-R-DRAI-Depot_Alignment; redata; XCA02_Rail Siding_ARIEL

Project No.: 7508/01





PRINT DATE: 07 March, 2012 - 11:43am



LEGEND

-  Lot 393 CP860178 and Lot 218 WD5245
-  Proposed depot works boundary
-  Wetland areas associated with Loders creek (approximate location)
-  DERM Recognised breeding ponds for Green-thighed frog (*Litoria brevipalmata*)
-  DERM recognised watercourses
-  Approximate location of Loders creek main channel
-  GCRT Corridor

REHABILITATION AREAS

-  Assisted natural regeneration
-  Revegetation
-  Fabrication
-  GCCC rehabilitation areas

30 0 30 60 90 120 150m 1:3000

Scale 1:3,000 (A3)

FIGURE 2

WETLAND, LODERS CREEK AND DEPOT

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Rev: 0 | Drawn: J.M | Checked: K.S | Date: 13/03/2012

GoldlinQ
CAD FILE: I:\7508-01_GCRT\Acad\Wetland management plan\Figure 2 - Wetland values and depot.dwg
XREFs: DCDB; X-00-C-DSHT-Zone_dividers; X-00-C-SCAD-North; X-02-R-DRAI-Alignment; X-02-R-DRAI-CL_S02RCL; X-00-C-SROA-Road Names 500; X-02-C-DROA-12D; XCA00 DWG SUB-PRECINCTS; X-C-SCAD-North and South; X-02-R-DRAI-CL_N02RCL; GCRT-CV-02B501-SKT-0001[G]Site Plan; X-01-C-DROA-CAD; X-01-R-DRAI-Alignment; X-02-R-DRAI-Depot_Alignment

Project No.: 7508/01

PRINT DATE: 13 March, 2012 - 4:34pm

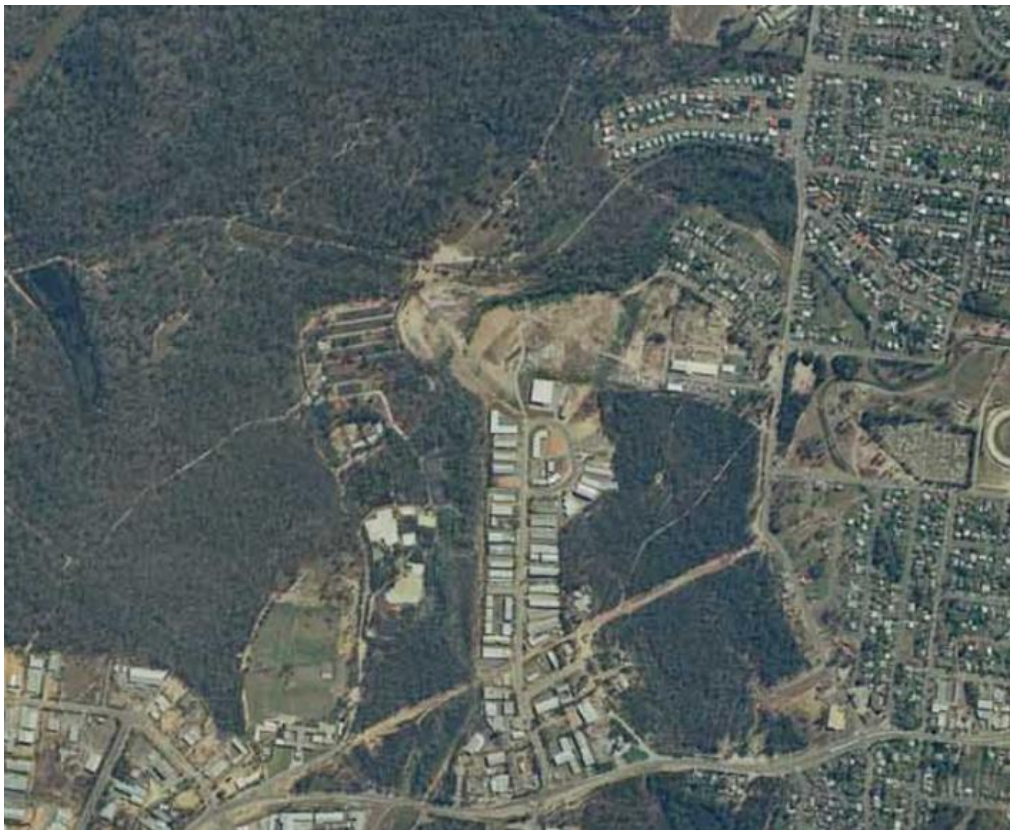
APPENDIX A – HISTORICAL AERIAL PHOTOGRAPHY



1965



1978



1983



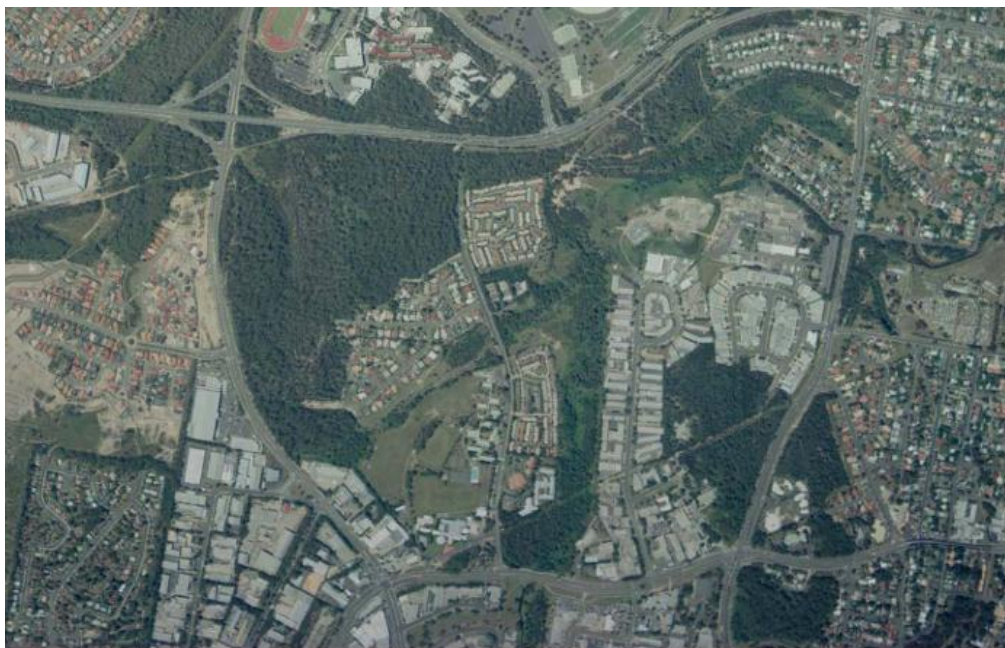
1987



1990



1993



2002

APPENDIX B – WETLANDS MAPPING



Map of Referable Wetlands Wetland Protection Areas

Requested By: KAREN.STEELE@CARDNO.COM.AU
Date: 01 Mar 12 Time: 10:55:50

Centered on Lot on Plan:
218 WD5245



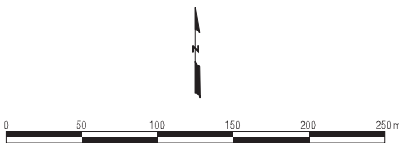
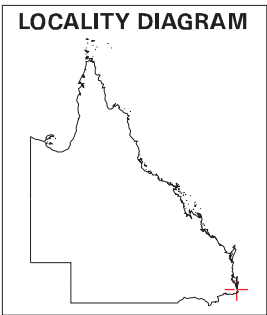
Queensland
Government

Legend

- Selected Land Parcel
- Property Boundary

Wetland Protection Areas

- HES Wetland
- Trigger Area



This scale bar is approximate only
Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)
This product is unprojected and is not suitable for measuring distances

Note:
This map shows the location of wetland protection areas which are defined under the Environmental Protection Regulation 2008.

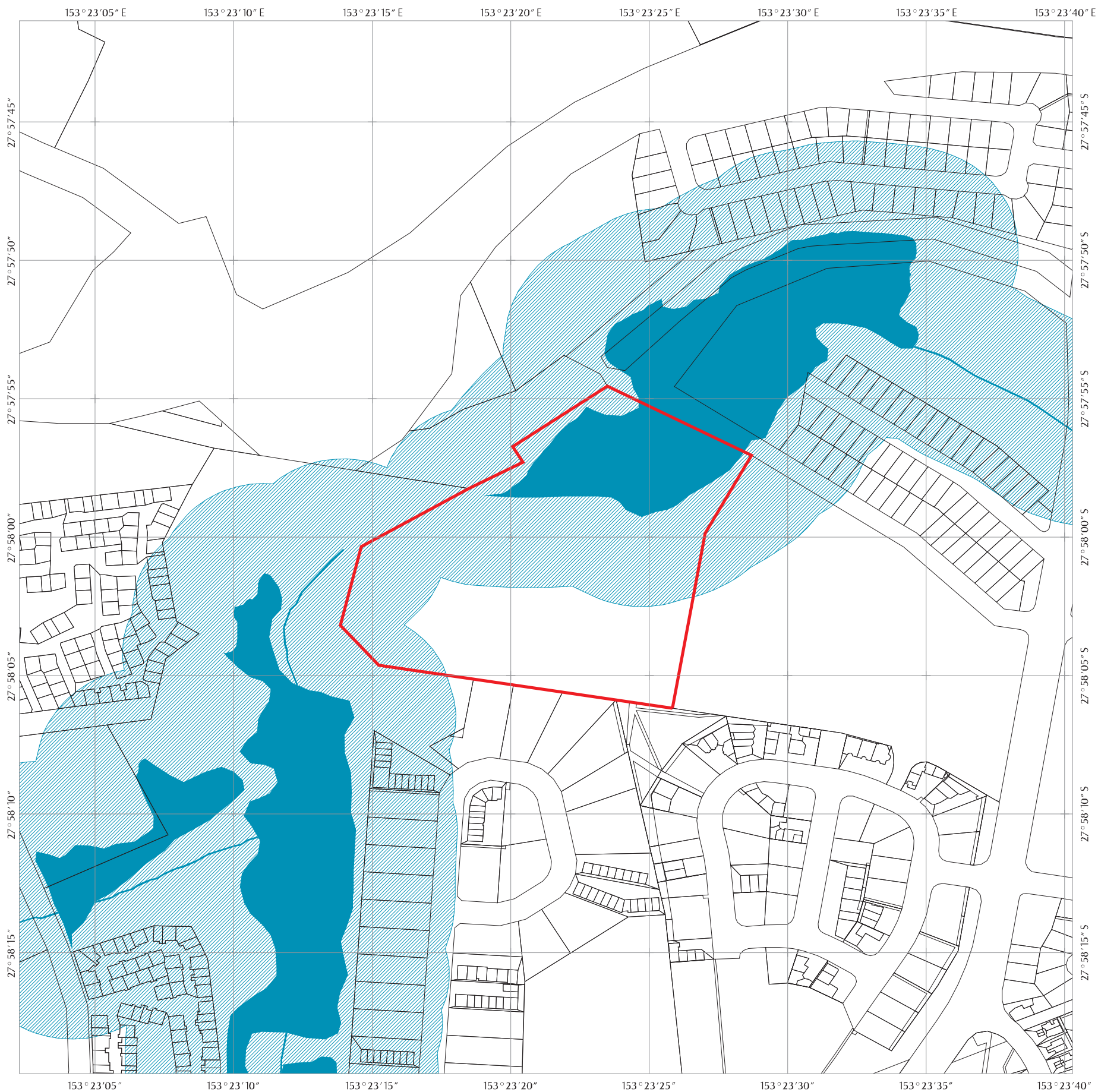
Within wetland protection areas, certain types of development involving high impact earthworks are made assessable under Schedule 3 of the Sustainable Planning Regulation 2009.

The Department of Environment and Resource Management has been made a concurrence agency under Schedule 7 of the Sustainable Planning Regulation 2009 for assessable development involving high impact earthworks within wetland protection areas.

The policy outcome and assessment criteria for assessing these applications are described in the State Planning Policy 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

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**Map of Referable Wetlands
Wetland Management Areas**



Requested By: KAREN.STEELE@CARDNO.COM.AU
Date: 01 Mar 12 Time: 10:55:52

Centered on Lot on Plan:
218 WD5245





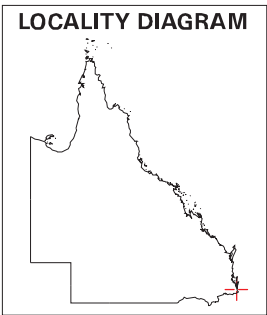
**Queensland
Government**

Legend

-  Selected Land Parcel
-  Property Boundary

Wetland Management Areas

-  Wetland
-  Trigger Area



This scale bar is approximate only
Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)
This product is unprojected and is not suitable for measuring distances

Note:
This map shows the location of wetland management areas which are defined under the Environmental Protection Regulation 2008.

Within wetland management areas, the Department of Environment and Resource Management has been made an advice agency under Schedule 7 of the Sustainable Planning Regulation 2009 for certain types of development.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Resource Management at <www.derm.qld.gov.au> or email <planning.support@derm.qld.gov.au>.



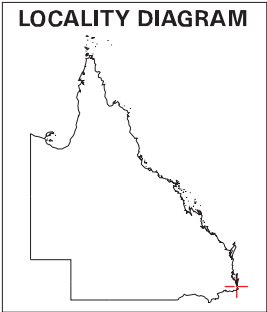
Queensland Coastal Plan

Requested By: JOHN.DELANEY@CARDNO.COM.AU
Date: 06 Mar 12 Time: 14.23.37

Centered on Lot on Plan:
393 CP860178



Queensland
Government



This scale bar is approximate only
Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)
This product is unprojected and is not suitable for measuring distances

- Selected Land Parcel
- Coastal Zone
- Coastal Management District
- Coastal Building Lines

- Coastal Dependant Development
- Port Area
 - Aquaculture Development Area
 - Maritime Development Area

This map shows areas where policies of the Queensland Coastal Plan apply.

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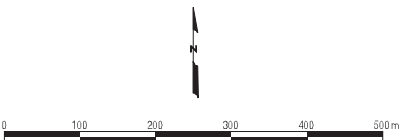
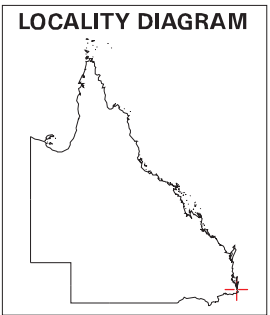
For Coastal Hazard Areas and other Queensland Coastal Plan mapping please refer to the relevant DERM website links.



Queensland Coastal Plan
Areas of Ecological Significance

Requested By: JOHN.DELANEY@CARDNO.COM.AU
Date: 06 Mar 12 Time: 14.23.40

Centered on Lot on Plan:
393 CP860178



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- Selected Land Parcel
- Coastal Management District
- Coastal Zone
- Areas of High Ecological Significance
- Areas of General Ecological Significance
- Strategic Rehabilitation Areas
- Dugong Protection Areas
- Fish Habitat Areas
- General Use Marine Park Zone
- Habitat Protection Marine Park Zone
- Estuarine Conservation Marine Park Zone
- Conservation Park Marine Park Zone
- Buffer Marine Park Zone
- Scientific Research Marine Park Zone
- Marine National Park Marine Park Zone
- Preservation Marine Park Zone

This map shows areas where policies of the Queensland Coastal Plan apply.

This map is produced at a scale relevant to the size of the lot on plan selected and should be printed as A4 size in portrait orientation.

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For Coastal Hazard Areas and other Queensland Coastal Plan mapping please refer to the relevant DERM website links.

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The mapping is derived from a number of data sources of varying scale. Consideration of the effects of mapped scale is necessary when interpreting data. Digital line work should be used as a guide only. Field surveys are recommended to verify feature boundaries prior to making development applications.

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