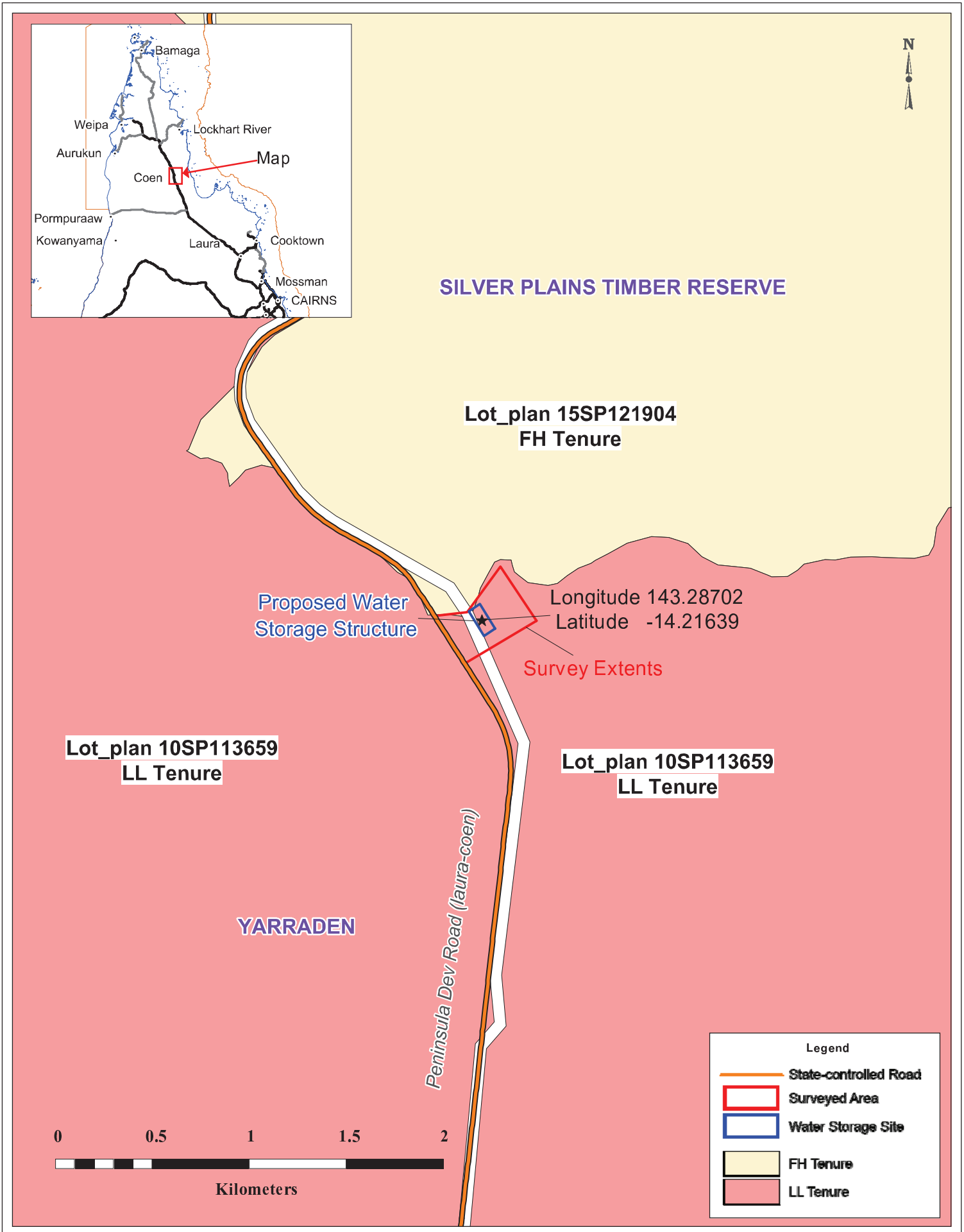
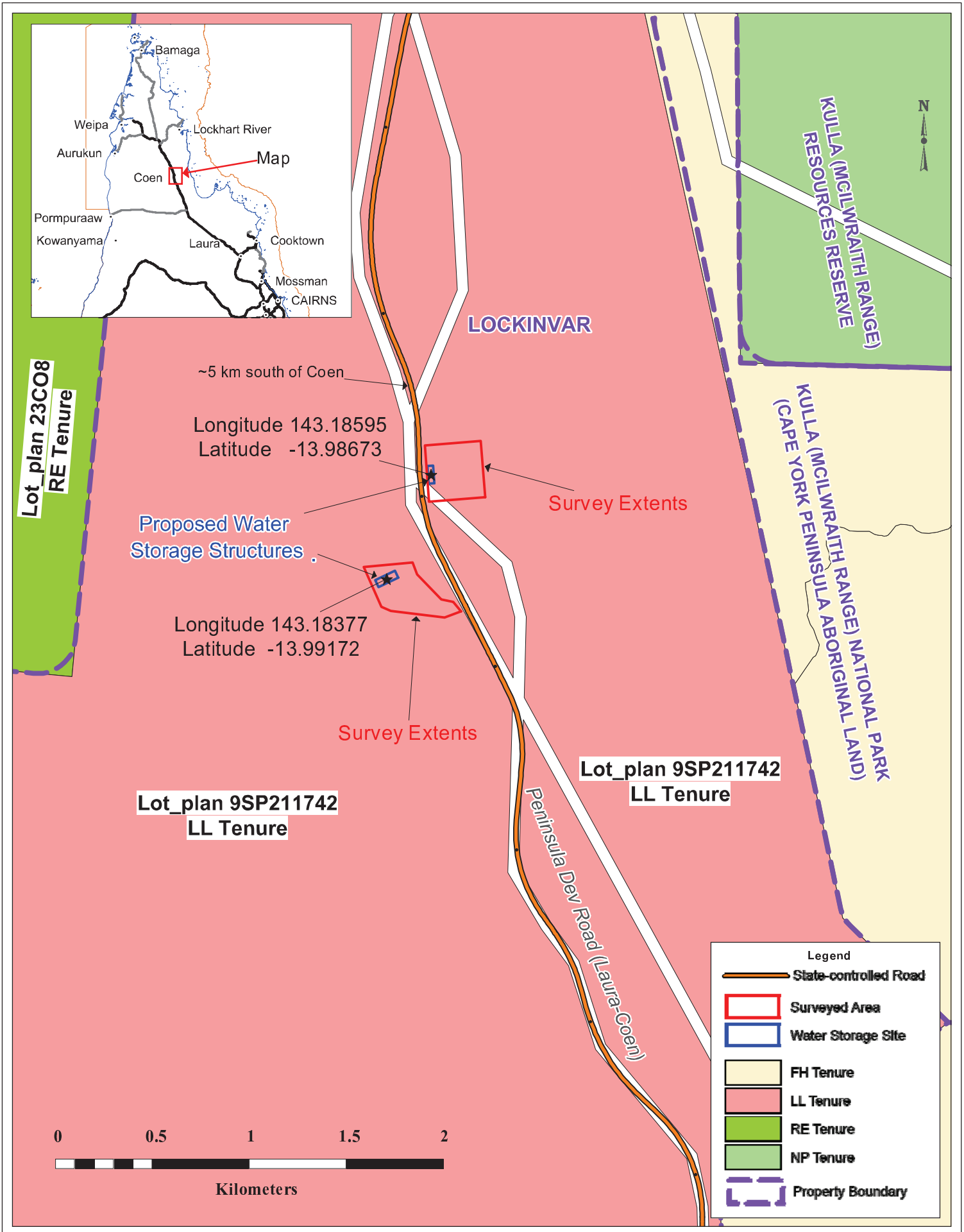


Branch/Unit : Geospatial Services/Far North Region	**Proposed Water Storage Structure Lot 10 on Plan SP113659**	Queensland Government Transport and Main Roads	
Projection/ Datum : Geocentric Datum of Australia (GDA) 1994		Plan No/ Job No: 2 / 1915	Issue: A / Date: 18/6/2015
File location : G:\CAD\GIS\MapInfo\Projects\Road\90C\Workspaces\Job_1915_WaterSS_10SP113659.wor		Drawn by: CMH	Checked by: X Xxxx

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Branch/Unit :
Geospatial Services/Far North Region

Projection/ Datum : Geocentric Datum of Australia (GDA) 1994

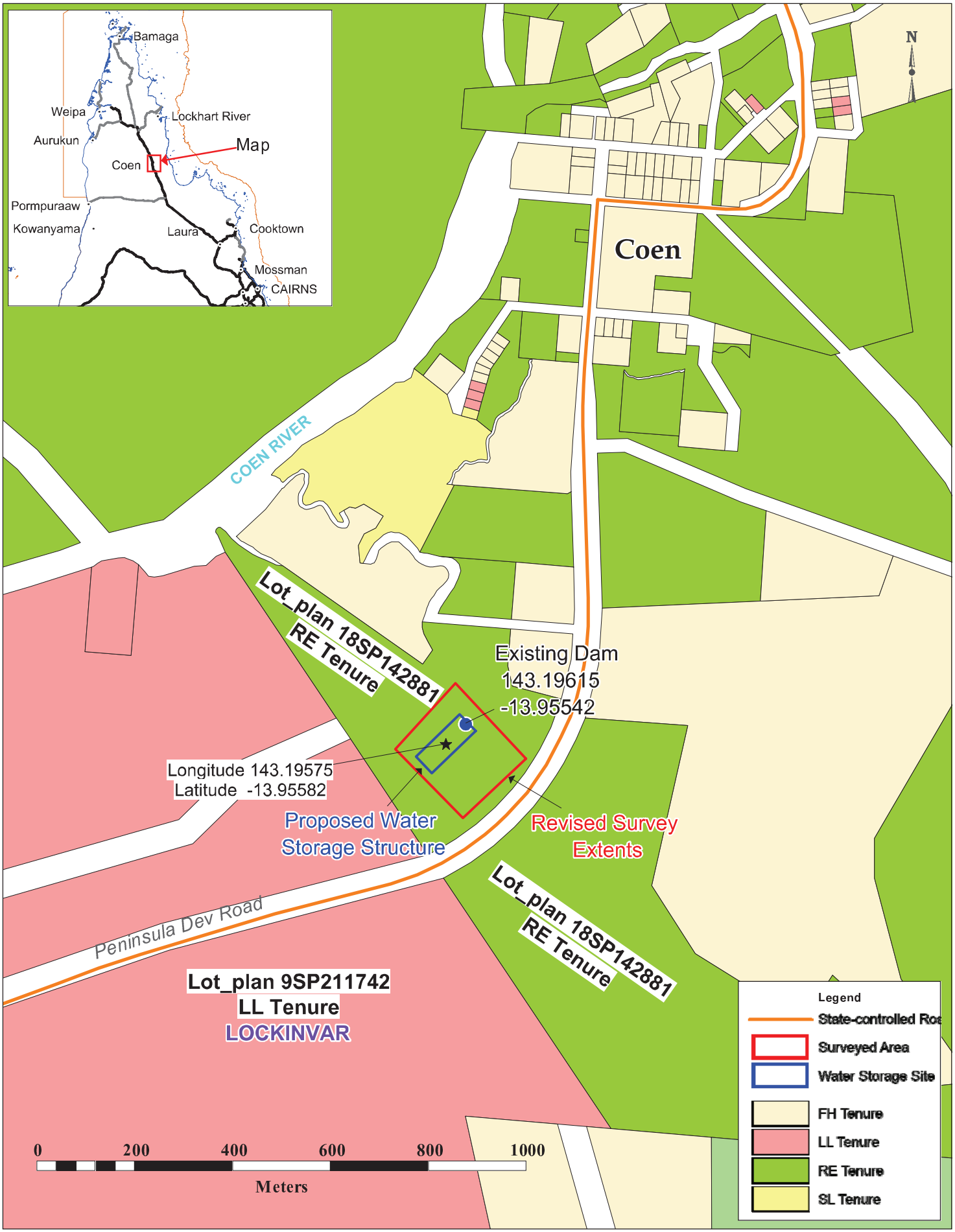
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Proposed Water Storage Structures
Lot 9 on Plan SP211742

Queensland Government
Transport and Main Roads

Plan No/ Job No:	Issue:	Date:
3 / 1915	A	18/6/2015
Drawn by: CMH	Checked by: X Xxxx	

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Branch/Unit : Geospatial Services/Far North Region	**Proposed Water Storage Structure Lot 18 on Plan SP142881**	Queensland Government Transport and Main Roads	
Projection/ Datum : Geocentric Datum of Australia (GDA) 1994			
File location : G:\CAID\GIS\MapInfo\Projects\Road\90C\Workspaces\Job_1915_WaterSS_18SP142881.wor		Plan No/ Job No: 1 / 1915	Issue: A / Date: 18/6/2015
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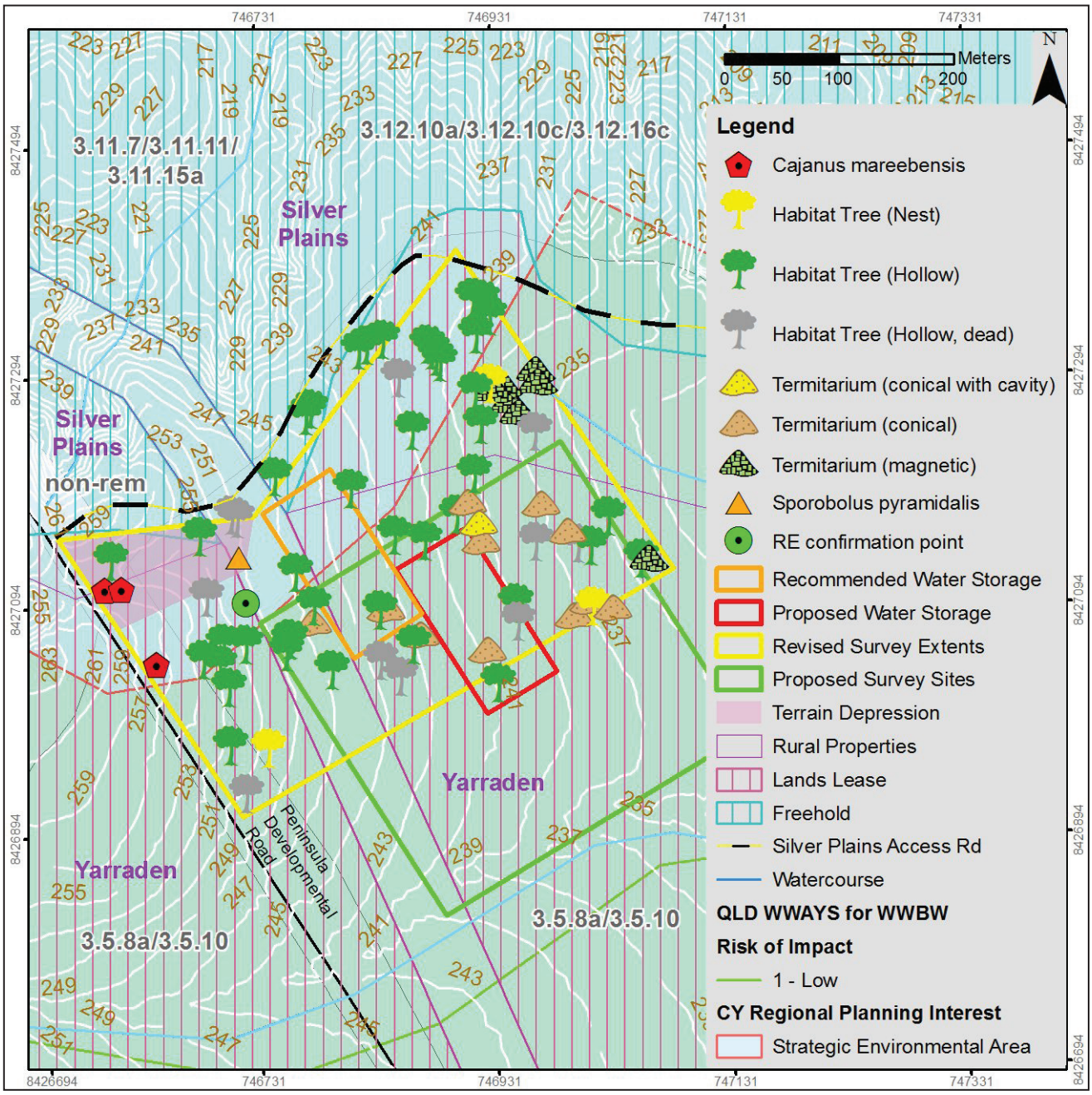
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PART B – DETAILED SITE SURVEYS

PDR 90C_210 (Chainage 210.75_RHS)

Centre of recommended water storage:

Easting: 746802, Northing: 8427132- Longitude: 143.287016, Latitude: -14.216389



RE Confirmation Point **3.5.8a / 3.5.10** **(70/30%) (All Least Concern)**	**Location: PDR 90C_210 (CH210.75 RHS) –** **Yarraden Station Lot: 10 / Plan: SP113659**
Easting: 746720, Northing: 8427098	**Longitude: 143.286261, Latitude: -14.2167**

Survey description:

Canopy: *Corymbia stockeri, Eucalyptus tetrodonta, Corymbia nesophila* and *Eucalyptus megasepala* dominate the sparse canopy (11-14m). A very sparse sub-canopy tree layer (8-10m) is present dominated by *Erythrophleum chlorostachys* (Cooktown Ironwood) and *Melaleuca stenostachya*.

Shrub layer: Very sparse consisting of juvenile *Acacia, Eucalyptus* and *Corymbia* species with occasional *Brachychiton vitifolius*.

Ground: Sparse to mid-dense and dominated by *Eriachne sp. Schizachyrium fragile* and *Pseudopogonatherum contortum*. Forbs are seasonally abundant.

Comments: The vegetation present conforms to the mapped blended Regional Ecosystems 3.5.8a & 3.5.10. The recommended storage location more effectively avoids potential animal breeding places, better utilises the landform for water surface water capture and shortens the required access.

EVNT Species: *Cajanus mareebensis* (Endangered – NCA 1992 & EPBC 1999) was recorded along the western section of the survey area, approximately 15-30m from the PDR. A total of three *C. mareebensis* individuals were recorded within the study area.
Weeds: *Sporobolus pyramidalis* (Giant rat's tail grass) (Class 2 Declared Weed Species) was recorded in one location on the site (143.286204, -14.216346). Other environmental weeds were recorded across the site.

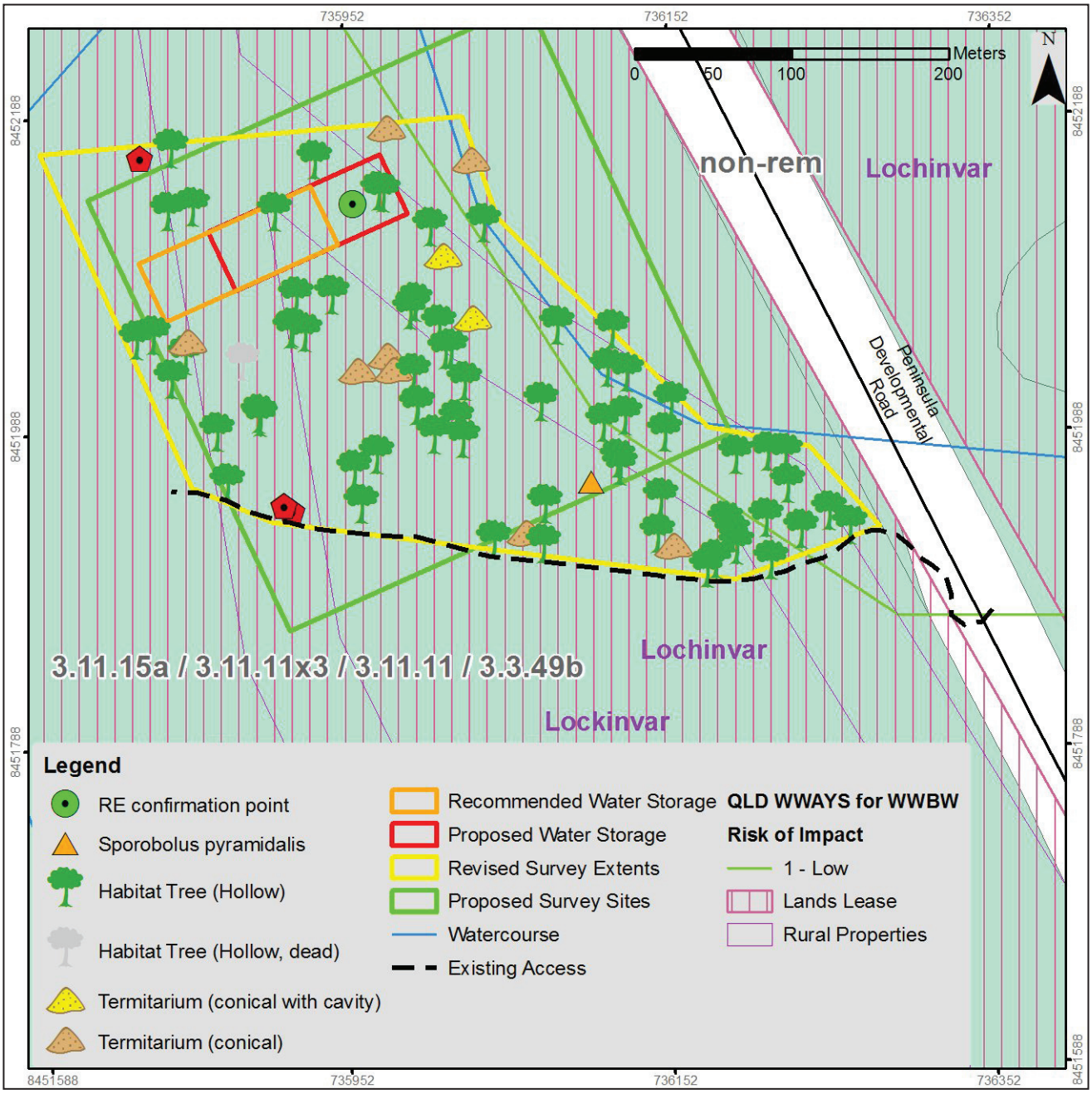
Constraints Summary and Recommendations:

- The recommended site is technically within the mapped boundaries of the Cape York Strategic Environmental Area. However, this is likely to be an inaccuracy in the mapping of the boundary of the SEA. Ecologically, the boundary of the SEA should be to the north of the Yarraden / Silver Plains property boundary and road. The site would then be outside (south) of the SEA.
- The recommended site is within Yarraden Nature Refuge. The works must not impact on the values of this Nature Refuge (refer to Section 4.2)
- Avoid direct or indirect impacts on *C. mareebensis* during construction. These plants should be fenced off for the duration of construction and the staff site induction should highlight their importance.
- Ensure vehicle/machinery washdown to avoid spread of *Sporobolus pyramidalis* to other areas.
- Ensure hollow-bearing trees are checked for fauna presence during pre-construction clearing.
- Ensure that nests are checked for eggs and live young during pre-construction clearing.
- Minimise impact on termitaria during pre-construction clearing and construction.



PDR 90C_240C (Chainage 240.6_LHS)

Centre of recommended water storage:
Easting: 735887, Northing: 8452102- Longitude: 143.183773, Latitude: -13.991720



RE Confirmation Point 3.11.15a/3.11.11x3/3.11.11/3.3.49b (50/20/20/10%) (All Least Concern)	**Location: PDR 90C_240C (CH240.6 – LHS) - Lochinvar Station Lot: 9 / Plan: SP211742**
Easting: 735958, Northing: 8452133	**Longitude: 143.184434; Latitude: -13.991435**

Survey description:

Canopy: Sparse to mid-dense (10-12m) dominated by *Corymbia stockeri*, *Eucalyptus tetrodonta* and *C. clarksoniana*. A sparse sub-canopy later (12m) dominated by *Erythrophleum chlorostachys, Parinari nonda* and *Acacia rothii*.

Shrub layer: Very scarce and consists of juvenile *Acacia* and *Eucalyptus / Corymbia sp.*.

Ground: Sparse and dominated by *Heteropogon contortus, Schizachyrium fragile* and *Panicum decompositum*.

Comments: The vegetation community within the survey area conforms to the mapped blended Regional Ecosystem. Intense stock grazing evident. The recommended storage location more effectively avoids potential animal breeding places and riparian areas. Any additional access establishment should avoid clearing habitat trees.

EVNT Species: *Cajanus mareebensis* (Endangered – NCA 1992 & EPBC 1999) was recorded along the south west boundary of the survey area, with an additional record to the north west boundary. A total of three *C. mareebensis* individuals were recorded within the study area.
Orchids: *Cepobaculum canaliculatum* and *Cymbidium canaliculatum* (Orchids are listed as 'Special Least Concern' under the NCA).
Weeds: *Sporobolus pyramidalis* (Giant rat's tail grass) (Class 2 Declared Weed Species) was recorded in one location on the site adjacent to an access track (143.185786, -13.993037). Other environmental weeds were recorded across the site.

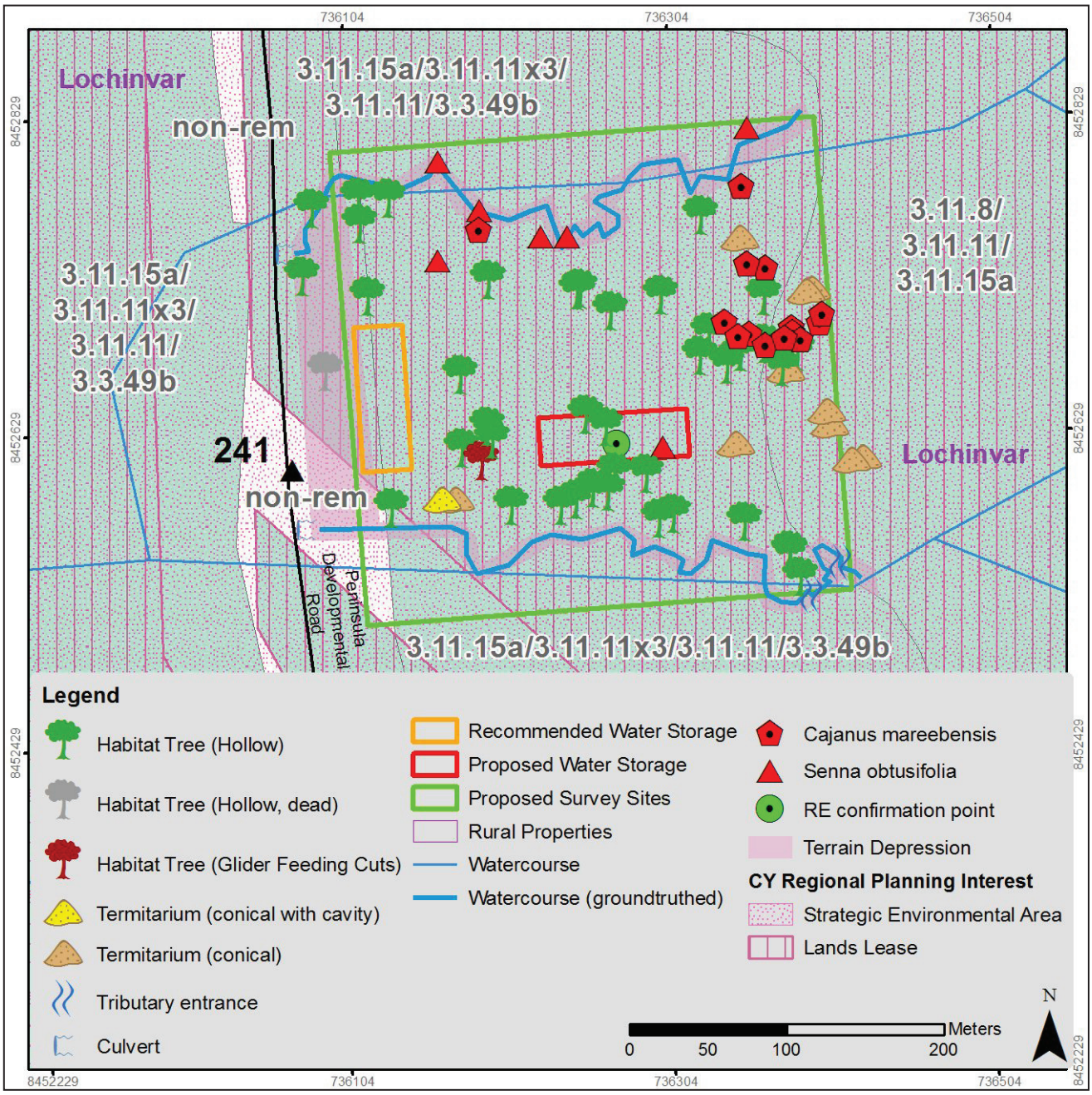
Constraints Summary and Recommendations:

- The site is within a Strategic Environmental Area (SEA). The site must conform to the 'Required Outcome' under the RPI Act Guideline 05/14 (refer to Section 4.1).
- A 'Low' risk of impact watercourse (stream order 1) mapped under WWBW legislation runs along the eastern fringe of the site.
- The site is situated within a 'Protected Plants – Flora Survey Trigger Area'. *Cajanus mareebensis* (E) was recorded onsite.
- Avoid direct or indirect impacts on *C. mareebensis* during construction. These plants should be fenced off for the duration of construction and the staff site induction should highlight their importance.
- Ensure vehicle/machinery washdown to avoid spread of *Sporobolus pyramidalis* to other areas.
- Relocate orchids onto suitable receptor trees outside of the disturbance zone during pre-construction clearing.
- Ensure hollow-bearing trees are checked for fauna presence during pre-construction clearing
- Ensure that nests are checked for eggs and live young during pre-construction clearing.
- Minimise impact on termitaria during pre-construction clearing and construction



PDR 90C_241 (Chainage 241.4_RHS)

Centre of recommended water storage:
Easting: 736127, Northing: 8452652- Longitude: 143.185949, Latitude: -13.986734



RE Confirmation Point 3.11.15a/3.11.11x3/3.11.11/3.3.49b (50/20/20/10) (All Least Concern)	**Location: PDR 90C_241 (CH 241.4– RHS) - Lochinvar Station Lot: 9 / Plan: SP211742**
Easting: 736272, Northing: 8452622	**Longitude: 143.187291, Latitude: -13.986992**

Survey Description:

Canopy: Sparse to mid-dense canopy (14-16m) dominated by *Corymbia clarksoniana* and *Eucalyptus leptophleba*. Sparse sub-canopy tree layer (12m) includes *Erythrophleum chlorostachys, Alphitonia pomaderroides, Brachychiton diversifolius* and *Planchonia careya*

Shrub layer: Very scarce consisting of *Flueggea virosa* and occasionally *Brachychiton vitifolius.*

Ground: Dense and dominated by *Heteropogon contortus, H. triticeus* and *Sarga plumosum*.

Comments: The vegetation community within the survey area conforms to the mapped blended Regional Ecosystem. Moderate stock grazing was evident. The site is situated between two seasonal watercourses (both stream order 2). The recommended storage location more effectively avoids potential animal breeding places and shortens the required access.

EVNT species: *Cajanus mareebensis* (Endangered – NCA 1992 & EPBC 1999) was recorded in the northern half of the site. More than ten *C. mareebensis* individuals were recorded within the study area.
Orchids: *Cymbidium canaliculatum* (Orchids are listed as 'Special Least Concern' under the NCA).
Weeds: *Senna obtusifolia* (Sicklepod), a Class 2 Declared Weed Species was common and recorded throughout the site.

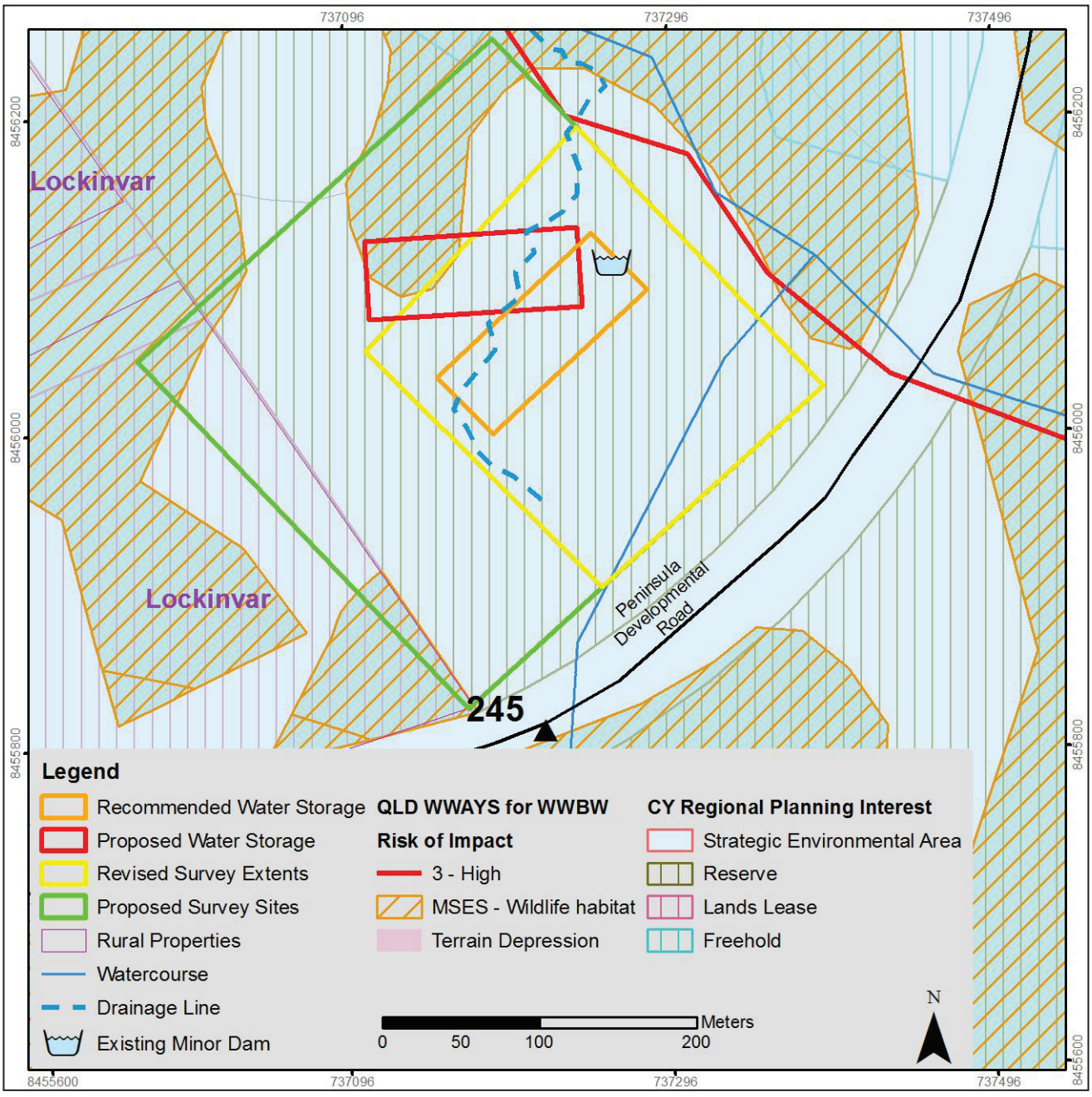
Constraints Summary and Recommendations:

- The site is within a Strategic Environmental Area (SEA). Any works must conform to the 'Required Outcome' under the RPI Act Guideline 05/14 (refer to Section 4.1).
- The site is situated within a 'Protected Plants – Flora Survey Trigger Area'. *Cajanus mareebensis* (E) was recorded onsite.
- Avoid direct or indirect impacts on *C. mareebensis* during construction. These plants should be fenced off for the duration of construction and the staff site induction should highlight their importance.
- Relocate orchids onto suitable receptor trees outside of the disturbance zone during pre-construction clearing.
- Ensure vehicle/machinery washdown to avoid spread of *Senna obtusifolia* to other areas.
- Ensure hollow-bearing trees are checked for fauna presence during pre-construction clearing
- Ensure that nests are checked for eggs and live young during pre-construction clearing.
- Minimise impact on termitaria during pre-construction clearing and construction



PDR 90C_245 (Chainage 245.2_LHS)

Centre of recommended water storage:
Easting: 737218, Northing: 8456063- Longitude: 143.195751, Latitude: -13.955825

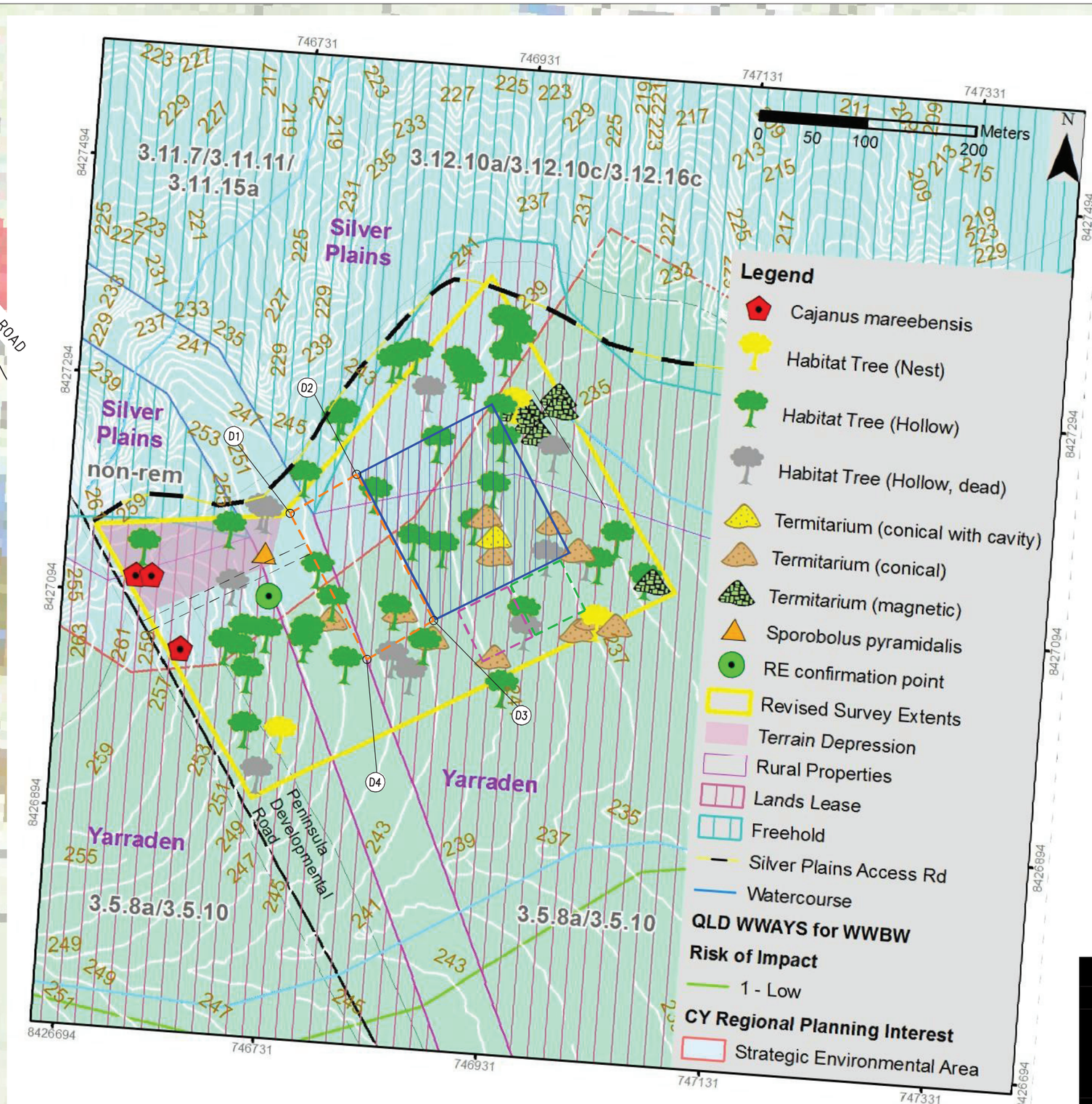


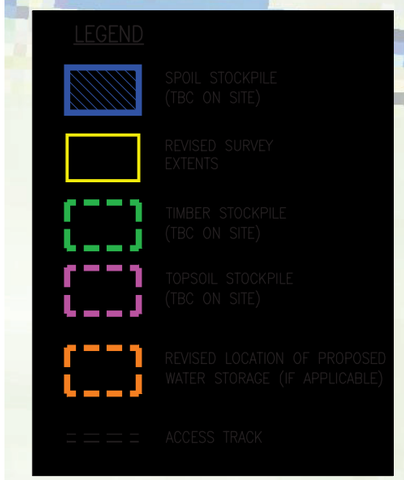
RE confirmation point not applicable: Non-Remnant (Grazing Paddock)	**Location: PDR 90C_245 (CH 245.2 – LHS) Public Land Lot: 18 / Plan: SP142881**
Northing: n/a, Easting: n/a	**Longitude: n/a, Latitude: n/a**
Survey description: Canopy: n/a Shrub layer: n/a Ground: n/a	
Comments: The site is a grazing paddock, presenting a high prevalence of declared and environmental weeds. No vegetation representing any habitat values was recorded. The recommended storage location more effectively avoids vegetation mapped as remnant and essential wildlife habitat	
EVNT species: No EVNT species were recorded within this site. *Weeds:* Weed species were commonly recorded at the site. *Senna obtusifolia* (Sicklepod) a Class 2Declared Weed Species under *the Land Protection (Pest and Stock Route Management) Act 2002* was common throughout the site. *Sporobolus pyramidalis* (Giant rat's tail grass) a Class 2Declared Weed Species under the *Land Protection (Pest and Stock Route Management) Act 2002* was also commonly encountered throughout the site. Care should be taken when working in this area to not spread seeds of Class 2 Declared Weeds.	
Constraints Summary and Recommendations: • A 'High' risk of impact watercourse (Coen River tributary; stream order 3) mapped under WWBW legislation runs along the north-eastern fringe of the site. Ensure that its riparian vegetation is not impacted by works • MSES Essential Wildlife Habitat : avoid any disturbance of all intact surrounding vegetation • The site is situated within a 'Protected Plants – Flora Survey Trigger Area'. No EVNT species were recorded • Any heavy vehicle access off the PDR across the paddock most likely requires stabilisation measures (gravelling). • Ensure vehicle/machinery washdown to avoid spread of declared weeds to other areas.	



PRELIMINARY

AECOM





REVISED WATER STORAGE LOCATION SETOUT DATA

POINT	EASTING	NORTHING
D1	746734.490	8427176.174
D2	746792.330	8427214.532
D3	746868.983	8427087.462
D4	746811.143	8427049.105

DATUM: GDA94 UTM54

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Cad ref: J:\60344681\5. CAD\25-SKETCHES\SITE C\PDR - Water Storage\60344681-SK-07_C.dwg

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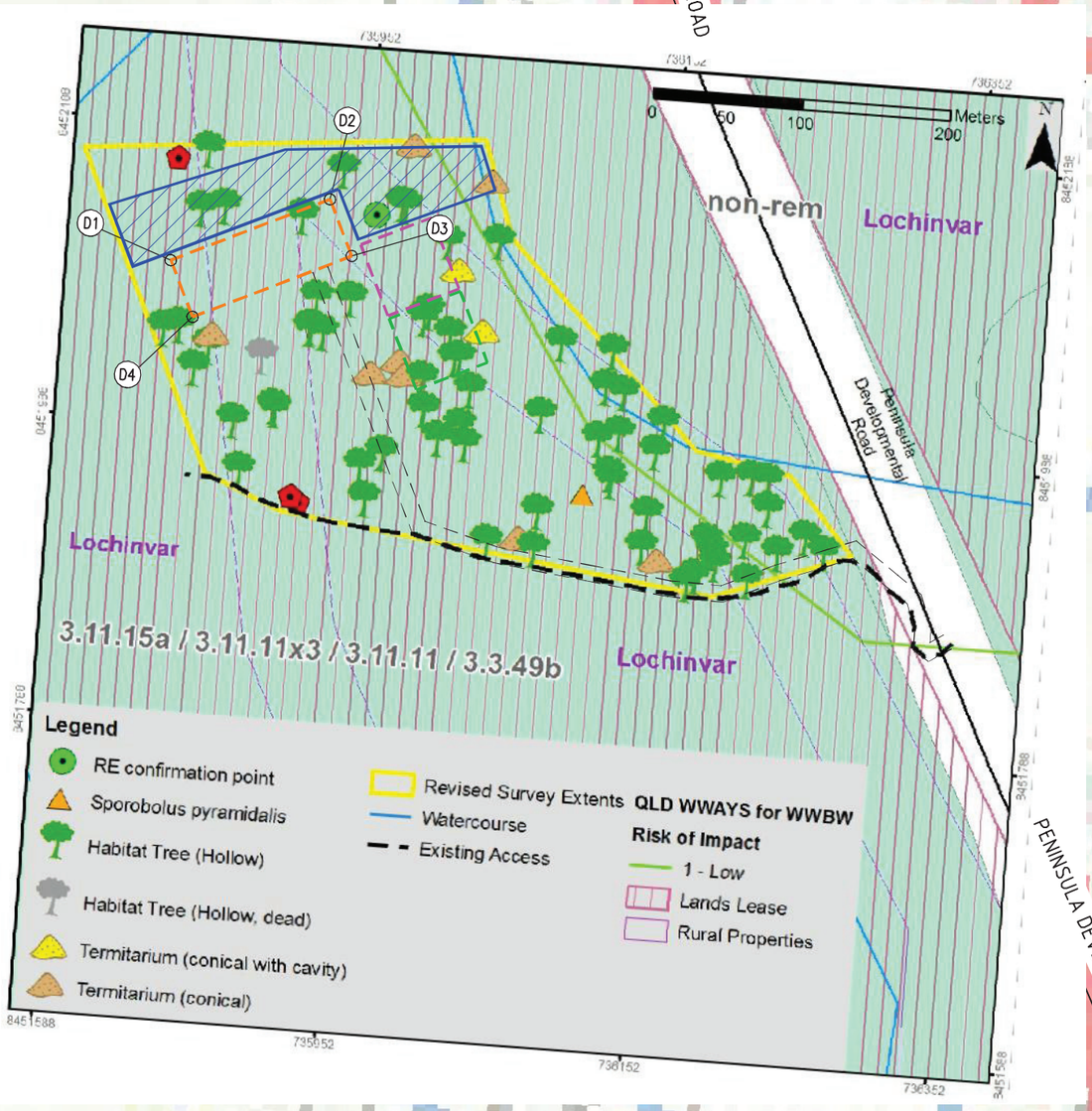
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PDR 90C WATER STORAGES
SITE C - 90C_210.8
SHEET 1 OF 6
SK-07_C

PRELIMINARY

AECOM

PENINSULA DEVELOPMENTAL ROAD



LEGEND

- SPOIL STOCKPILE (TBC ON SITE)
- REVISED SURVEY EXTENTS
- TIMBER STOCKPILE (TBC ON SITE)
- TOPSOIL STOCKPILE (TBC ON SITE)
- REVISED LOCATION OF PROPOSED WATER STORAGE (IF APPLICABLE)
- ACCESS TRACK

PENINSULA DEVELOPMENTAL ROAD

REVISED WATER STORAGE LOCATION SETOUT DATA

POINT	EASTING	NORTHING
D1	735824.853	8452096.794
D2	735926.989	8452142.753
D3	735943.403	8452106.276
D4	735841.267	8452060.317

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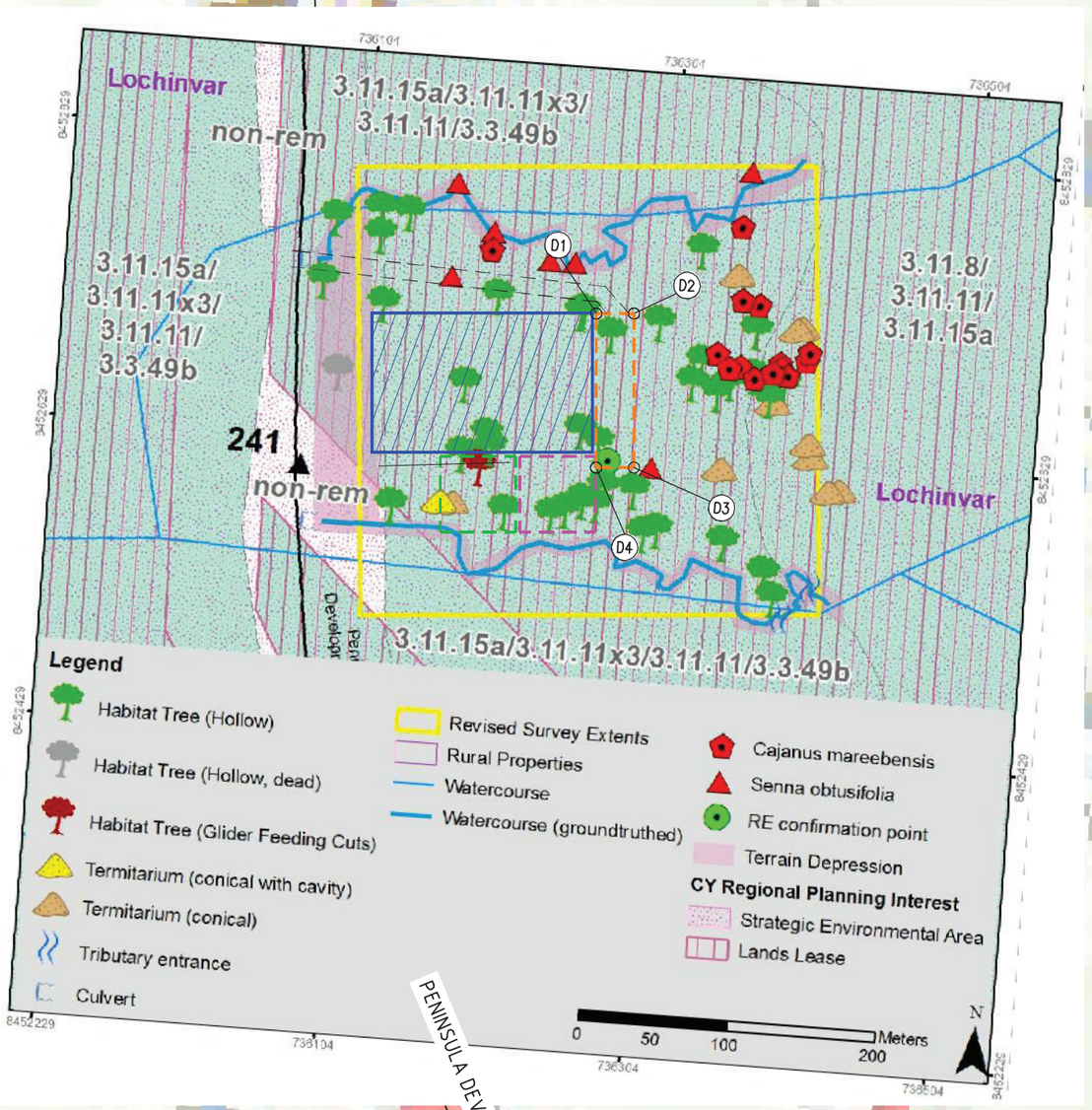
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DRAWING IN PROGRESS | DATE: 19/6/2015

PDR 90C WATER STORAGES
SITE C - 90C_240C
SHEET 4 OF 6
SK-10_C

PRELIMINARY

AECOM



LEGEND

- SPOIL STOCKPILE (TBC ON SITE)
- REVISED SURVEY EXTENTS
- TIMBER STOCKPILE (TBC ON SITE)
- TOPSOIL STOCKPILE (TBC ON SITE)
- REVISED LOCATION OF PROPOSED WATER STORAGE (IF APPLICABLE)
- ACCESS TRACK

PENINSULA DEVELOPMENTAL ROAD

REVISED WATER STORAGE LOCATION SETOUT DATA

POINT	EASTING	NORTHING
D1	736258.052	8452720.827
D2	736283.011	8452722.266
D3	736288.883	8452620.435
D4	736263.924	8452618.996

DATUM: GDA94 UTM54

Last modified: 19 Jun 15 - 15:25
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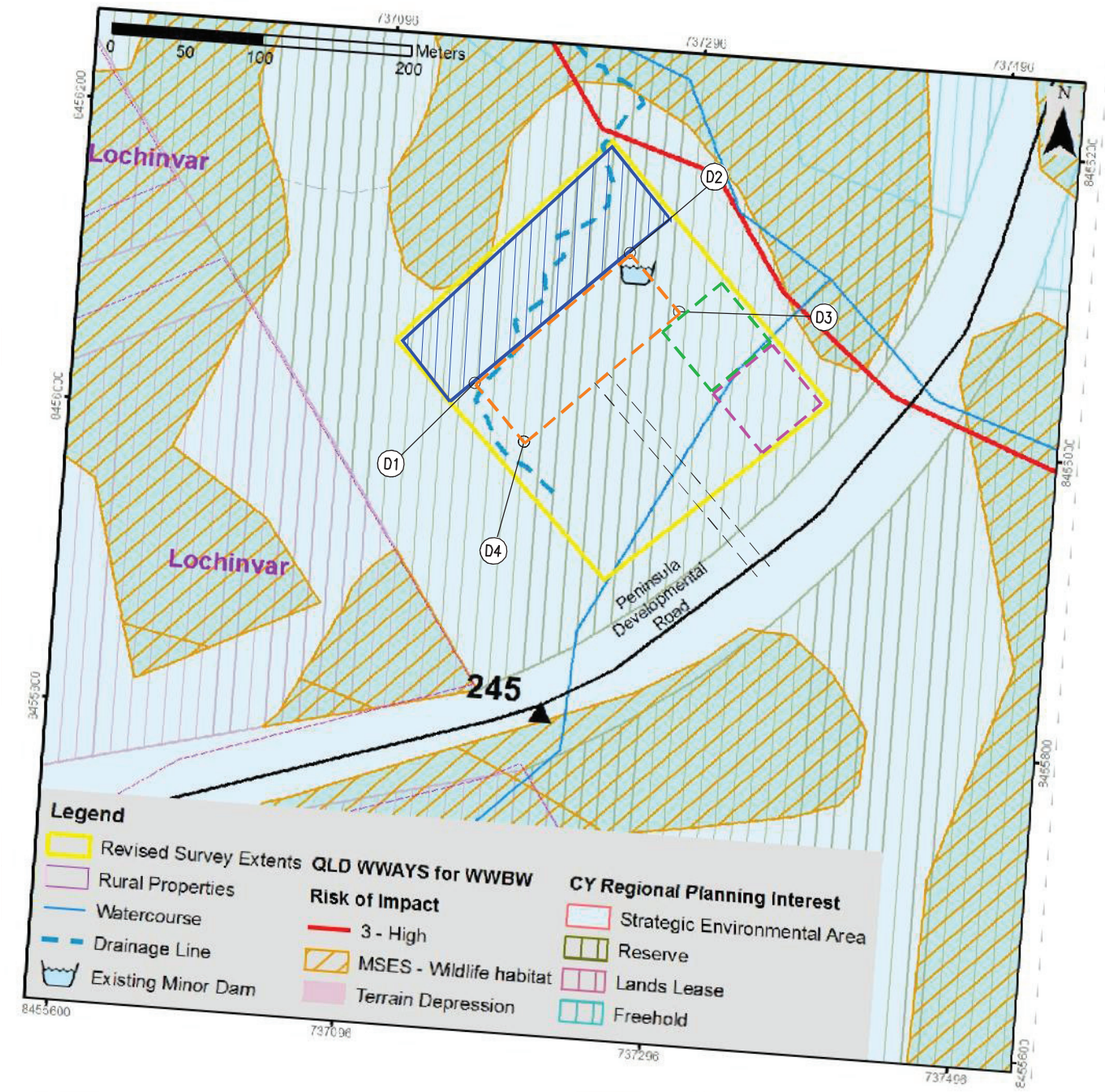
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DRAWING IN PROGRESS | DATE: 19/6/2015

PDR 90C WATER STORAGES
SITE C - 90C_241
SHEET 5 OF 6
SK-11_C

PRELIMINARY

AECOM



PENINSULA DEVELOPMENTAL ROAD

LEGEND

- SPOIL STOCKPILE (TBC ON SITE)
- REVISED SURVEY EXTENTS
- TOPSOIL STOCKPILE (TBC ON SITE)
- REVISED LOCATION OF PROPOSED WATER STORAGE (IF APPLICABLE)
- ACCESS TRACK

REVISED WATER STORAGE LOCATION SETOUT DATA

POINT	EASTING	NORTHING
D1	737160.721	8456026.804
D2	737256.846	8456117.271
D3	737291.113	8456080.860
D4	737194.988	8455990.394

DATUM: GDA94 UTM54

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PDR 90C WATER STORAGES
SITE C - 90C_245
SHEET 6 OF 6
SK-12_C

PENINSULA DEVELOPMENTAL ROAD
EARLY WORKS PACKAGE:
WATER STORAGES LAURA TO COEN
SECTIONS B&C
ENVIRONMENTAL ASSESSMENT REPORT

JUNE 2015






ENVIRONMENT NORTH

DOCUMENT CONTROL CERTIFICATE

PROJECT AND CLIENT DETAILS

Project name:	Peninsula Developmental Road Early Works Package Water Storages Laura to Coen – Sections B&C	Job Number:	507c
Title:	Environmental Assessment Report		
Client:	Department of Transport and Main Roads		
Contact:	Sumit Khadka		
Description of report:	This Environmental Assessment Report (EAR) has been prepared to assess the required water storages in accordance with the Environmental Processes Manual and addresses matters normally addressed in the following documents: • Review of Environmental Factors (Planning) • Environmental Management Plan (Planning). It describes an environmental assessment of 14 proposed water storages located between Laura and Coen (Sections B&C) on the Peninsula Developmental Road. These storages are required to provide construction water for adjacent roadworks associated with the Cape York Region Package. As agreed with TMR, this EAR includes: • Part A: a description of the proposed water storages project and regional environmental data • Part B: detailed assessments of each water storage site • Part C: recommendations for environmental management etc. (i.e. as input to the Contractors' Environmental Management Plan (Construction) for each storage site). The document also serves as an Assessment Application Report for Development Approval for some storages as required under the *Regional Planning Interests Act 2014* (Qld) and provides information regarding development in the Yarraden Nature Refuge.		

PREPARATION AND DISTRIBUTION DETAILS

Version	Purpose	Prepared by	Checked by	Date
1	Draft (desktop only)	David Rivett	Not checked	22 January 2015
2a	Draft for RIDA consultation	David Rivett	Lou Kamenos	25 May 2015
2b	Section C only	David Rivett	Cameron Slack	22 June 2015

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Summary of Recommendations for EMP (Construction)

Abbreviations and Acronyms

TERM	MEANING
ACH Act	*Aboriginal Heritage Cultural Act 2003* (Qld)
AEP	Annual Exceedance Probability (%) of a rainfall/runoff event
ARI	Average Recurrence Interval (years) of a rainfall/runoff event – roughly the inverse of Annual Exceedance Probability
CSC	Cook Shire Council
CYLC	Cape York Land Council
CYP	Cape York Peninsula
CYPLUS	Cape York Peninsula Land Use Strategy
DAFF	Department of Agriculture, Fisheries and Forestry
DILGP	Department of Infrastructure, Local Government and Planning
EHP	(Department of) Environment and Heritage Protection
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EVNT	Endangered, Vulnerable, or Near Threatened (plants or animals)
LiDAR	Light Detection And Ranging
LP Act	*Land Protection (Pest and Stock Route Management) Act* 2002 (Qld)
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance

TERM	MEANING
NC Act	*Nature Conservation Act 1992* (Qld)
PDR	Peninsula Developmental Road
QUDM	Queensland Urban Design Manual
REF	Review of Environmental Factors
RIDA	Regional Interests Development Approval
RPI Act	*Regional Planning Interests Act 2014 (Qld)*
SEA	(Cape York) Significant Environmental Area
TMR	(Department of) Transport and Main Roads
VM Act	*Vegetation Management Act 1999* (Qld)
WSS	Water Storage Site
YNR	Yarraden Nature Refuge

EXECUTIVE SUMMARY

1 BACKGROUND

The Department of Transport and Main Roads (TMR) has commissioned a team led by AECOM to undertake the concept design of two sections of the Peninsula Developmental Road (PDR) between Laura and Coen from chainages 127 km to 137 km (Section B) and from chainages 222 km and 246 km (Section C). This follows a previous assessment of Section A between chainages 3.3 km and 31 km.

The upgrading of the PDR requires new earthworks and pavement construction and this necessitates a reliable supply of construction water for compaction and dust control. TMR will provide this construction water via a series of water storages to be constructed adjacent to the PDR. These will supplement water from existing storages and rivers, subject to availability.

2 DETAILS OF WATER STORAGES

2.1 REQUIRED STORAGE CAPACITY

The volume of new storages required has been assessed based on water needs for the type and timing of construction, less existing storage capacity. Allowance has been made for evaporation and seepage. Storages have an average volume of 26 ML and range in volume from 4 to 60 ML.

2.1.1 Section B

- Section B water storages are to be constructed in time to fill during the 2015/16 wet season for first construction use during the 2016 dry season and an overall construction period of four years. This requires a construction date of no later than September 2015.
- Approximately 10 ML of construction water is required per kilometre. The maximum volume needed in any one year is 162 ML (2017).
- Approximately 45 ML of capacity currently exists, meaning that there is an assessed theoretical undersupply of water of 162-45=117 ML excluding allowance for evaporation and seepage.

2.1.2 Section C

- Section C water storages are to be constructed in time to fill during the 2015/16 wet season for first construction use during the 2016 dry season and an overall construction period of two years. This requires a construction date of no later than September 2015.
- Approximately 7 ML of construction water is required per kilometre. The maximum volume needed in any one year is 157 ML (2019).
- Approximately 110 ML of capacity currently exists, meaning that there is an assessed theoretical undersupply of water of 157-110=42 ML excluding allowance for evaporation and seepage.

2.2 NATURE OF STORAGES

The proposed storages are not technically dams as:

- inflow is largely overland flow from a suitable catchment of the road itself, led to the storages from road drainage (e.g. small culverts or table drain turnouts) using minor excavated drains where needed – i.e. the storages are not proposed to be constructed on major watercourses
- they are to be constructed by excavating below-ground storages – suitable excavated material will be heaped up to form a 'turkey's nest' structure in the downhill side of the excavation to slightly increase storage but this is not intended to be a dam wall as such
- a bypass is provided for safety.

When completed, the margins of storages will be rehabilitated and fenced and control handed over to the landholder for use as farm storages under agreements to be negotiated.

2.3 SITE SELECTION / SCREENING

Site selection and screening of sites for new storages involved a comprehensive process over many years, involving:

- 2009 assessment by RoadTek of 64 potential dams between Laura and Weipa (for supply of maintenance water).
- October 2014 field reconnaissance (Section C only) of candidate sites and alternatives where these were required.
- January 2015 desktop assessment of 14 candidate sites (Sections B and C).
- April 2015 field reconnaissance of revised candidate sites (Sections B and C) and alternatives where these were required.
- May 2015 geotechnical testing of selected sites (Sections B and C) where soil profiles required confirmation.
- May / June 2015 detailed biodiversity surveys and analysis of revised candidate sites (Section C).
- May / June 2015 cultural heritage desktop assessment (Sections B and C).
- June 2015 detailed biodiversity surveys and analysis of revised candidate sites (Section B) [this work and the cultural heritage fieldwork are yet to be undertaken].

The overall methodology involved best practice environmental planning to protect natural and cultural values, namely:

- avoid areas with high values
- minimise impacts on values
- mitigate impacts on values by environmental management
- restore values where possible by rehabilitation.

Twenty-five sites were assessed overall, leading to 14 confirmed sites that were the subject of detailed site investigations.

3 ENVIRONMENTAL ASSESSMENT

3.1 METHODOLOGY

Each candidate site was subjected to a desktop assessment and field survey involving:

- geology and soils
- waterways
- biodiversity (regional ecosystems, plants of conservation significance, animals of conservation significance)
- cultural heritage.

The biodiversity field surveys were undertaken in accordance with TMR standards and in accordance with the Flora Survey Guidelines – Protected Plants (as amended by TMR's transitional Protected Plant Exemption) on sites identified as a 'high risk' area. The on-ground survey was undertaken by a 'suitably qualified person' as required by the guidelines. Surveys resulted in GPS-based plots of constraints (EVNT species, habitat features, etc.) and field recommendations made for siting infrastructure to avoid constraints and minimise impacts.

Cultural heritage field studies are yet to be undertaken.

3.2 FINDINGS

3.2.1 Section B

Table 3-1 Summary of Site Findings – Section B

[Work is currently in preparation.]

3.2.2 Section C

Table 3-2 Summary of Site Findings – Section C

ITEM	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
Soils (Note 1	-	High permeability	High permeability	High erosivity	High erosivity	-
Regional ecosystems	Least concern	Least concern	Least concern	Least concern	Least concern	Least concern
Listed flora						
Cajanus mareebensis	X (Note 2)	-	X (Note 2)	X (Note 2)	X (Note 2)	-
Cepobaculum tattonianum syn. Cymbidium tattonianum	-	X (Note 3)	X (Note 3)	X (Note 3)	X (Note 3)	-

(Continued over)

ITEM	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
Exotic flora (main species only) Note 4	*Sporobolus pyramidalis*	-	-	*Sporobolus pyramidalis*	*Senna obtusifolia*	*Senna obtusifolia*
Listed fauna	-	-	-	-	-	-
Fauna habitat	Note 5	Note 5	Note 5	Note 5	Note 5	Note 5
Waterway barriers?	-	Low risk	-	-	-	-
Cape York SEA?	x	-	-	x	x	x
Yarraden Nature Refuge?	x	x	x	-	-	-

Notes:

1. Undesirable properties noted arte known to be able to be managed by design and construction practices.
2. Species located in survey area but not within infrastructure footprint.
3. Species located on trees likely to be cleared.
4. Sites with specified weeds require weed control during (TMR) and following construction (land holder).
5. All sites contain some habitat of local value.

3.3 IMPLICATIONS

3.3.1 Section B

[In preparation]

3.3.2 Section C

In summary, the following approvals are or may be required for Section C. Where relevant, exemptions or other reliefs are stated.

Table 3-3 Summary of Approvals Required – Section C

LEGISLATION	SITE					
	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
EPBC Act	Nil	Nil	Nil	Nil	Nil	Nil
NC Act	Works in Yarraden Nature Refuge – EHP protocol to be followed	Works in Yarraden Nature Refuge – EHP protocol to be followed	Works in Yarraden Nature Refuge – EHP protocol to be followed	Nil	Nil	Nil
EVNT Plants	Nil	Nil	Nil	Nil	Nil	Nil
Orchids	Nil	Nil (however, recommended that orchids are relocated)	Nil (however, recommended that orchids are relocated)	Nil (however, recommended that orchids are relocated)	Nil (however, recommended that orchids are relocated)	
EVNT Animals	Nil	Nil	Nil	Nil	Nil	Nil
Animal breeding places	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan
LP Act	Management of Class 2 weeds required	Nil	Nil	Management of Class 2 weeds required	Management of Class 2 weeds required	Management of Class 2 weeds required
VM Act	Nil	Nil	Nil	Nil	Nil	No – avoid mapped essential habitat.
Fisheries Act	Nil	Assessment required under self-assessable waterway barriers code	Nil	Nil	Nil	Nil

(Continued over)

LEGISLATION	SITE					
	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
RPI Act	RIDA required	Nil	Nil	RIDA required	RIDA required	RIDA required
SP Act	Nil	Nil	Nil	Nil	Nil	Exempt
ACH Act	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required

Source: Study team compilation.

TERM	MEANING
ACH Act	*Aboriginal Heritage Cultural Act 2003* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EVNT	Endangered, Vulnerable, or Near Threatened (plants or animals)
EVNT	Endangered, Vulnerable, or Near Threatened (plants or animals)
LP Act	*Land Protection (Pest and Stock Route Management) Act* 2002 (Qld)
NC Act	*Nature Conservation Act 1992* (Qld)
RIDA	Regional Interests Development Approval
RPI Act	*Regional Planning Interests Act 2014 (Qld)*
VM Act	*Vegetation Management Act 1999* (Qld)

4 IMPACTS AND MITIGATION

4.1.1 Construction Phase

The main potential impacting processes during the construction phase and associated mitigation are:

- **Clearing of vegetation**. Clearing of natural vegetation is required for the storage footprint, access track, machinery / laydown areas, and stockpiles. Vegetation to be removed includes woodland and open grass areas and some orchids. Individuals of the endangered (EPBC Act, NC Act) *Cajanus mareebensis* were located on four sites but will be able to be avoided. The removal of vegetation has the potential to provide open areas for colonisation by weeds, destabilise banks of watercourses, and increase the risk of erosion. Some trees contain hollows that may be colonised by native fauna and this habitat will be lost. No EVNT fauna species are likely to be present.
- **Earthmoving**. Earthmoving during construction will be required for the removal of topsoil, establishment of access tracks, and construction of the storages and bypass structures. Certain soils may have high erosivity properties and special care is indicated during earthworks when handling this soil type. In general, earthmoving has the potential to cause erosion resulting in the destabilisation of landforms. This can contribute to movement of sediment from the disturbed area and subsequent loss of water quality in seasonal creeks. Vehicle washdown and other management actions are required to prevent the spread of weeds during construction.
- **Other construction activities**. In addition to the above works, other construction impacts often occur due to unplanned peripheral disturbance. Such works include the construction of access tracks, works areas, and temporary works (including drainage diversions). These works are generally not as well planned as core project activities and so have a higher potential for environmental impact.

Mitigation is to be by an EMP (Construction) prepared by the Contractor. Recommended actions are recommended for each storage site is outlined in **Part C** (Environmental Management). Actions include:

- Where practicable, avoid items of fauna habitat value such as termitaria with cavities and hollow– bearing trees.
- Avoid clearing trees supporting bird nests. If clearing of nests is unavoidable, undertake works outside of breeding season where possible. If not practicable, careful removal of the nests is required with all eggs or young being handed to a wildlife carer if possible.
- Minimise clearing within the construction zone.
- An trained spotter catcher must be on site when mature trees are being felled.
- Clear vegetation in one direction to allow escape of wildlife.
- Contact details for emergency wildlife care to be kept on site for the duration of works.
- Management of soil and water in the form of an Erosion and Sedimentation Control Plan is required.

4.1.2 Operation Phase

Ongoing management of weeds and stock use will be required and that the fencing to be provided by TMR is essential. Surveillance will be required to mitigate any traveller-related impacts. This on-going management will be the responsibility of the landholder once TMR hands over the storages at the end of the construction period. Special on-going management is required for the Yarraden Nature Refuge storages under the existing Conservation Agreement.

1 INTRODUCTION

1.1 BACKGROUND

The Department of Transport and Main Roads (TMR) has commissioned a team led by AECOM to undertake the concept design of two sections of the Peninsula Developmental Road (PDR) between Laura and Coen (described as road 90C) from chainages 127 km to 137 km (Section B) and from chainages 222 km and 246 km (Section C). All chainages (in kilometres) are measured north from Laura. This follows a previous assessment of Section A between chainages 3.3 km and 31 km documented in Environment North (2014a).

The upgrading of the PDR requires new earthworks and pavement construction and this necessitates a reliable supply of construction water for compaction and dust control. It has been decided that as the Principal under the proposed construction contract, TMR will provide construction water via a series of water storages to be constructed adjacent to the PDR. These are proposed to cover a slightly larger length of road such that the areas of interest are as follows (refer to **Figure 1-1**):

- Section B: Ch 113 to Ch 146
- Section C: Ch 203 to Ch 245.

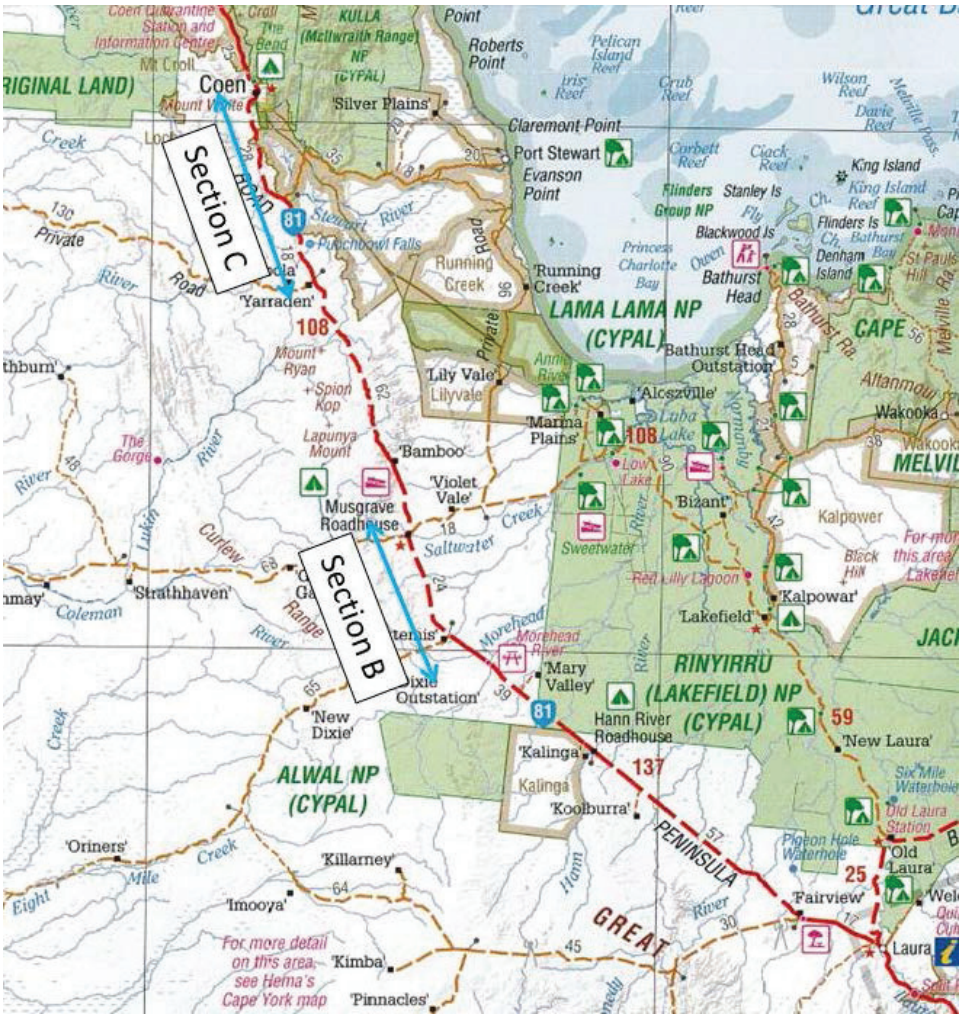


Figure 1-1 Locality plan.

1.2 NATURE OF THIS REPORT

This Environmental Assessment Report (EAR) has been prepared to assess the required water storages in accordance with the TMR's Environmental Processes Manual (EPM) (TMR 2013) and addresses matters normally addressed in the following documents:

- Review of Environmental Factors (Planning) (REF (Planning))
- Environmental Management Plan (Planning) (EMP (Planning)).

As agreed with TMR and allowed for in the EPM, this EAR includes:

- **Part A**: a description of the proposed water storages project and regional environmental data
- **Part B**: detailed site surveys (assessments of each water storage site)
- **Part C**: recommendations for environmental management etc. (i.e. as input to the contractor's Environmental Management Plan (Construction) (EMP (Construction)) for each site.

This document also serves two additional purposes:

- It serves as an Assessment Application Report for Development Approval (Regional Interests Development Approval or RIDA) for some storages as required under the *Regional Planning Interests Act 2014 (Qld)*. Detailed information is summarised in **Chapter 6**.
- It documents issues associated with developing storages in the Yarraden Nature Refuge declared under the *Nature Conservation Act 1992* (Qld). Detailed information is summarised in **Chapter 7**.

This version (2b) is missing the results of desktop and field surveys for Section B as these have yet to be completed. It is provided for the purposes of supporting applications for the RIDA (relevant to Section C only) as this approval is required urgently to meet the construction deadlines of the overall project. Incomplete work is indicated, usually via yellow shading.

1.3 PREVIOUS VERSIONS

Two previous versions of this report have been issued:

- Desktop assessment (Environment North 2015a). This was issued for 14 proposed sites (most of which have now been confirmed) and contained a desktop assessment only. This current version has been updated and expanded to refer to sites now proposed and to include the findings of detailed biodiversity surveys (Section C only) and a desktop cultural heritage assessment (Sections B and C).
- RIDA consultation draft (Environment North 2015b). This was issued to the Department of Infrastructure, Local Government and Planning (DILGP) for the purposes of agency consultation with DILGP, Department of Environment and Heritage Protection (EHP) and Department of Natural Resources and Mines (NRM) on the RIDA application.

1.4 PREVIOUS STUDIES

Environment North and Biotropica Australia completed a study in 2010 of 67 existing and 64 proposed waterpoints (Environment North 2010a; 2010b). This study included a biodiversity and environmental engineering assessment of all 131 sites. These waterpoints were assessed for suitability for maintenance (i.e. not construction) and hence the target size was around 4 ML. However, some existing storages were larger than this.

Some of these sites (indicated in **Table 2-8**) are the subject of this more detailed investigation into specific water storages at each site. Reference is made to these reports where relevant.

1.5 OVERVIEW OF METHODOLOGY

The methodology undertaken in completing this report involved:

1. 2009 assessment of 64 potential dams / waterpoints between Laura and Weipa (for supply of maintenance water). This is documented in Environment North (2010b) as described above.
2. October 2014 field reconnaissance (Section C only) of candidate sites and alternatives where these were required (landholder consultation, soils, hydrology, biodiversity, access).
3. January 2015 desktop assessment of 14 candidate sites (Sections B and C) (geology, soils, hydrology, waterway barriers issues, biodiversity values, cultural heritage values). This is documented in Environment North (2015a) which has been superseded by this report.
4. April 2015 field reconnaissance of revised candidate sites (Sections B and C) and alternatives where these were required (landholder consultation, soils, hydrology, biodiversity, access). This assessment also confirmed the required storage volume based on the construction activities proposed and was informed by previous desktop assessments of hydrology.
5. May 2015 geotechnical testing of selected sites (Sections B and C) where soil profiles required confirmation.
6. May / June 2015 detailed biodiversity surveys and analysis of revised candidate sites (Section C). This is detailed in **Chapter 3**.
7. May / June 2015 cultural heritage desktop assessment (Sections B and C). This is detailed in **Chapter 3**. As noted later, no fieldwork has been undertaken for the cultural heritage assessment at this time.
8. The Section B biodiversity desktop and field investigations are scheduled for late June and will documented in a new version of this report. Timing for the fieldwork component of the cultural heritage assessment is currently uncertain.

A detailed description of the site selection process is provided in **Section 2.3.4** and a summary of all sites investigated shown in **Table 2-8**.

1.6 STUDY TEAM

The study team of this project is as set out below.

Table 1-1 Study Team

ORGANISATION	NAME	ROLE
AECOM	Michael Christie Aaron Sexton	Project manager Engineering Reconnaissance survey
Environment North	David Rivett	Environment team lead Reconnaissance survey Reporting Environmental management
Biotropica Australia	Nigel Tucker Sarah Holt Lars Kazmeier James Hill	Biodiversity lead / reporting Biodiversity reporting Reconnaissance survey Fauna assessment / GIS Flora assessment / reporting
Alice Buhrich	Alice Buhrich	Cultural heritage

2 DETAILS OF WATER STORAGES

2.1 REQUIRED STORAGE CAPACITY

2.1.1 Section B

The volume of new storages required has been assessed based on water needs for the type and timing of construction, less existing storage capacity (Saltwater Creek and existing storages). As noted previously, water is required for compaction of earthworks and pavement and for dust control.

a) Required Capacity

Timing

It is envisaged that the Section B water storages will be constructed in time to fill during the 2015/16 wet season for first construction use during the 2016 dry season. This requires a construction date of no later than September 2015. As shown in **Table 2-1** below, each storage will be used for up to four construction years and this reduces the total capacity required to be provided.

Required Total Storage Capacity

An assessment of the final embankment design reveals that approximately 10 ML of construction water is required per kilometre in order to fully construct the road (i.e. embankment, paving, dust suppression, etc.). Details follow.

Table 2-1 Water Requirements Per Construction Year (Section B)

CONSTRUCTION YEAR	START CHAINAGE	END CHAINAGE	DISTANCE (km)	ML/ km	WATER REQUIRED (ML)
2017	109.82	126	16.18	10	161.8
2016	126	137	11	10	110
2018	137	140	3	10	30
	140	142	2	10	20
2019?	142	149.6	7.6	10	76

Source: Study team compilation.

The maximum volume needed in any one year is 162 ML (2017). Note that this could change, depending on experience gained in constructing other sections of the PDR.

b) Existing Sources of Water

Below is a list of current water sources in the vicinity of Section B that TMR propose to use as part of the overall water storage resource. The capacity or safe yield of these sites is estimated based on site inspections and advice from RoadTek.

Table 2-2 Existing Capacity – Section B

DESCRIPTION	NOTES
Saltwater Creek (within 500 m of Musgrave)	Seasonal
90C_118 (Windmill Dam) *	Less than 5 ML of available storage
90C_123 (White Dam) +	Greater than 5 ML of available storage
90C_126 (Eight Mile Dam) *	Less than 5 ML of available storage
90C_128 (South Five Mile Dam) *	Less than 5 ML of available storage
90C_133 (Four Mile Dam) +	5 – 10 ML of available storage
90C_141 (One Mile Dam) *	Less than 5 ML of available storage
90C_144 (Un-named Dam)	Less than 5 ML of available storage
90C_145 (Anthill Dam) +	Approximately 5 ML of available storage
90C_147A (North Five Mile Dam)	No Access Track – assumed not available
90C_147B (Bamboo Station)	Issues with Access – assumed not available
90C_147C((Big Mound Dam)	Less than 5 ML of available storage
Total	**45 ML** (+ seasonal supply from Saltwater Creek as required)

Source: Study team compilation based on advice from RoadTek.

* assessed in Environment North (2010a)

\+ constructed subsequent to the completion of Environment North (2010a).

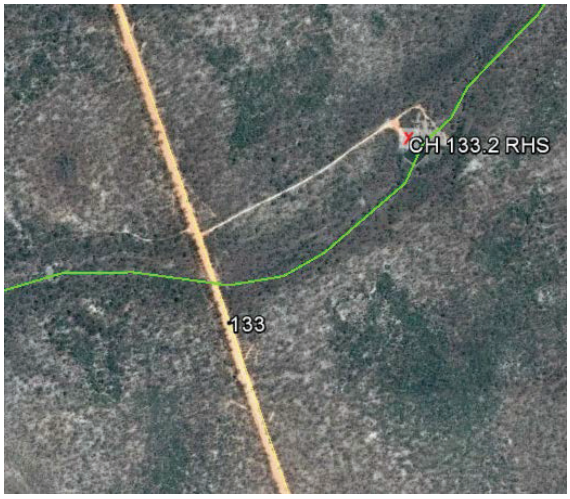
This analysis reveals that approximately 45 ML of capacity currently exists. Refer to the following photographs from the Environment North (2010a) investigations and reconnaissance surveys and Google Earth images (all images are not at the same scale) for details of these existing storages.

Table 2-3 Images of Existing Storages – Section B

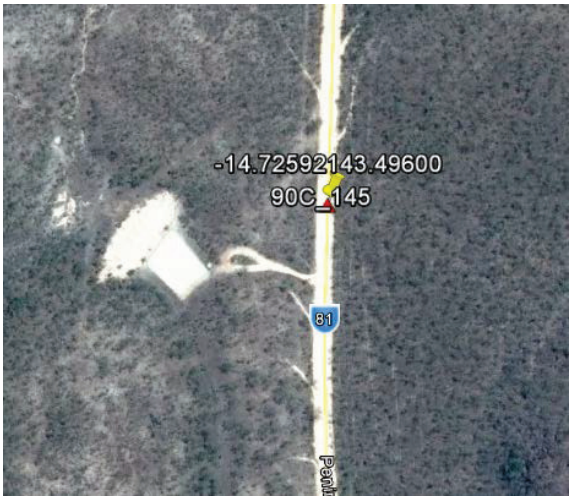
	
Photo 2-1 Existing storage 90C_118 (Windmill Dam). **Source:** April 2015 reconnaissance survey.	Google Earth image (all images not same scale).
	
Photo 2-2 Existing storage 90C_123 (White Dam). **Source:** April 2015 reconnaissance survey.	Google Earth image (all images not same scale).

	
Photo 2-3 Existing storage 90C_126 (Eight Mile Dam). **Source:** Environment North (2010a).	Google Earth image (all images not same scale).
	
Photo 2-4 Existing storage 90C_128 (South Five Mile Dam). **Source:** Environment North (2010a).	Google Earth image (all images not same scale).

(Continued over)

[Photo required]	
Photo 2-5 Existing storage 90C_133 (Four Mile Dam). **Source:** April 2015 reconnaissance survey.	Google Earth image (all images not same scale).
	
Photo 2-6 Existing storage 90C_141 (One Mile Dam). **Source:** Environment North (2010a).	Google Earth image (all images not same scale).

(Continued over)

	
Photo 2-7 Existing storage 90C_145 (Anthill Dam). **Source:** April 2015 reconnaissance survey. This storage is to be enlarged.	Google Earth image (all images not same scale).

c) New Storage Volume

Based on the above, there is an assessed theoretical undersupply of water of 162 – 45 = 117 ML (ignoring evaporation and seepage). In order to reduce the risk that the new storages will not always produce the required yield and to provide storages at frequent locations along the road (ideally at an average spacing of around 5 km) to reduce travel time for water carts (and traffic interruptions and road damage during carting), the proposed project includes a slightly greater theoretical yield than that stated above, after allowing for evaporation and seepage. Refer to **Section 2.5**.

2.1.2 Section C

a) Required Capacity

Timing

It is envisaged that the Section C water storages will be constructed in time to fill during the 2015/16 wet season for first construction use during the 2016 dry season. This requires a construction date of no later than September 2015. As shown in **Table 2-4** below, each storage will be used during two separate construction years and this reduces the total capacity required to be provided.

Required Total Storage Capacity

An assessment of the final embankment design reveals that approximately 7 ML of construction water is required per kilometre in order to fully construct the road (i.e. embankment, paving, dust control etc.). Details follow.

Table 2-4 Water Requirements Per Construction Year (Section C)

CONSTRUCTION YEAR	START CHAINAGE	END CHAINAGE	DISTANCE (km)	ML/ km	WATER REQUIRED (ML)
2016	201	215	14	7	98
2019	222.6	245	22.4	7	157

Source: Study team compilation.

The maximum volume needed in any one year is 157 ML (2019). Note that this could change, depending on experience gained in constructing other sections of the PDR.

b) Existing Sources of Water

Below is a list of current water sources in the vicinity of Section C that RoadTek propose to use as part of the overall water storage resource. The capacity or safe yield of these sites is estimated based on experience and advice from RoadTek. Images following the table show the nature of these storages.

Table 2-5 Existing Capacity – Section C

DESCRIPTION	NOTES
Coen River (approximately 1km north of Coen)	Seasonal
90C_218B (Nectars Dam) *	Approximately 5 ML of available storage.
90C_232 (Hanging Rock Dam) *	Approximately 80 ML of available storage
90C_234 (Great Divide Dam) *	Approximately 5 ML of available storage
90C_236 (Hogans Dam) *	Approximately 5 ML of available storage
90C_238 (Kidney Dam) *	Less than 5 ML of available storage
90C_239 (Micks Dam)	Approximately 5 ML of available storage
90C_244 (Paddy Shepard Dam) *	Approximately 5 ML of available storage
Total	**110 ML** (+ seasonal supply from the Coen River as required)

Source: Study team compilation based on advice from RoadTek.

* assessed in Environment North (2010a)

Table 2-6 Images of Existing Dams – Section C

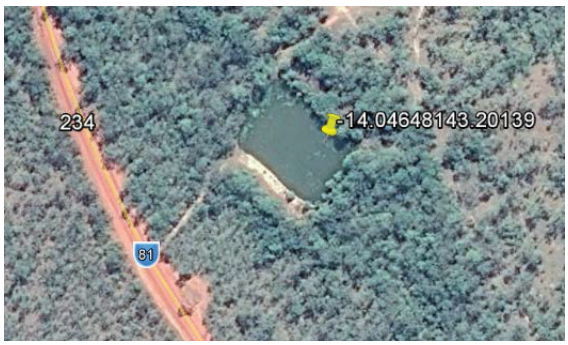
	
Photo 2-8 Existing storage 90C_218B (Nectars Dam). **Source:** Environment North (2010a).	Google Earth image (all images not same scale).
	
Photo 2-9 Existing storage 90C_232 (Hanging Rock Dam). **Source:** Reconnaissance survey October 2014.	Google Earth image (all images not same scale).
	
Photo 2-10 Existing storage 90C_234 (Great Divide Dam). **Source:** Environment North (2010a).	Google Earth image (all images not same scale).





Photo 2-11 Existing storage 90C_236 (Hogans Dam).
Source: Environment North (2010a).

Google Earth image (all images not same scale).





Photo 2-12 Existing storage 90C_238 (Kidney Dam).
Source: Environment North (2010a).

Google Earth image (all images not same scale).





Photo 2-13 Existing storage 90C_239 (Micks Dam).
Source: Reconnaissance survey October 2014.

Google Earth image (all images not same scale).

	
Photo 2-14 Existing storage 90C_244 (Paddy Shepard Dam). **Source:** Environment North (2010a).	Google Earth image (all images not same scale).

c) New Storage Volume

Based on the above, there is an assessed theoretical undersupply of water of 157-110=47 ML excluding allowance for evaporation and seepage. The possible yield of the existing dams is currently being reassessed.

2.2 DETAILS OF PROPOSED STORAGES

2.2.1 Size

Each proposed storage has been sized based on a number of criteria including:

- construction needs of adjacent road (principally height of new embankment)
- catchment
- site constraints (topography, soils, ecological, cultural heritage, landholder desires)
- overall spacing of storages (ideally at about 5 km to reduce travel time for water carts and limit traffic interruptions and road damage during carting).

This assessment has yielded a required storage volume at each site ranging from approximately 5 ML to 60 ML. See **Table 2-11** and **Table 2-12**.

2.2.2 Nature

The proposed storages in Sections B and C are not technically dams as:

- inflow is largely overland flow from a suitable catchment of the road itself, led to the storages from road drainage (e.g. small culverts or table drain turnouts) using minor excavated drains where needed – i.e. the storages are not proposed to be constructed on 'major watercourses' (see **Section 6.5.3** for a definition of this term)
- they are to be constructed by excavating below-ground storages – suitable excavated material will be heaped up to form a 'turkey's nest' structure in the downhill side of the excavation to slightly increase storage but this is not intended to be a dam wall as such
- a bypass is provided for safety.

The following is an image of a typical storage on the PDR (90D) soon after construction and prior to rehabilitation and fencing.



Photo 2-15 Typical constructed storage on the PDR (90D) in late 2014.

Photo: T Short 19 December 2014. This photo was taken prior to rehabilitation and fencing.

TMR have indicated that lining the water storages (i.e. with clay or plastic membrane) is not required and that the preferred construction methodology involves the use of scrapers and dozers. For flat topography, it is envisaged that the scrapers will enter and exit the excavation in the one plane, which will result in front and back slopes on a gentle grade (i.e. 1:6) and steeper side slopes (i.e. typically 1:1 – to be confirmed onsite by the Contractor to suit soil conditions). For simplicity, the geometry of the water storage has been assumed as follows (refer **Figure 2-1** below):

- trapezoidal prism
- depth of 6 m (typical)
- end slope of 1:6.

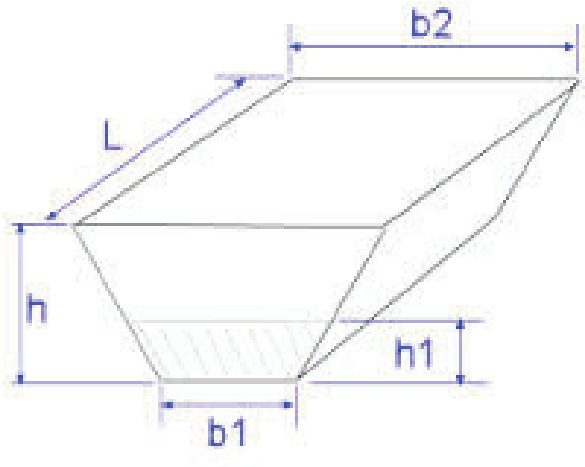
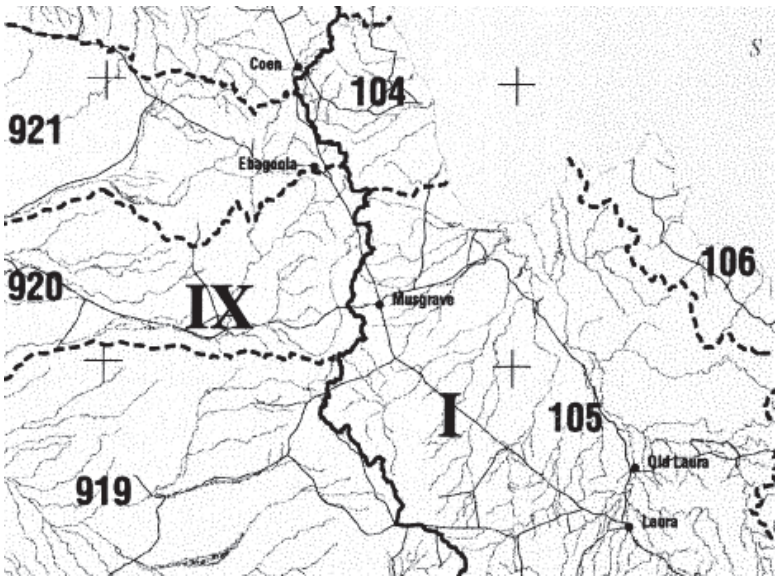


Figure 2-1 Schematic of storage design.

Dimensions indicated are provided for proposed storages in **Table 2-11**.

2.2.3 Hydrology – Yield

Average annual yield information is provided in work undertaken for the Cape York Peninsula Land Use Strategy (Environment Science & Services (NQ) 1995) as follows. Sections B and C are located in the Normanby and Coleman catchments respectively (shaded in **Table 2-7**). See **Figure 2-2**.



DRAINAGE DIVISIONS KEY

I North East Coast
IX Gulf

RIVER BASINS

101 Jacky Jacky
102 Olive – Pascoe
103 Lockhart
104 Stewart
105 Normanby
106 Jeannie
107 Endeavour
108 Daintree

919 Mitchell
920 Coleman
921 Holroyd
922 Archer
923 Watson
924 Embley
925 Wenlock
926 Ducie
927 Jardine
928 Torres Strait Islands

Figure 2-2 River catchments.

Source: Environment Science & Services (NQ) (1995).

Table 2-7 River Basins on Cape York Peninsula

NAME	CATCHMENT AREA (km^2)	MEAN ANNUAL DISCHARGE [1] ($ML \times 10^3$)	MEAN ANNUAL RUNOFF [2] (mm)
Catchments draining to the east coast			
Stewart	2795	1162	416
Normanby	24 605	5954	242
Catchments draining to the west coast			
Coleman	13 080	4197	321
Holroyd	10 425	3856	370
Archer	13 595	4828	355
Watson	4715	3556	754
Wenlock	7575	3373	445

Source: Environment Science & Services (NQ) (1995). See over for key.

KEY

1: The duration of individual stream records varies.
2: This column provides an indication of catchment response to rainfall. The units of millimetres are equivalent to megalitres per square kilometre.

This table indicates that for the relevant catchments (shaded), Mean Annual Runoffs are as follows:

- Normanby (Section B) – 242 mm
- Coleman (Section C) – 321 mm.

2.2.4 Hydrology – Design Flows

Bypass weirs have been sized for 50% Annual Exceedance Probability (i.e. 2 year Average Recurrence Interval – ARI) event and catchment flows have been determined using the Rational Method as outlined below:

1. Equation:

$$Q_Y = \frac{C_Y \cdot I_{t_c,Y} \cdot A}{360}$$
$$C_Y = C_{10} \cdot FF_Y$$

$Q_Y =$ Peak flow rate (m^3/s)

$C_Y =$ Runoff coefficient (dimensionless) for ARI of *Y* years

$I_{t_c,Y} =$ Average rainfall intensity (mm/h) for design duration of t_c hours and ARI of *Y* years

$A =$ Area of catchment (ha)

$C_{10} =$ Runoff coefficient (dimensionless) for 10 year ARI

$FF_Y =$ Frequency factor (dimensionless) for ARI of *Y* years

2. Catchments were developed based on existing LiDAR survey information and/or topographic maps.
3. A C_{10} value of 0.70 has been adopted – as per Table 4.5.4 of the Queensland Urban Drainage Manual (QUDM) for a 10 year ARI of between 70 mm/hour and 90 mm/hour for light cover bushland, medium soil permeability and zero fraction impervious.
4. A 2 year ARI frequency factor (FF_y) of 0.85 was adopted from the QUDM.
5. Time of concentration has been determined using the Bransby Williams equation

$$t_c = \frac{58 \cdot L_c}{A^{0.1} \cdot {S_e}^{0.2}}$$

$t_c =$ Time of concentration (min)

$L_c =$ Length (km) of flow path from catchment divide to outlet

$A =$ Area of catchment (ha)

$S_e =$ Equal-area slope of stream flow path (%)

6. It should be noted that evaporation has been determined for 9 months of the year from January to September with volumes cited being at the end of September. Evaporation was estimated using a water balance method utilising monthly average pan evaporation rates obtained from the Bureau of Meteorology.

2.3 SITE SELECTION AND SCREENING

2.3.1 Introduction

As previously noted, the methodology undertaken to select and screen sites for new storages involved a comprehensive process over many years. Key steps in the process were:

- 2009 assessment of potential dams between Laura and Weipa (for supply of maintenance water).
- October 2014 field reconnaissance (Section C only) of candidate sites and alternatives where these were required.
- January 2015 desktop assessment of 14 candidate sites (Sections B and C).
- April 2015 field reconnaissance of revised candidate sites (Sections B and C) and alternatives where these were required.
- May 2015 geotechnical testing of selected sites (Sections B and C) where soil profiles required confirmation.
- May / June 2015 detailed biodiversity surveys and analysis of revised candidate sites (Section C).
- May / June 2015 cultural heritage desktop assessment (Sections B and C).
- June 2015 detailed biodiversity surveys and analysis of revised candidate sites (Section B) [this work and the cultural heritage fieldwork are yet to be undertaken].

The overall methodology involved best practice environmental planning to protect natural and cultural values, namely:

- avoid areas with high values
- minimise impacts on values
- mitigate impacts on values by environmental management
- restore values where possible by rehabilitation.

Details are provided below of the work undertaken. A summary is provided in **Table 2-8**.

2.3.2 2009 Assessment

As noted in **Section 1.4**, an ecological and environmental engineering assessment was undertaken in 2009 of 64 possible sites for new storages (Environment North 2010b). At the time of this study, proposed storages were for the purposes of maintenance and, with a volume of approximately 4 ML each, are considerably smaller than required for road construction.

The report included documentation of the following matters:

- Project Details
  - Need for project
  - Description of project.

- Natural resources and biodiversity values
  - topography and climate
  - water and drainage
  - geology
  - physiography
  - soils
  - regional ecosystems
  - plants of conservation significance
  - animals of conservation significance.
- Threats to values
  - weeds
  - ponded pasture species
  - feral and native animals
  - fire
  - roadworks.
- Environmental management needs:
  - weeds
  - feral animals
  - stock
  - soil and water management
  - design inputs
  - construction phase
  - operation phase
  - general recommendations.
- Approvals.
- Project Implications.

The detailed site assessments proved to be invaluable in completing the recent work, even though the new storages are larger than those originally envisaged. The detailed assessment of existing dams also provided an insight into management needs and these are discussed in **Section 5.2.1b)**.

Fourteen sites in Sections B and C were selected for further consideration, along with some existing storages that could potentially be expanded.

2.3.3 Post 2010 Construction

Since the completion of the above study, three additional storages have been constructed by TMR, namely:

- 90C_123 (Ch 123.6 RHS) – White Dam
- 90C_133 (Ch 133.2 RHS) – Four Mile Flat Dam
- 90C_145 (Ch 145.9 LHS) – Anthill Dam.

These were investigated during various aspects of the current work as later described.

Three new existing storages in Section B were constructed in 2010 and were selected for further investigation (some could potentially be expanded).

2.3.4 October 2014 Reconnaissance Survey

The 2009 locations and other sites were inspected by TMR, RoadTek, AECOM, Environment North, and Biotropica representatives on 7, 8 and 9 October 2014. This involved landholder consultation and assessment of soils, hydrology, biodiversity, and access.

On the basis of this assessment (which included re-appraisal of sites once proposed as 4 ML maintenance structures for 20-40 ML construction storages), eight potential sites were selected (Section C only). Of these, two had been assessed in 2009. It has since transpired that two of these sites (90C_240A and 90C_240B) were located too close to large streams and would involve high walls. These sites were rejected.

Eight sites in Section C were selected for further consideration, along with some existing storages that could potentially be expanded.

2.3.5 January 2015 Desktop Assessment

A desktop assessment of 14 candidate sites (Sections B and C) was undertaken in January 2015 and documented in Environment North (2015a). This assessment, supplemented by additional hydrology analysis, was used to inform the April 2015 reconnaissance survey and included ten sites from the 2009 study.

a) Natural Resources and Biodiversity

Topics included:

- geology and soils
- regional ecosystems
- waterways
- plants of conservation significance
- animals of conservation significance
- legislation (especially the Cape York Significant Environmental Area (SEA) and Yarraden Nature Refuge issues).

The desktop assessment revealed potential soils issues for some sites (permeability and erosivity) and this issue was further assessed by RoadTek based on field experience with similar soil types. Some sites were found to be potentially restricted due to the presence of the Cape York SEA, the Yarraden Nature Refuge, and various High Risk Protected Plant Areas.

b) Cultural Heritage

The cultural heritage report completed by Alice Buhrich (2014) for Section A was considered to be largely relevant for Sections B and C (a copy is included in **Appendix E**). This included a description of (desktop only):

- history
- site descriptions
- proposed project activities
- legislation
- registers and databases
- previous studies
- consultation
- results
- recommendations.

Fourteen sites (seven each in Sections B and C) were assessed for further consideration, along with some existing storages that could potentially be expanded.

2.3.6 April 2015 Reconnaissance Survey

The 14 sites assessed in the desktop work and other potential sites were inspected by TMR, RoadTek, AECOM, Environment North, and Biotropica representatives on 29 and 30 April 2015. As for the 2014 reconnaissance survey, this involved landholder consultation and assessment of soils, hydrology, biodiversity, and access. Of the potential sites, six were selected for further testing of soil depth.

Sixteen sites (nine in Section B and seven in Section C) were selected for further consideration, along with some existing storages that could potentially be expanded.

2.3.7 May 2015 Soil Investigations

The April 2015 reconnaissance survey ruled out several potential sites on the basis of insufficient soil depth (see **Section 3.2.3c)**). It also identified six sites where further testing was required. RoadTek subsequently undertook backhoe investigations and ruled three sites in and three out.

Six sites (four in Section B and two in Section C) were selected for further investigation of soil depth. This ruled three sites in and three out.

2.3.8 May/June 2015 Detailed Surveys

The final suite of storages selected for detailed site surveys was based on the comprehensive assessment process outlined above. This involved eight sites in Section B and six in Section C. Prior to committing to these sites, consideration was given to a number of criteria including:

- soils (desktop, as confirmed by the May 2015 geotechnical testing of selected sites)
- catchment areas (catchments need to be of a suitable size for the required storages)
- waterways (ideally storages should avoid waterways identified in the Guide for the determination of waterways using the spatial data layer *Queensland waterways for waterway barrier works* and larger streams shown on the *Water Act 2000* (Qld) waterway layer.

As detailed in **Part B**, refinements were made in the location of storages based on site constraints identified during detailed surveys.

2.3.9 Summary of Site Screening

a) Sites Assessed

The following table is a summary of all sites investigated in one or more of the following processes (text in brackets indicates the EPISODE columns below):

- 2009 RoadTek investigation (2009)
- October 2014 reconnaissance survey (2014R)
- January 2015 desktop study (2015D)
- April 2015 reconnaissance survey (2015R)
- May 2015 soils exploratory survey (2015S)
- June 2015 surveys (SURVEY).

An 'x' or '+' in any cell indicates that the site was considered during the relevant assessment while 'Comments' summarise the outcome. Final sites are highlighted in green. Section B chainages are approximate only.

Table 2-8 Summary of Assessment

SECTION	SITE	EPISODE						COMMENTS
		2009	2014R	2015D	2015R	2015S	SURVEY	
B	90C_113	x		x	x	Soils proved OK	x	Confirmed
B	90C_115				x	Insufficient soil depth		Ruled out - insufficient soil depth
B	90C_119				x		x	Confirmed
B	90C_129	x		x	x	Soils proved OK	x	Confirmed
B	90C_134	x		x	x		x	Confirmed
B	90C_136	x		x	x	Soils proved OK	x	Confirmed
B	90C_142	x		x	x		x	Confirmed
B	90C_145	x		x	+		x	Constructed post-2009, to be enlarged
B	90C_146	x		x	+		x	Moved to opposite side of road
C	90C_200		x					Ruled out - inadequate catchment

SECTION	SITE	EPISODE						COMMENTS
		2009	2014R	2015D	2015R	2015S	SURVEY	
C	90C_203		x		x			Ruled out - insufficient soil depth
C	90C_205	x			x	Insufficient soil depth		Ruled out - insufficient soil depth
C	90C_207				x	Insufficient soil depth		Ruled out - insufficient soil depth
C	90C_210	x			x		x	Confirmed
C	90C_213	x	x	x	x		x	Confirmed
C	90C_222	x		x	x		x	Confirmed
C	90C_228	x						Ruled out - high ecological value (habitat trees)
C	90C_233	x						Ruled out - high ecological value (habitat trees)
C	90C_239		x	x				Ruled out - in watercourse
C	90C_240A		x	x				Ruled out - in watercourse
C	90C_240B		x	x				Ruled out - in watercourse
C	90C_240C				x		x	Confirmed
C	90C_241		x	x			x	Moved to site between streams
	90C_244							Ruled out - inadequate catchment
C	90C_245	x	x	x			x	Existing storage on site, new storage to augment
No.	**25**	**14**	**8**	**14**	**16**	**6**	**14**	

Source: Study team compilation from sources cited.

b) Summary of Outcomes

This table reveals that, overall:

- 25 sites were assessed overall
- 14 were assessed in detail in the 2009 desktop / survey assessment
- 8 were assessed in the October 2014 reconnaissance survey
- 14 were assessed in detail in the 2015 desktop assessment
- 16 were assessed in the April 2015 reconnaissance survey
- 6 were assessed in the May 2015 soils investigation
- 6 were assessed in detail in the Section C (June 2015) desktop / site survey assessment
- 8 are proposed to be assessed in detail in the Section B (June 2015) desktop / site survey assessment (Section B).

The detailed site surveys either confirmed the original location of the storage and other infrastructure on the site or made recommendations for minor relocations to avoid constraints. Refer to **Part B**.

2.4 SITES OF PROPOSED NEW WATER STORAGES

2.4.1 Section B

Proposed sites in Section B are as summarised below. By convention, the RoadTek name (Column 1) includes a three digit suffix that corresponds to the approximate chainage on road 90C opposite the centre of the survey area. Chainages are north of Laura and are approximate only at this time. [Data in preparation]

Table 2-9 Details of Proposed New Water Storages – Section B

SITE	SIDE OF ROAD	LATITUDE	LONGITUDE	PROPERTY NAME / TENURE
90C_113	RHS	-14.9850	143.6105	Artemis / Lands Lease
90C_119	RHS	-14.9523	143.5774	Artemis / Lands Lease
90C_129	RHS	-14.8733	143.5496	Artemis / Lands Lease
90C_134	RHS	-14.8178	143.5201	Artemis / Lands Lease
90C_136	RHS	-14.7980	143.5118	Artemis / Lands Lease
90C_142	LHS	-14.7547	143.5048	Artemis / Lands Lease
90C_145	LHS	-14.7147	143.4886	Artemis / Lands Lease
90C_146	LHS	-14.7005	143.4980	Artemis / Lands Lease

2.4.2 Section C

Proposed sites in Section C are as summarised below.

Table 2-10 Details of Proposed New Water Storages – Section C

SITE	SIDE OF ROAD	LATITUDE	LONGITUDE	PROPERTY NAME / TENURE
90C_210	RHS	-14.216389	143.287016	Yarraden Nature Refuge
90C_213	LHS	-14.198499	143.279151	Yarraden Nature Refuge
90C_222*	LHS	-14.138028	143.230992	Yarraden Nature Refuge
90C_240C	LHS	-13.991720	143.183773	Lochinvar / Lands Lease
90C_241	RHS	-13.986734	143.185949	Lochinvar / Lands Lease
90C_245	LHS	-13.955825	143.195751	No Name / Reserve

2.5 ENGINEERING DETAILS

2.5.1 Dimensions

The following table provides relevant engineering details of the selected sites. The previous sketch (**Figure 2-1**) showing the labels listed in the ID column. Chainages to be confirmed.

Table 2-11 Details of Proposed Water Storages – Section B

ID	90C_113	90C_119	90C_129	90C_134	90C_136	90C_142	90C_145	90C_146
Catchment size (ha)	1.6	8.3	4.9	1.6	14.9	15.2	17.8	8.8
Mean Annual Runoff (ML	4	20	12	4	36	37	43	21
Base width [b1] (m)	10	45	35	15	60	65	70	45
Top width [b2] (m)	82	117	107	87	132	137	142	117
Length (m)	15	40	25	12	55	60	65	40
Depth (m)	6	6	6	6	6	6	6	6
Volume (Total = 166.7) (ML)	4.1	19	11	4	32	36	41	19
Catchment Length (km)	0.24	0.7	0.42	0.25	0.68	0.8	0.62	0.74
Equal area slope (%)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

ID	90C_113	90C_119	90C_129	90C_134	90C_136	90C_142	90C_145	90C_146
Time of concentration (min)	15	38	24	16	35	41	31	40
Rainfall depth (mm)	27.0	44.2	34.8	27.6	42.6	45.7	40.8	45.2
Rainfall intensity (mm/hr)	106.3	70.3	87.4	104.2	74.0	67.5	79.0	68.4
Q2 Bypass Flow (m3/s(	0.28	0.96	0.71	0.28	1.82	1.70	2.32	1.00
Volume after evaporation = 90.4 (ML)	**1.4**	**9.9**	**6.0**	**1.7**	**19.5**	**18.6**	**22.4**	**10.9**

Source: Study team compilation (AECOM .25 May 2015).

The table above shows that a total volume of 90 ML (after evaporation) is available. This is less than the theoretical deficiency of 117 ML. Existing dams may provide more than the expected yield or this shortage may require adjustment of construction staging.

Table 2-12 Details of Proposed Water Storages – Section C

ID	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
Catchment size (ha)	13.2	17	10.9	5.3	2.7	8.3
Mean Annual Runoff (ML	42.3	54.5	35	17.0	8.6	26.6
Base width [b1] (m)	75	100	60	40	30	60
Top width [b2] (m)	147	172	132	112	102	132
Length (m)	70	74	60	40	25	50
Depth (m)	6	6	6	6	6	6
Volume (Total = 194.3) (ML)	46.6	60.4	35	18.2	9.9	28.8
Catchment Length (km)	0.56	0.63	1.03	0.27	0.39	0.44
Equal area slope (%)	0.5	0.5	0.5	0.5	0.5	0.5
Time of concentration (min)	28.8	31.6	54	15.2	23.5	23.7
Rainfall depth (mm)	37.9	39.8	51.1	26.0	35.7	33.5

ID	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
Rainfall intensity (mm/hr)	79.0	75.5	56.7	102.8	91.1	84.7
Q2 Bypass Flow (m3/s(	1.7	2.1	1.02	0.9	0.4	1.1
Volume After Evaporation (ML) Total = 85.2	**19.2**	**25.5**	**16.7**	**8**	**4**	**11.8**

Source: Study team compilation (AECOM .25 May 2015).

The table above shows that a total volume of 85 ML (after evaporation) is available. This is greater than the theoretical deficiency of 47 ML as storages needed to be provided at regular intervals along the works to minimise travel time and effects on road traffic.

2.5.2 Construction Activities

Construction of the proposed water storages will generally consist of:

- confirmation of footprint (contractor property owner, based on this EAR)
- installation of erosion and sediment control measures (if applicable)
- site clearing (approximately 1 ha) and stockpiling of timber in nominated area (approximately 0.25 ha)
- topsoil stripping and stockpiling in nominated area (approximately 0.25 ha)
- construction of an access track (site to be determined on-site) based on avoiding noted constraints
- excavation of proposed water storage and stockpiling spoil in nominated area (approximately 2 ha)
- construction of bypass weir / spillway and erosion protection as appropriate (based on site assessment)
- re-spreading of topsoil around exposed areas.

Refer to **Figure 2-3** below for a sample map showing these features. Fencing and other infrastructure is to be installed as per standard arrangements.

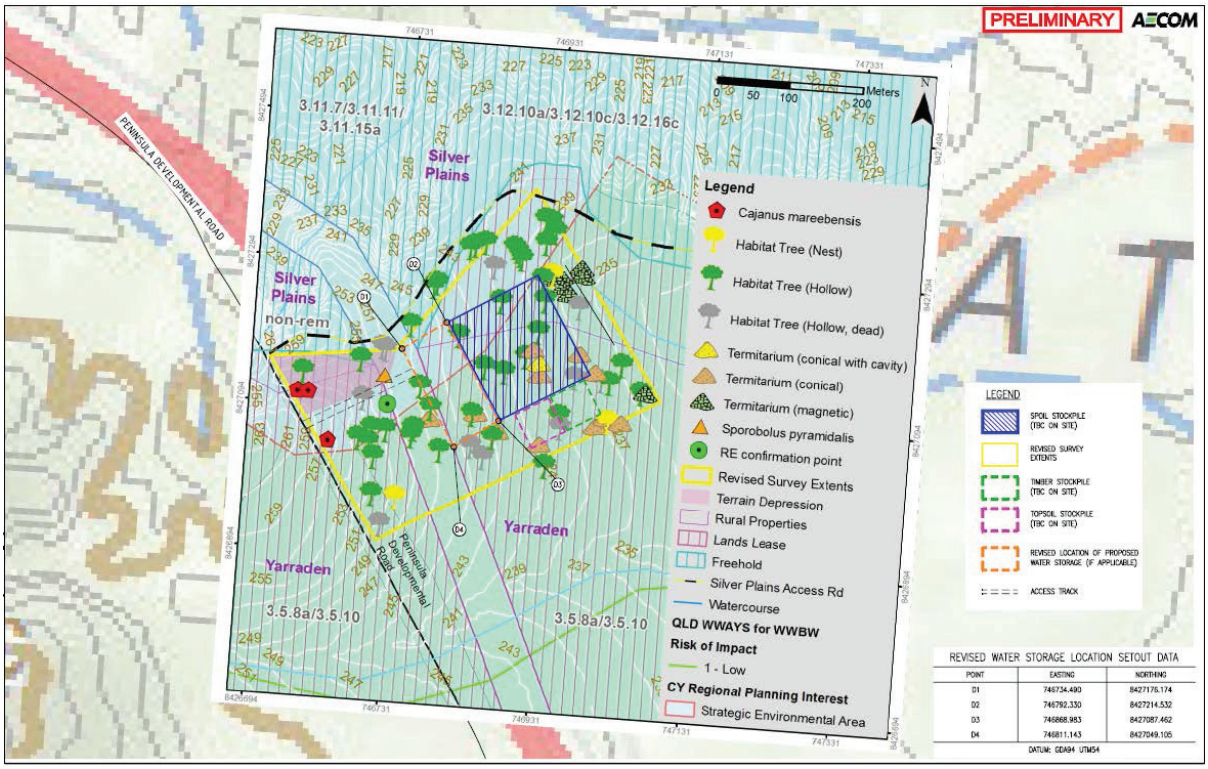


Figure 2-3 Typical site plan for construction, based on fieldwork recommendations.

Larger scale detailed plans are included in **Part C**.

A full set of the above plans is attached to **Part C** for use in finalising the EMP (Construction).

2.5.3 Operation Phase

Consultation with property owners has included reaching agreement on the end use of the storages once they are no longer required for road construction. In all cases covered by this report, the storages are to remain under the management of the property owner and will be used for cattle watering and other agricultural uses. Many similar storages used for this purpose exist along the PDR.

TMR will install a fence of the desired standard around the storage to exclude cattle and most feral animals. After hand-over, the property owner will be responsible for on-going maintenance and management of weeds etc. Refer to **Section 5.2**.

2.6 SUMMARY OF EXISTING AND PROPOSED STORAGES

The final network of construction storages will comprise suitable existing sources and proposed storages detailed above. The following table provides a summary of these. It should be noted that 'capacity' is the gross storage available and does not consider losses in yield due to evaporation and seepage (although these have been considered when estimating yield).

Table 2-13 Summary of Existing and Proposed Storages

SECTION	DAM NO.	TYPE	CAPACITY (ML)	NOTES	GAP (km)
B	90C_107.74*	Existing	5.0	Capacity to be confirmed	
B	90C_113	Proposed	4.1		5.26
B	90C_114.5*	Existing	5.0	Capacity to be confirmed	1.50
B	90C_119	Proposed	19.0		4.50
B	90C_123.57	Existing	5.0		4.57
B	90C_126	Existing	5.0		2.43
B	90C_128	Existing	5.0		2.00
B	90C_129	Proposed	11.0		1.00
B	90C_134	Proposed	4.0		5.00
B	90C_136	Proposed	32.0		2.00
B	90C_138.5*	Existing	5.0	Capacity to be confirmed	2.50
B	90C_141	Existing	5.0	<5 ML expected	2.50
B	90C_142	Proposed	36.0		1.00
B	90C_144	Existing	5.0	<5 ML expected	2.00
B	90C_145	Existing	5.0		1.00
B	90C_145	Proposed	41.0		0.00
B	90C_146	Proposed	19.0		1.00
B	90C_147.6	Existing	5.0	<5 ML expected	1.60
C	90C_210	Proposed	46.4		
C	90C_213	Proposed	60.4		2.70
C	90C_218	Existing	5.0		4.55
C	90C_222	Proposed	35.0		4.75

SECTION	DAM NO.	TYPE	CAPACITY (ML)	NOTES	GAP (km)
C	90C_232	Existing	80.0		9.25
C	90C_234	Existing	5.0		2.00
C	90C_236	Existing	5.0		2.00
C	90C_238	Existing	5.0	<5 ML expected	2.00
C	90C_239	Existing	5.0		1.00
C	90C_240C	Proposed	18.2		1.60
C	90C_241	Proposed	9.9		0.80
C	90C_244	Existing	4.0		2.60
C	90C_245	Proposed	28.8		1.20

Source: Study team compilation.

This table allows the following statistics to be derived:

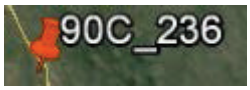
- Existing capacity 159.0 ML (30% of required storage) – subject to confirmation
- Proposed capacity 364.8 ML (70% of required storage)
- Total capacity 523.8 ML
- Average spacing 2.6 km
- Minimum spacing 0.0 km
- Maximum spacing 9.3 km.

The locations of existing and proposed storages are shown on the following figures.



Figure 2-4 Location of existing and proposed storages (Section B).

Legend:



= Existing storage



= Proposed storage

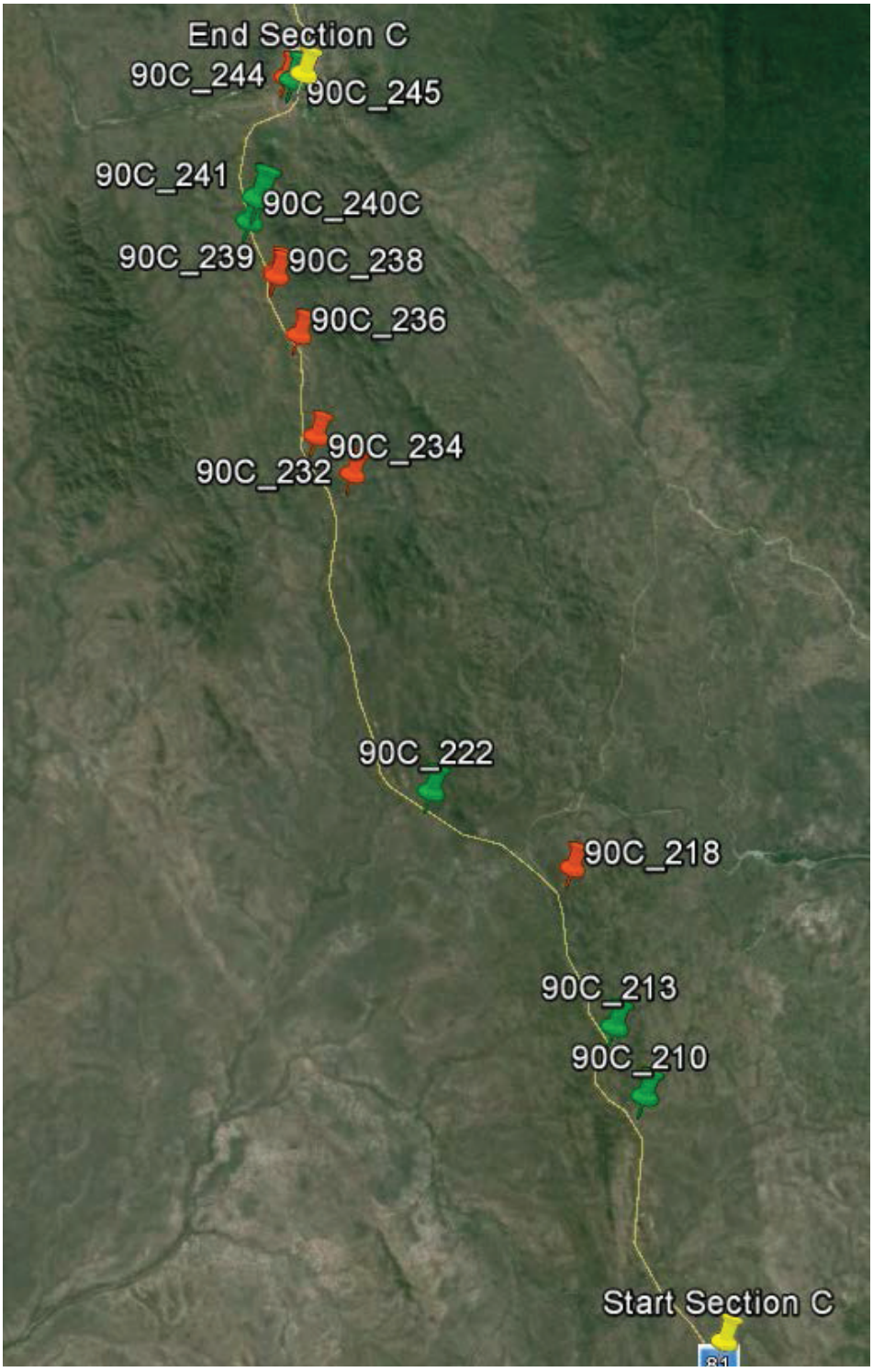
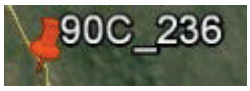


Figure 2-5 Location of existing and proposed storages (Section C).

Legend:



= Existing storage



= Proposed storage

These figures and the preceding tabulation show that the final network of existing and proposed storages generally meets the required spacing criteria. Gaps in the spacing are due to a combination of hydrological and environmental constraints.

3 EXISTING ENVIRONMENT

3.1 INTRODUCTION

This chapter describes aspects of the existing environment, based on a combination of desktop analysis and field survey including detailed work by Biotropica Australia and Alice Buhrich. More specific information on each site is provided in **Part B**. Topics covered include:

- geology and soils
- waterways
- biodiversity (regional ecosystems, plants of conservation significance, animals of conservation significance)
- cultural heritage.

Legislative issues are described separately in **Chapter 4**.

3.2 GEOLOGY AND SOILS

3.2.1 Geology

The study area lies in the Coen Inlier as defined in Biggs and Philip (1995). See **Figure 3-1**.

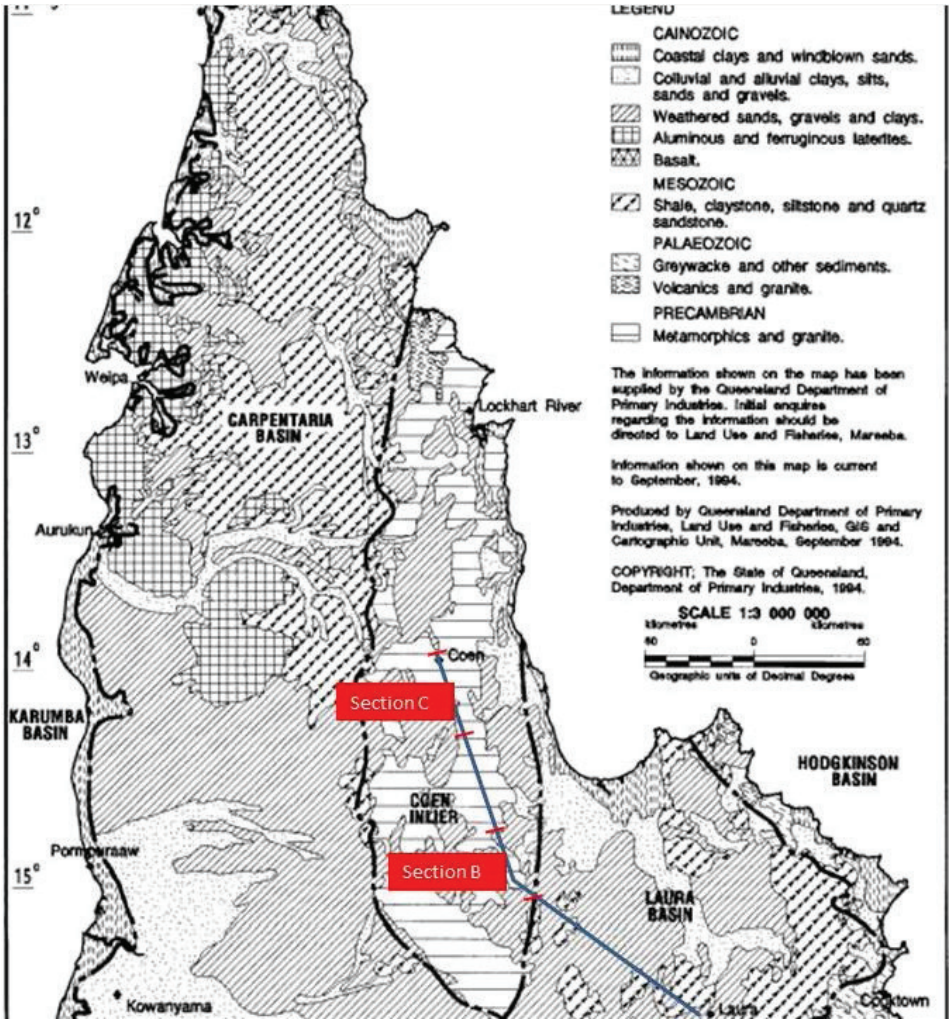


Figure 3-1
Generalised geology.

Source: (Biggs and Philip 1995) – extract.

The following is an extract from the CYPLUS soils report (Biggs and Philip 1995) for this feature.

> Of a similar age to the Yambo Inlier [1500 m.y.a] are the metamorphosed sediments of the Coen Inlier, which exist as a north-trending ridge from approximately 15 ~ 30' S to the coastline at Temple Bay. Subdivided into the Sefton, Holroyd and Coen Metamorphics, they are mostly schists, gneiss, amphibolite and greenstone (Whitaker and Grimes, 1977; Wilmott and Powell, 1977a). Minor dolerite intrusions are present at its northern and southern extremities. Steep sided hills are the norm, with generally narrow valley floors. Ewers and Bain (1992) have recently revised the Coen and Holroyd Metamorphics within the Ebagoola sheet area. The Coen Metamorphics are primarily restricted to an area surrounding the township of Coen (Whitaker and Gibson, 1977a), while the Holroyd Metamorphics dominate the southern end of the Inlier, although scattered outcrops also occur in the Coen area. Within the southern extent of the Holroyd Metamorphics, are alternating outcrops of quartzite and greenstone. The Sefton Metamorphics outcrop in the northern-most section of the Inlier, particularly around Lockhart River. (p 11)

Details maps of the sites covered by this report are provided below for Sections B and C.

For ease of interpretation, specific geological units relevant to each site are listed in **Table 3-1**. The major project implication of geology is the properties of the soils derived from this underlying sedimentary geology.

a) Section B

At the time of writing the analysis of geology for Section B has not commenced.

[Figure to come]

Figure 3-2 Geology (Section B – northern part).

Source: Biotropica Australia (in preparation).

[Figure to come]

Figure 3-3 Geology (Section B – southern part).

Source: Biotropica Australia (in preparation).

b) Section C

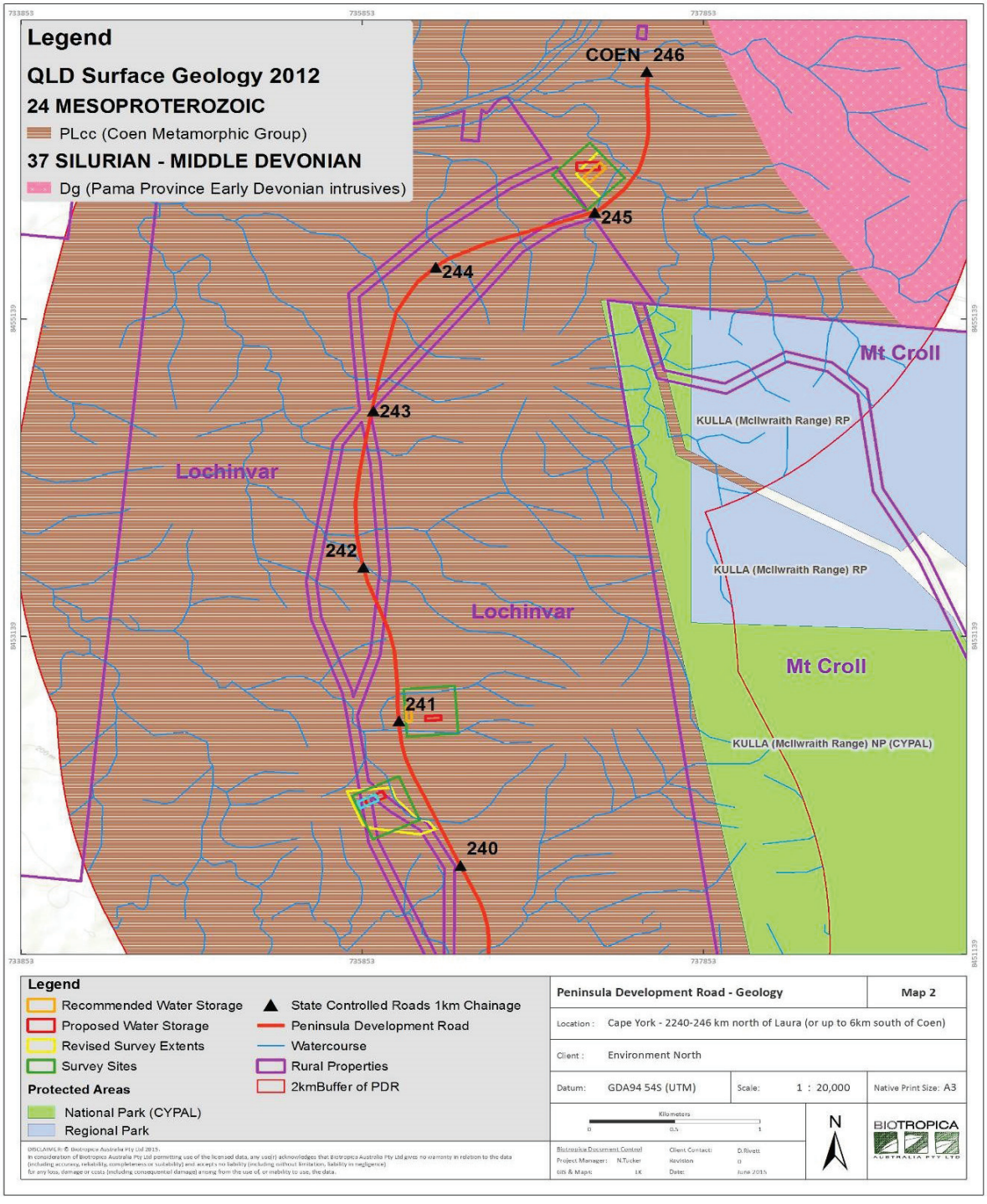


Figure 3-4 Geology (Section C – northern part).

Source: Biotropica Australia (2015).

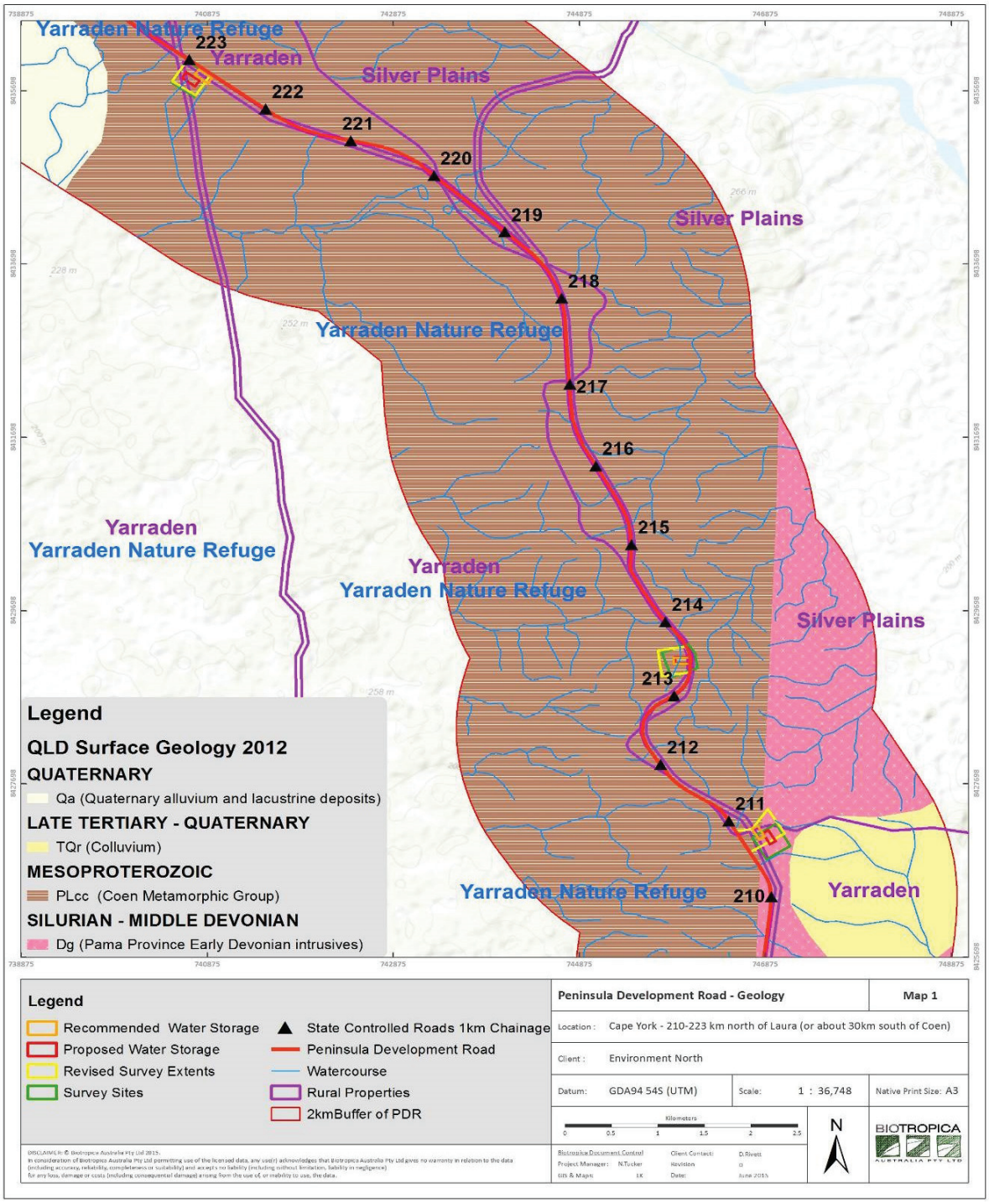


Figure 3-5 Geology (Section B – southern part).

Source: Biotropica Australia (2015).

3.2.2 Soils

a) Overview – Section B

The following figures show the soils of Sections B, with data derived from Biggs and Philip (1995).

At the time of writing the analysis of geology for Section B has not commenced.

[Figure to come]

Figure 3-6 Soils (Section B – northern part).
Source: Biotropica Australia (in preparation).

[Figure to come]

Figure 3-7 Soils (Section B – southern part).
Source: Biotropica Australia (in preparation).

b) Overview – Section C

The following figures show the soils of Sections B, with data derived from Biggs and Philip (1995).

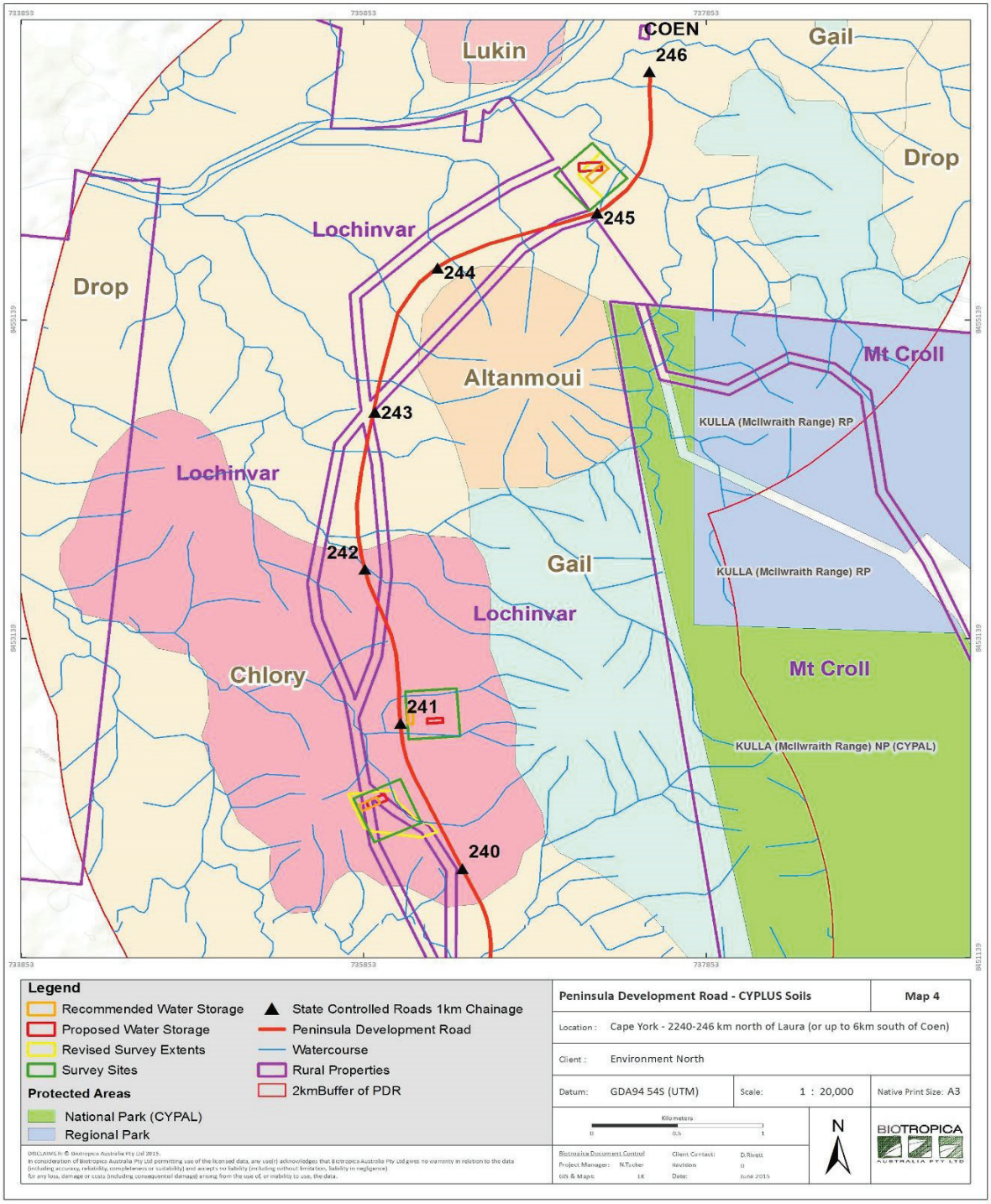


Figure 3-8 Soils (Section C – northern part).

Source: Biotropica Australia (2015).

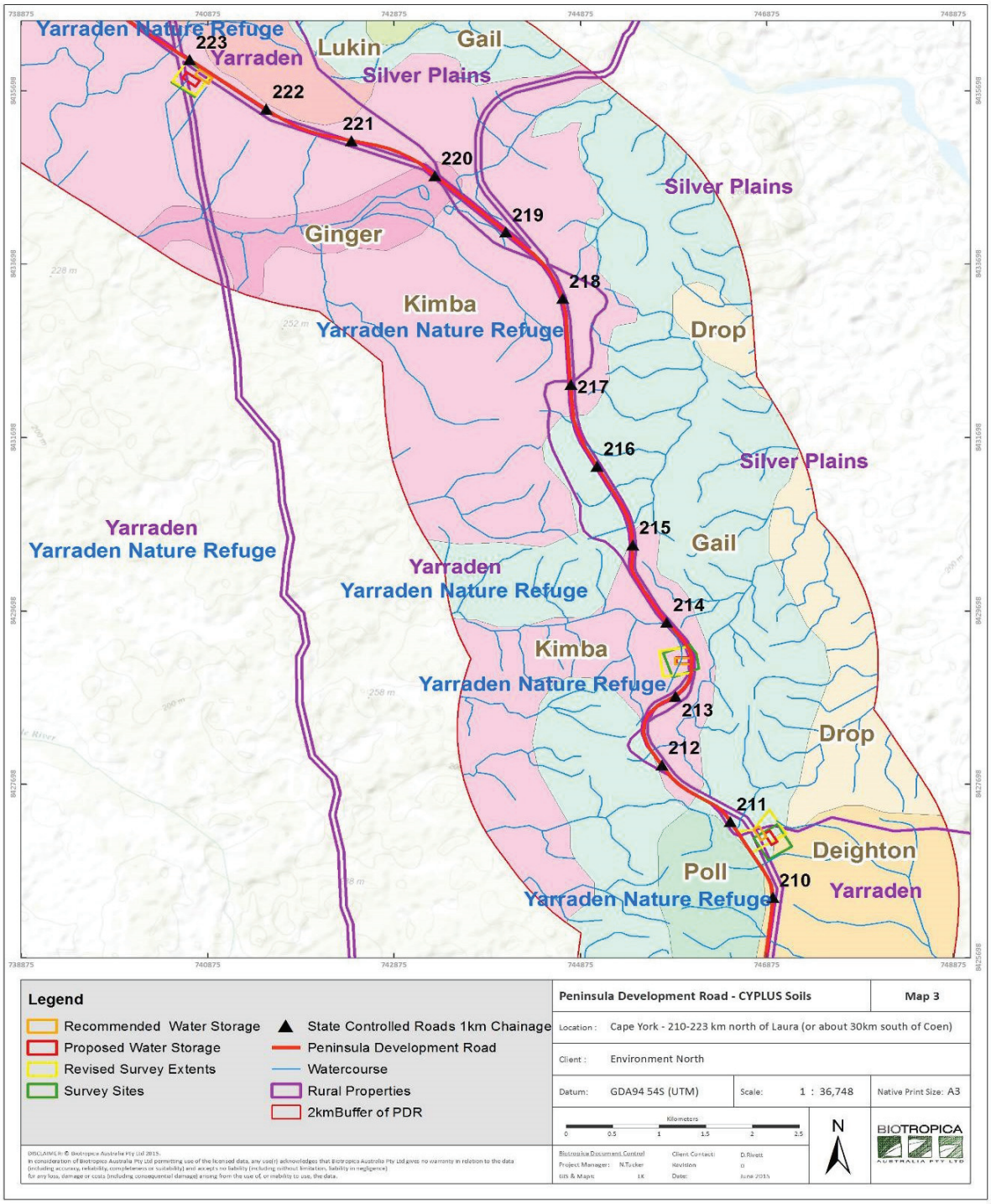


Figure 3-9 Soils (Section C – southern part).

Source: Biotropica Australia (2015).

For ease of interpretation, specific soils types relevant to each proposed storage site and obtained from the GIS coverage based on this mapping are listed in **Table 3-1**.

3.2.3 Engineering Properties

The following table shows the geology and soils derived from the mapping, together with details of key engineering properties described in Biggs and Philip (1995).

Table 3-1 Geology and Soils by Site

SECTION	SITE	GEOLOGY	SOIL	PERMEABILITY	EROSIVITY
B	At the time of writing the analysis of geology and soils for Section B has not commenced.				
C	90C_210	Dg	Gail	Moderate	Low
C	90C_213	TQsPC	Kimba	High	Low
C	90C_222	TQsPC	Kimba	High	Low
C	90C_240C	Put	Chlory	Low-Moderate	High
C	90C_241	Pcn	Chlory	Low-Moderate	High
C	90C_245	Put	Drop	Moderate	Low

Source: Biggs and Philip (1995).

Table 3-2 below summarises key engineering properties. Properties that have Moderate and High values are shaded yellow and red respectively. The implications of these properties are discussed below the table.

Table 3-2 Summary of Key Engineering Properties

SOIL TYPE	DESCRIPTION	PERMEABILITY	EROSIVITY
Chlory	Moderately deep Duplex sodic brown soils formed on schist, phyllite, quartzite and gneiss	Low-Moderate	High
Clark	Deep bleached Gradational yellow massive soils formed on residual sands	Moderate	Low
Deighton	Deep Uniform yellow massive sands formed on residual sands or sandstone	High	High
Dixie	Deep bleached Uniform, grey and yellow coarse sands derived from adamellite and granite	High	High
Drop	Moderately deep Gradational yellow soils formed on hillslopes of adamellite or granite	Moderate	Low
Gail	Shallow Gradational yellow massive soils formed on schist, phyllite, quartzite and gneiss	Moderate	Low

(Continued over)

SOIL TYPE	DESCRIPTION	PERMEABILITY	EROSIVITY
Ginger (mixed soil site only)	Deep bleached Uniform sands on lower slopes and drainage depressions on residual sands	High	High
Kimba	Very deep Gradational red massive soils formed on residual sands	High	Low
Quarantine	Moderately deep Duplex sodic neutral to alkaline soils on lower slopes and fans derived from acid plutonic rocks	Low-Moderate	Low-Moderate
Silver	Deep Duplex sodic soils formed on colluvial plains derived from acid plutonic hillslopes	Low-Moderate	High

Source: Study team compilation based on Biggs and Philip (1995) and Environment North (2010b).

a) Permeability

This assessment reveals that several soils types encountered have potentially undesirable permeability:

- high:
  - Deighton
  - Dixie
  - Ginger (mixed soil site only)
  - Kimba.
- moderate:
  - Clark
  - Drop
  - Gail.

These soils may not be ideal for holding water.

Previous Experience on Similar Soils

However, a review of existing storages (Environment North 2010a) reveals that several are built on soils identified in the above mapping. A review was undertaken of the site surveys for populating column four in the following table.

Table 3-3 Existing Storages on Soils with Possible Permeability Issues

SITE NAME	SOILS	STORAGE NAME	COMMENT (Environment North 2010a)
At the time of writing the analysis of geology and soils for Section B has not commenced			
90C_234	Chlory	Great Divide Dam	No observed permeability problems.
90C_158B	Dixie	Bamboo Range Dam	No observed permeability problems.
90C_169A	Dixie	Terrys Dam	No observed permeability problems.
90C_171	Dixie	Rickys Hole	No observed permeability problems.
90D_068B	Dixie	Old Mine Dam	No observed permeability problems.
90D_071	Dixie	Hornets Nest Dam	No observed permeability problems.
90C_112	Kimba	Brimies Dam	No observed permeability problems.
90C_218B	Kimba	Nectars Dam	No observed permeability problems.

Source: Study team compilation based on Environment North (2010a).

RoadTek Assessment

See following section.

b) Erosivity

This assessment reveals that four soils have high erosivity:

- Chlory
- Deighton
- Dixie
- Ginger (mixed soil site only).

These soils may not be ideal due to potential erosion problems.

Previous Experience on Similar Soils

However, a review of existing storages (Environment North 2010a) reveals that several are built on soils identified in the above mapping. A review was undertaken of the site surveys for populating column four in the following table.

Table 3-4 Existing Storages on Soils with Possible Erosivity Issues

SITE NAME	SOILS	STORAGE NAME	COMMENT (Environment North 2010a)
90C_128	Silver	South Five Mile Dam	The site is flat with a low risk of erosion. High flow velocity and concentrated flows should be avoided due to the absence of ground cover.
90C_154	Silver	Bamboo Grid Dam	High concentrated flows and fast velocities have caused extensive failure of the dam wall and significant erosion to drainage paths beyond the dam. The sandy horizons of the Silver soil material do not bind well and lacks structure in the presence of water.
90C_158B	Dixie	Bamboo Range Dam	The soil is moderately erosive but only in areas of concentrated or high velocity flows.
90C_169A	Dixie	Terrys Dam	There are no major signs of erosion, however, the soil is susceptible to scouring in high volume and/or high velocity flows. This is worsened by the steep banks and limited ground cover.
90C_171	Dixie	Rickys Hole	The limited ground cover and steep banks increase the likelihood of erosion. This is confirmed by multiple instances of erosion in drainage paths leading to creek line.
90C_194	Deighton	Ryans Soak Dam	There is rill erosion of dam banks where flow has concentrated upon discharge to the dam. The heavy disturbance to the site also increases the likelihood of erosion. The soil on site is structurally poor and is a high erosion risk. Overtopping of the dam would cause major failure of the dam due to the absence of a fortified spillway.
90C_232	Gail	Hanging Rock Dam	There is no major erosion evident. High velocity or high concentration flow will likely cause erosion, and should be avoided.
90D_068B	Dixie	Old Mine Dam	There is next to no evidence of erosion upstream of the dam wall. It is assumed that there is sufficient storage capacity in the existing dam. Overtopping of the dam wall would result in critical failure of the dam wall.
90D_071	Dixie	Hornets Nest Dam	The evidence of erosion at the basin access ramp combined with the gradient of the land toward the dam suggests that a moderate erosion risk is appropriate. Such risk is only applicable where soil is exposed to concentrated flows.

Source: Study team compilation based on Environment North (2010a).

The above information has been reviewed by RoadTek who confirm (T Short pers. comm. 13 April 2015) that it will be possible to construct water storages on soils with a potential high erosivity, as long as attention is given to standard construction and soil conservation measures such as:

- limiting slope of land over which water will run
- installing suitable erosion protection works (e.g. dumped rock, rock mattresses) where warranted
- quickly re-establishing vegetation cover on disturbed soils.

Recent experience from storages north of Coen suggests that this is a practical and effective approach.

c) Soil Profile

In order to be suitable for storage construction, sites need to contain a thick enough soil layer to permit excavation to a depth that is sufficient for a practical storage (i.e. about 4.5 m). Storages shallower than this have large surface areas and are therefore prone to excessive evaporation, as well as requiring more clearing. Evidence from the reconnaissance survey was used to rule out certain sites by inspection as well as select a set of sites that required additional investigations to confirm available depth.



Photo 3-1 Example of site (90C_203).

At this site exposed rock in drainage lines suggests that soil depth is insufficient for a practical storage (rock was apparent at less than 2 m depth).

Source: April 2015 reconnaissance survey.

Prospective sites with unsuitable soil profiles were discarded (refer to **Table 2-8**).

3.3 WATERWAYS AND WATERCOURSES

3.3.1 Introduction

The storage sites have been selected to avoid major waterways (the term includes watercourses). However, there are some waterways present that have been mapped by various Queensland Government agencies and these are subject to certain legislative restrictions as discussed below. Relevant mapping is shown on the detailed site surveys in **Part B** and in **Table 3-6** (Section B) and **Table 3-7** (Section C). It is obvious in most cases that the same streams have been mapped in the separate coverages and that there is a small mapping difference between the locations. When stream location is considered critical, site mapping was undertaken (see **Part B**).

3.3.2 Waterway Barrier Works

According to the Guide for the determination of waterways using the spatial data layer *Queensland waterways for waterway barrier works* (DAFF 2013) – see **Table 3-8**:

> The definition of a waterway under the Fisheries Act is broad and a Queensland-wide data layer has been developed to better delineate this. The spatial data layer *Queensland Waterways for Waterway Barrier Works* shows the furthest extent of the Fisheries Act interest in barrier works on waterways. On the data layer, these waterways are depicted as a coloured stream network from the upstream limit, downstream to the tidal or wetland conclusion.
>
> Streams that are not coloured on the data layer are not considered waterways. Waterway barrier works on these streams do not require approvals or assessment under the Fisheries Act. However barrier works within freshwater wetlands are subject to other state and federal legislation.

Mapping categories are described in **Table 3-5** below.

Table 3-5 Assessment Requirements for Minor Works

Waterway zoning colour	Risk of impact	Development Type			
		Bed-level crossing	Culvert crossing	Low impact dam/weir	Temporary works
Green	Low	Self-assessable	Self-assessable	Self-assessable	Self-assessable
Amber	Moderate	Self-assessable	Self-assessable	Development approval	Self-assessable
Red	High	Self-assessable	Self-assessable	Development approval	Self-assessable
Purple	Major	Self-assessable	Development Approval	Development approval	Self-assessable
Grey	Major	Development Approval	Development Approval	Development approval	Self-assessable

Source: DAFF (2013) – Table 1.

3.3.3 Water Act Watercourses

According to the *Water Act 2000* (Qld) Part 2 s5:

> (1) A ***watercourse*** is a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events—
> - (a) in a natural channel, whether artificially modified or not; or
> - (b) in an artificial channel that has changed the course of the stream.
>
> (2) A ***watercourse*** includes any of the following located in it—
> - (a) in-stream islands;
> - (b) benches;
> - (c) bars.
>
> (3) However, a ***watercourse*** does not include a drainage feature.

A digital layer of all mapped watercourses (Queensland wetland mapping V3 – see **Table 3-8**) was used in the analysis described in this report, along with a measurement of stream order based on this mapping.

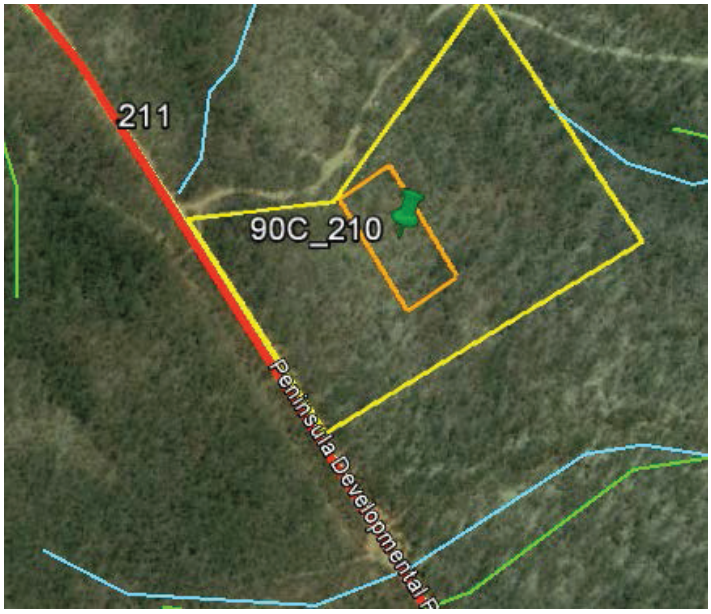
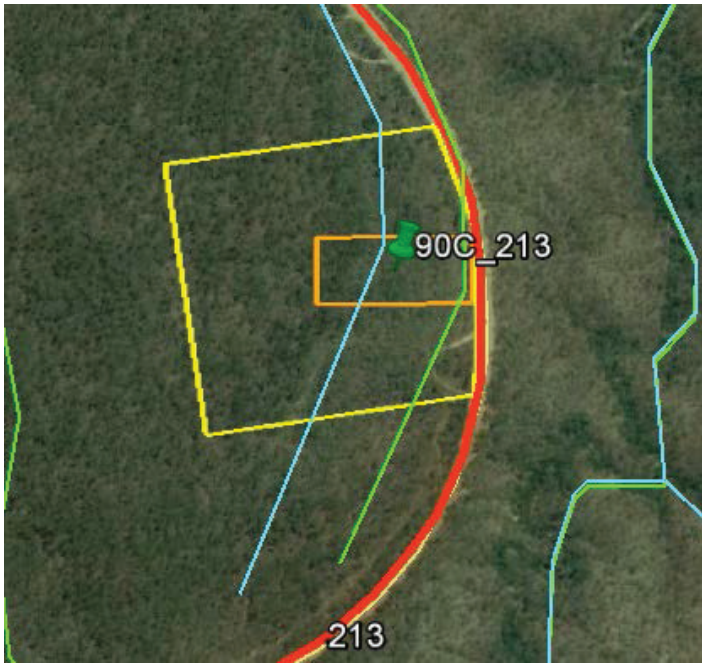
3.3.4 Site Details

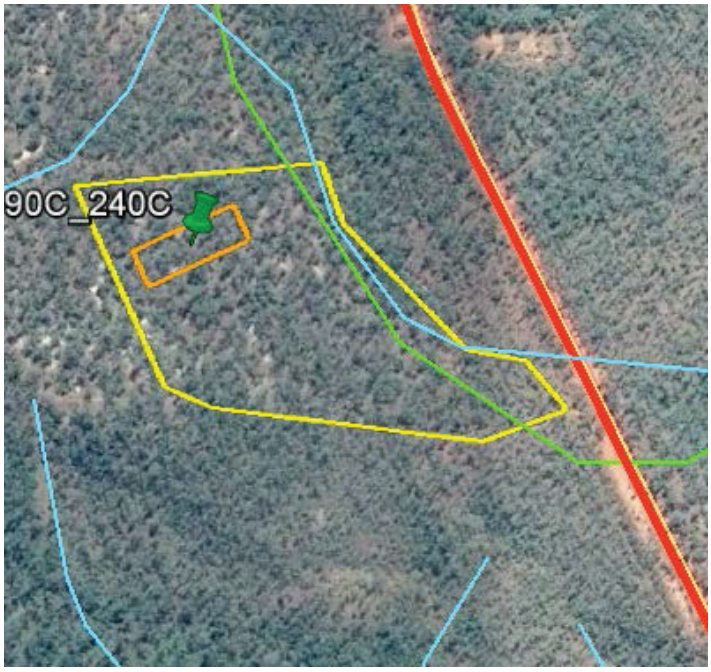
A search was undertaken using these tools and the results are included in the maps in **Part B**. Snapshots from the original layer superimposed on Google Earth images are shown below.

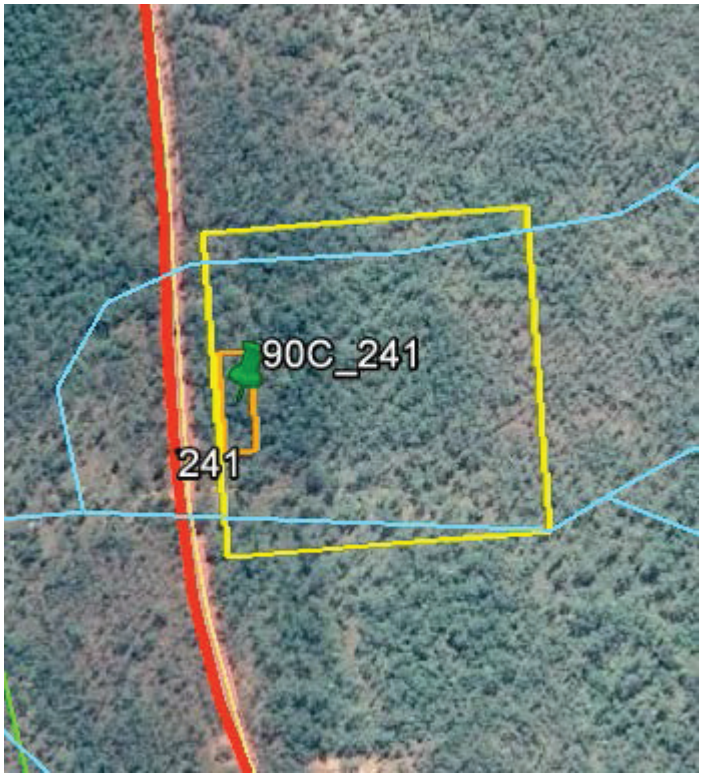
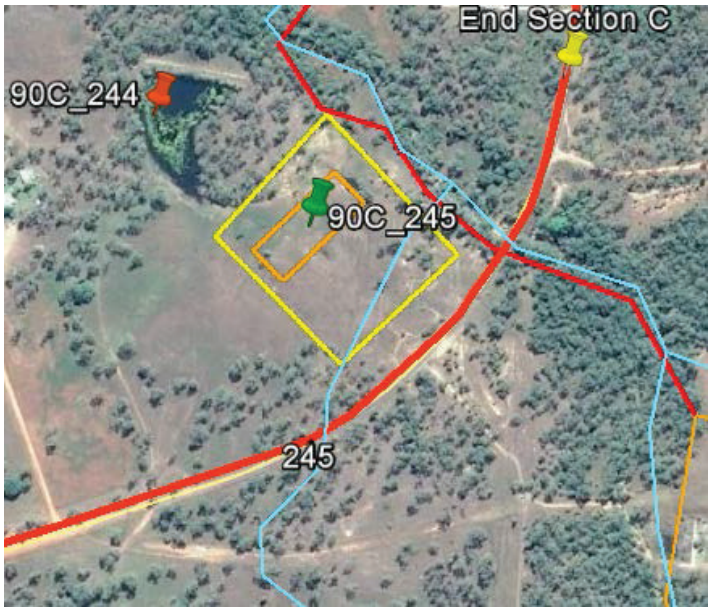
Table 3-6 Waterways – Section B

SITE	RISK OF IMPACT	STREAM ORDER	IMAGE
At the time of writing the analysis of waterways for Section B has not commenced.			

Table 3-7 Waterways – Section C

SITE	RISK OF IMPACT	STREAM ORDER	**IMAGE** (Blue = Water Act stream, Green = *Low* risk Fisheries Act stream). Generally streams shown side by side are actually the one stream. Not all images are at the same scale.
90C_210	Nil	Nil	
90C_213	Low	1	

SITE	RISK OF IMPACT	STREAM ORDER	IMAGE (Blue = Water Act stream, Green = *Low* risk Fisheries Act stream). Generally streams shown side by side are actually the one stream. Not all images are at the same scale.
90C_222	Nil (Low in survey area but outside storage)	Nil (1st order in survey area but outside storage)	
90C_240C	Nil (Low risk stream in survey area but outside storage)	Nil (1st order stream in survey area but outside storage)	

SITE	RISK OF IMPACT	STREAM ORDER	IMAGE (Blue = Water Act stream, Green = *Low* risk Fisheries Act stream). Generally streams shown side by side are actually the one stream. Not all images are at the same scale.
90C_241	Nil	Nil (2nd order streams in survey area but outside storage)	
90C_245	Nil (High risk stream (red) is adjacent (north-east) but not affected)	Nil (3rd order stream is adjacent but not affected)	

Source: Study team compilation.

The mapping reveals that

- Site 90C_210 has no streams in survey area
- 90C_241 has two 2nd order streams in survey area but not within storage area
- Sites 90C_222 and 90C_240 have *Low* risk 1st order streams within the survey areas but not within storage area.
- Site 90C_213 straddles a *Low* risk, 1st order stream. This means that a self-assessable waterway barrier works assessment is required.
- Site 90C_245 has a *High* risk of impact watercourse (Coen River tributary; 3rd order stream) that runs along the north-eastern fringe of the survey area but outside of the recommended water storage.

3.4 BIODIVERSITY ASPECTS (BIOTROPICA AUSTRALIA)

3.4.1 Methodology

a) Overview

Further to the summary in **Section 2.3**, the biodiversity study involved the following steps:

- 2009 assessment of potential storages between Laura and Weipa (for supply of maintenance water). This is documented in Environment North (2010b) which includes detailed assessment sheets for all sites investigated (biodiversity and environmental engineering aspects).
- January 2015 desktop assessment of 14 candidate sites (Biotropica Australia 2014). This is documented in Environment North (2015a) which has been superseded by this report. Methodology and outputs were as described below for the currently proposed sites.
- April 2015 field reconnaissance of the 14 candidate sites and alternatives to assess biodiversity opportunities and constraints.
- May / June 2015 biodiversity assessment (Biotropica Australia 2015). This includes a revised desktop assessment (to include new sites and exclude those no longer considered) and detailed field surveys and analysis for section C, all as detailed below.

At the time of writing, fieldwork for Section B has not commenced. It will be documented in Biotropica Australia (in preparation) and a revised version of this report.

b) Desktop Survey

On-line database searches and spatial dataset interrogations were performed on the proposed sites (refer **Table 2-13**). To meet the desktop research requirements in the Guidelines for Flora Survey & Assessment in Northern Queensland (Wannan 2012), EPBC Protected Matters Search and Wildlife On-line searches were undertaken with a buffer of 25 km for the following co-ordinates:

- Section B:
  - [In preparation]
- Section C:
  - 90C_113 (-14.97668, 143.59479)
  - 90C_146 (-14.71166, 143.49648)
  - 90C_203 (-14.27566, 143.31128)
  - 90C_245 (-13.95495, 143.19597).

To get a more accurate determination of the likely species recorded on each individual study site, a further search of both databases was undertaken based on the central co-ordinate for the site plus a 1 km buffer. The results of both sets of searches are available in **Appendix D**. Those results were then consolidated (refer to **Table 3-10**) and, for the species most likely to occur on a site, spatial species occurrence records were retrieved from the Atlas of Living Australia (ALA) database. A spatial query was performed to identify records within a distance of relevance (1 km for flora and within 5 km for fauna). These results, together with the results of the interrogation of the on-line databases and spatial datasets listed below in **Table 3-8** and are presented in **Appendix D**.

Table 3-8 Desktop Research

DATABASE
Atlas of Living Australia (ALA) – Species Occurrence Records
Australia's important bird areas (IBA)
Cape York regional planning interests (RPI)– Strategic environmental area (SEA)
EPBC PMST
HERBRECS (Queensland Herbarium Database)
Modelled potential habitat for selected threatened species in Queensland
Ordered Drainage 100K – Queensland
Queensland floodplain assessment overlay
Queensland geological framework
Queensland Matters of State Environmental Significance –version 4.1 (MSES)
Queensland Nature Conservation Act – protected plants flora survey trigger map spatial layer V1.1
Queensland nature refuges and coordinated conservation areas
Queensland NCA Wildlife On-line
Queensland protected areas
Queensland State surface geology -
Queensland statewide corridors V1.1
Queensland waterways for waterway barrier works
Queensland wetland mapping V3
Regional nature conservation values (RNCV) for the Cape York regional plan area V2
Soils of the Cape York Peninsula (CYPLUS)
Vegetation management – regulated vegetation management map – version 1.9
Vegetation Management Act- regional ecosystem and remnant map - version 8.0 non-coastal & coastal (RE)

c) Ground Survey – Section B

At the time of writing, fieldwork for Section B has not commenced.

d) Ground Survey – Section C

Overview

A ground survey for Section C was undertaken between 25 and 29 May 2015 in overcast conditions. The flora survey was undertaken by James Hill who has over five years of experience in the study of Cape York botany. The fauna survey was undertaken by Lars Kazmeier who has over ten years of experience in the study of Far North Queensland fauna.

The survey was undertaken at the end of the wet season in May, which is an appropriate time for plant identification.

The flora survey method at each site was dependent on whether the site was located within a 'high risk area' for protected plants mapped under the *Nature Conservation Act* 1992 (NC Act). Refer to **Section 3.5.8**. At each site, the (nominal – dimensions varied) 300 m x 300 m study area was marked:

- If the site was located within a high risk area, a survey was undertaken following TMR's alternative survey methodology in accordance with the TMR class exemption for the Flora Survey Guidelines – Protected Plants under the NC Act (refer below).
- If the site was located outside a high risk area, a series of meander surveys were undertaken to cover representative areas of the site. All plants were identified to species level.

Based on the desktop analysis and personal experience, specific sets of threatened species (selected based on occurrence likelihood) were targeted in surveys at each particular site. Additionally, the aim was to document all potential animal breeding places (nests, tree hollows, termitaria (type and presence of cavities), hollow logs and rock piles). For the first two hours, both ecologists together observed and discussed site characteristics by walking the entire proposed survey perimeter in order to refine the survey focus and extent. In the last two to three hours, each ecologist individually meandered the entirety of the revised survey extent, recording skill-specific parameters.

Waypoints were taken at all habitat features using a Garmin 62s GPS, and points transformed using the ArcGIS platform. A 3 m to 5 m error should be anticipated.

Flora survey method – Protected Plants

Two sites (90C_241 and 90C_245) are located within a 'high risk area' for protected plants under the NC Act. Section 257 of the *Nature Conservation (Wildlife Management) Regulation 2006* ('the regulations') requires that a flora survey and flora survey report to comply with the Flora Survey Guidelines – Protected Plants ('the guidelines') is undertaken on any sites identified as a 'high risk' area. See also **Section 4.3.2**.

TMR holds a transitional Protected Plant Exemption (EHP 2015) that permits changes to the regulated methodology. An extract is included as **Figure 3-10** below.

Section 2.1a) of the *Protected plant exemption under Section 89 of the Nature Conservation Act 1992 and Section 41(1)(a)(ii) of the Nature Conservation (Protected Plants) Conservation Plan 2000* states the following:

For projects under this exemption, an environmental assessment must be undertaken prior to disturbing the plants. Where appropriate, this shall include on-ground ecological assessments, in addition to desk-top analysis. On-ground ecological assessments must be conducted by a "suitably qualified and experienced person" as defined in section 4. Where such an assessment identifies that whole 'near threatened, vulnerable, or endangered plants" as prescribed under the NCA are to be taken and the taking is not otherwise exempt under the terms of this approval, the Authority Holder must seek a clearing permit under the NCA, unless another exemption under the NCA or the Conservation Plan applies.

["suitably qualified and experienced" *means a person with formal qualifications and/or experience in ecological assessment and environmental management including flora survey and identification skills.*]

Figure 3-10 Extract from transitional protected plant exemption.

Source: EHP (2015).

The on-ground survey was undertaken by a 'suitably qualified person' as described below. In accordance with the exemption, the need to avoid EVNT plants by 100 m does not apply.

Suitably qualified person

The flora survey was co-ordinated and led by James Hill who fulfils the criteria in the guidelines by having:

- a PhD (to be conferred 2015) and BSc (Hons) specialising in tropical botany
- over 5 years of experience in undertaking surveys for EVNT species in Cape York and FNQ.

Timing of survey

The survey was undertaken in May at the end of the 2014/2015 wet season. This is within a suitable timeframe to maximise the chance of detecting EVNT species.

Survey method

- Site 90C_241. A timed meander survey method was used for this site. There is one vegetation community (Least Concern RE 3.11.15a / 3.1.11x3 / 3.11.11 / 3.3.49b) represented within the site. The guidelines require that two meanders are to be undertaken in each area of habitat less than 10 ha in size. The listed endangered species *Cajanus mareebensis* was recorded during the first survey. Further targeted searches for this species were then undertaken until no further new species had been recorded for 30 minutes (as per the Flora Survey Guidelines – Protected Plants).
- Site 90C_245, a grazing paddock, consists completely of non-remnant vegetation. No protected plant species were recorded on this site.

Unidentified plant species

All plant taxon recorded within the survey area were identified to species level.

3.4.2 Results

a) Desktop Survey

State and Commonwealth databases were interrogated relating to EVNT (Endangered, Vulnerable, or Near Threatened) species and communities, and the original search results are attached as **Appendix D**. Consolidated results of all relevant database interrogations are presented in **Appendix A**.

Regional Ecosystems (Section B)

At the time of writing, the desktop assessment for Section B has not commenced.

Regional Ecosystems (Section C)

Regional Ecosystem (V8.0) searches indicate the ecosystems described below in **Table 3-9** are present within the surveyed areas. The Regional Ecosystems mapped are 'mixed' REs, i.e. they consist of several individual types at certain percentages.

Table 3-9 Regional Ecosystems

RE	VMA STATUS	VEGETATION
3.3.49b	Least concern	*Melaleuca viridiflora* (broad-leaved paperbark) low open woodland usually with a distinct to sparse sub-canopy layer of *Petalostigma banksii* (smooth-leaved quinine). The shrub layer is generally sparse and the ground layer sparse to mid-dense. Occurs on floodplains. (BVG1M: 21a)
3.5.8a	Least concern	*Eucalyptus tetrodonta* (Darwin stringybark) dominates the sparse canopy (12-22m tall). *Corymbia stockeri subsp. peninsularis* (gum-topped bloodwood) is always present and *Erythrophleum chlorostachys* (Cooktown ironwood) is often present as subdominant canopy trees. *Corymbia nesophila* (Melville Island bloodwood) is occasionally present and may be dominant in places. *Adenanthera abrosperma* (bead tree), *E. chlorostachys* and *Grevillea glauca* (bushman's clothes peg) are the most frequently encountered trees in the very sparse sub-canopy layer (4-12m tall). A very sparse to sparse shrub layer (0.2-2m tall) is present. *Xanthorrhoea johnsonii* (grass tree), or less frequently, *Bossiaea armitii* dominates this layer. *Corymbia stockeri subsp. peninsularis, Eucalyptus tetrodonta, Planchonia careya* (cocky apple) and *Acacia rothii* (Roth's wattle) are other commonly encountered shrubs. The ground layer is sparse to mid-dense and dominated by grasses such as *Thaumastochloa sp., Heteropogon triticeus* (giant speargrass) and *Schizachyrium fragile* (fire grass) and the sedge *Schoenus sparteus*. Occurs on undulating rises and erosional plains. (BVG1M: 14b)
3.5.8c	Least concern	*Corymbia stockeri* (gum-topped bloodwood) and *Eucalyptus tetrodonta* (Darwin stringybark) usually dominate the sparse canopy. *Melaleuca stenostachya* (fibre-barked teatree) usually dominates a very sparse sub-canopy tree layer. *M. viridiflora* (broad-leaved teatree) is also frequently present. A sparse shrub layer is usually present. *Petalostigma banksii* (smooth-leaved quinine) and *Corymbia stockeri* frequently dominate this layer. The ground layer is sparse to mid-dense and dominated by the grasses, *Schizachyrium fragile* (fire grass), *Sarga plumosum* (plume sorghum) and *Heteropogon triticeus* (giant speargrass). Occurs on eroding edges of plains & undulating rises. (BVG1M: 14b)

RE	VMA STATUS	VEGETATION
3.5.10	Least concern	*Eucalyptus tetrodonta* (Darwin stringybark) and *Corymbia nesophila* (Melville Island bloodwood) dominate the very sparse to mid-dense canopy (10-28m tall). In most situations both species are present and codominant, however, *C. nesophila* may be dominant or occasionally absent. *Corymbia stockeri subsp. peninsularis* (gum-topped bloodwood) is sometimes present in the canopy. A very sparse to sparse sub-canopy tree layer (8-20m tall) is present with *Erythrophleum chlorostachys* (Cooktown ironwood), just below the canopy, *Grevillea glauca* (bushman's clothes peg), *Parinari nonda* (nonda plum) and *Acacia rothii* (Roth's wattle) the most frequent species. A very sparse low tree layer (2-8m tall) is sometimes present. The shrub layer (0.3-2.5m tall) is dominated mainly by species that also occur in the tree layers and is sparse to mid-dense. The shrub layer of recently burnt areas is usually mid-dense. The ground layer is sparse to mid-dense and dominated by grasses. *Heteropogon triticeus* (giant speargrass), *Sarga plumosum* (plume sorghum), *Thaumastochloa spp.* and *Eriachne spp.* (wanderrie grass) frequently dominating the ground layer biomass. Occurs on gently undulating rises and low hills on kandosol soils. (BVG1M: 14a)
3.11.8	Least concern	*Eucalyptus cullenii* (Cullen's ironbark) dominates the sparse to mid-dense canopy (6-24m tall). *Corymbia clarksoniana* (Clarkson's ironbark) is usually present as a subdominant canopy species. Other *Eucalyptus spp.* or *Corymbia spp.* may be present in the canopy and are occasionally subdominant. Dendrolobium umbellatum (horse bush), *Erythrophleum chlorostachys* (Cooktown ironwood) and *Acacia disparrima subsp. calidestris* (black wattle) are frequent species in the very sparse to mid-dense sub-canopy layer (2-8m tall). The sparse shrub layer (0.2-3m tall) is dominated by the same species. The ground layer is sparse to dense and dominated by the grasses *Heteropogon contortus* (black speargrass), *H. triticeus* (giant speargrass), *Themeda triandra* (kangaroo grass) and *Sarga plumosum* (plume sorghum). Occurs on metamorphic ranges. (BVG1M: 13a)
3.11.9	Least concern	*Eucalyptus cullenii* (Cullen's ironbark) dominates the sparse canopy (9-18m tall). *Corymbia stockeri subsp. peninsularis* (gum-topped bloodwood) is usually present as a subdominant species. Other *Eucalyptus spp.* and *Erythrophleum chlorostachys* (Cooktown ironwood) may be present in the canopy and are occasionally subdominant. *Planchonia careya (cocky apple), Eucalyptus* cullenii, C. stockeri subsp. peninsularis, Acacia rothii (Roth's wattle) and *Melaleuca viridiflora* (broad-leaved teatree) are frequent species in the very sparse to sparse sub-canopy layer (2-13m tall). The shrub layer (0.3-2m tall) is very sparse to mid-dense and dominated by a variety of species. The grasses Themeda triandra (kangaroo grass), *Sarga plumosum* (plume sorghum), *Heteropogon contortus* (black speargrass), *H. triticeus* (giant speargrass) and *Schizachyrium spp.* (fire grass) dominate the very sparse to mid-dense, ground layer. Occurs mainly on metamorphic hills. (BVG1M: 13a)
3.11.11	Least concern	*Corymbia stockeri* (gum-topped bloodwood) and *Eucalyptus tetrodonta* (Darwin stringybark) usually dominate the sparse canopy (9-15m, occasionally 20m tall). *Eucalyptus cullenii* (Cullen's ironbark) is codominant, particularly on the upper slopes of rises. *Melaleuca stenostachya* (fibre-barked teatree) usually dominates a very sparse sub-canopy tree layer (8-12m tall). *M. viridiflora* (broad-leaved teatree) is also frequently present. A sparse shrub layer (3-8m tall) is usually present. *Petalostigma banksii* (smooth-leaved quinine) and *Corymbia stockeri subsp. peninsularis* frequently dominate this layer. The ground layer is sparse to mid-dense and dominated by *Schizachyrium fragile* (fire grass), *Sarga plumosum* (plume sorghum) and *Heteropogon triticeus* (giant speargrass). Occurs on hills and erosional surfaces. (BVG1M: 14d)

RE	VMA STATUS	VEGETATION
3.11.11x1c	Least concern	*Eucalyptus tetrodonta* (Darwin stringybark) and *Corymbia nesophila* (Melville Island bloodwood) dominate the very sparse to mid-dense canopy (10-28m tall). In most situations both species are present and codominant, however, *C. nesophila* may be dominant or occasionally absent. *Corymbia stockeri subsp. peninsularis* (gum-topped bloodwood) is sometimes present in the canopy. A very sparse to sparse sub-canopy tree layer (8-20m tall) is present with *Erythrophleum chlorostachys* (Cooktown ironwood), just below the canopy, *Grevillea glauca* (bushman's clothes peg), *Parinari nonda* (nonda plum) and *Acacia rothii* (Roth's wattle) the most frequent species. A very sparse low tree layer (2-8m tall) is sometimes present. The shrub layer (0.3-2.5m tall) is dominated mainly by species that also occur in the tree layers and is sparse to mid-dense. The shrub layer of recently burnt areas is usually mid-dense. The ground layer is sparse to mid-dense and dominated *Heteropogon triticeus* (giant speargrass), *Sarga plumosum* (plume sorghum), *Thaumastochloa spp.* and *Eriachne* spp. (wanderrie grass). Occurs on metamorphic undulating rises and low hills. (BVG1M: 14d)
3.11.11x3	Least concern	*Eucalyptus tetrodonta* (Darwin stringybark) dominates the sparse canopy (12-22m tall). *Corymbia stockeri subsp. peninsularis* (gum-topped bloodwood) is always present and *Erythrophleum chlorostachys* (Cooktown ironwood) is often present as subdominant canopy trees. *Corymbia nesophila* (Melville Island bloodwood) is occasionally present and may be dominant in places. *Adenanthera abrosperma* (bead tree), *E. chlorostachys* and *Grevillea glauca* (bushman's clothes peg) are the most frequently encountered trees in the very sparse sub-canopy layer (4-12m tall). A very sparse to sparse shrub layer (0.2-2m tall) is present. *Xanthorrhoea johnsonii* (grass tree), or less frequently, Bossiaea armitii dominates this layer. *Corymbia stockeri subsp. peninsularis, Eucalyptus tetrodonta, Planchonia careya* (cocky apple) and *Acacia rothii* (Roth's wattle) are other commonly encountered shrubs. The ground layer is sparse to mid-dense and dominated by grasses such as *Thaumastochloa sp., Heteropogon triticeus* (giant speargrass) and *Schizachyrium fragile* (fire grass) and the sedge *Schoenus sparteus*. Occurs on metamorphic hills. (BVG1M: 14d)
3.11.15a	Least concern	*Eucalyptus leptophleba* (Molloy red box) dominates the very sparse to sparse canopy (11-22m tall). *Corymbia dallachiana* (Dallachy's gum) is always present in the canopy. *Eucalyptus chlorophylla* (shiny-leaved box) is sometimes present with *E. leptophleba* and occasionally replaces it as the dominant canopy tree. Scattered *E. cullenii* (Cullen's ironbark) and *Erythrophleum chlorostachys* (Cooktown ironwood) trees are sometimes present. A very sparse to sparse sub-canopy tree layer (4-10m tall) is usually present where *Eucalyptus leptophleba, Dendrolobium umbellatum* (horse bush), *Erythroxylum ellipticum* (matchwood) and *Brachychiton garrawayae* (kurrajong) are the most commonly encountered species. *Antidesma ghaesembilla* (black currant), *Flueggea virosa subsp. melanthesoides* (white currant), *Planchonia careya* (cocky apple), *Alphitonia pomaderroides* (soapwood), *Dendrolobium umbellatum* and *Grewia retusifolia* (dog's balls) are usually the primary species in a very sparse to sparse shrub layer (0.5-3m tall). The ground layer is mid-dense to dense and dominated by a variety of grasses including *Heteropogon contortus* (black speargrass), *H. triticeus* (giant speargrass), *Sarga plumosum* (plume sorghum) and *Themeda triandra* (kangaroo grass). Occurs on metamorphic hills and ranges. (BVG1M: 9b)

Source: Biotropica Australia (2015) – see also **Appendix D**.

This table reveals that all regional ecosystems affected by the proposed works are of least concern.

Other (Spatial) Database Interrogations

The results of further on-line database interrogations are presented in **Appendix A**.

Flora and Fauna (Section B)

At the time of writing, the desktop assessment for Section B has not commenced.

Findings from on-line searches are summarised below. In addition, individual 1 km searches for each site were also undertaken and results included in **Appendix D**. Though rare and not readily observed where they occur, in **blue and bolded** are those species with the highest probability of occurrence at the sites to be surveyed. It must be noted that different assemblages apply in different localities, e.g. in the Coen area compared to the Morehead River area.

Table 3-10 EVNT Species from Searches

SCIENTIFIC NAME	COMMON NAME	NC ACT 1992 STATUS	EPBC ACT 1999 STATUS	GROWTH FORM
FLORA				
Acmena mackinnoniana (syn *Syzygium mackinnonianum*)	Rocky river satinash	NT	-	Shrub / small tree
Acriopsis emarginata	Pale chandelier orchid	V	V	Orchid
Aphyllorchis queenslandica	Yellow pauper orchid	NT	-	Orchid
Astonia australiensis	-	E	-	Aquatic plant
Brachychiton grandiflorus	-	NT	-	Small tree
Cadetia wariana	-	V	-	Orchid
Cajanus mareebensis	-	E	E	Shrub to small tree
Carmona retusa	-	V	-	Shrub
Cepobaculum carronii (syn Dendrobium carronii)	Pink tea tree orchid	V	V	Orchid
Cecarria obtusifolia		NT	-	Orchid
Ceratobium antennatum (syn. *Dendrobium antennatum*)	Antelope orchid	E	E	Orchid
Chrysophyllum roxburghii	Star apple	NT	-	Tree
Crepidium fimbriatum	Fringed spur orchid	V	-	Orchid
Croton brachypus	-	NT	-	Shrub
Ctenopterella blechnoides	-	V	V	Fern
Cucumis costatus	-	NT	-	Orchid
Cycas tuckeri	-	V	-	Cycad
Dendrobium bigibbum (synVappodes phalaenopsis, syn *Vappodes bigibba)*	Cooktown orchid	V	V	Orchid
Dendrobium johannis	Chocolate tea-tree orchid	V	V	Orchid
Dendrobium malbrownii	-	V	-	Orchid

SCIENTIFIC NAME	COMMON NAME	NC ACT 1992 STATUS	EPBC ACT 1999 STATUS	GROWTH FORM
Dipodium pictum	-	E	E	Orchid
Dockrillia wassellii (syn *Dendrobium wassellii)*	Furrowed pencil orchid	NT	-	Orchid
Durabaculum nindii (syn *Dendrobium nindii*)	Blue antler orchid	E	E	Epiphytic orchid
Firmiana papuana	Lacewood	V	-	Tree
Freycinetia percostata	-	V	-	Vine
Glossocardia orthochaeta	-	E	-	Shrub
Habenaria rumphii	-	NT	-	Ground orchid
Homoranthus tropicus	-	NT	-	Shrub
Hoya macgillivrayi	Red hoya	NT	-	Vine
Hydnophytum ferrugineum	-	V	-	Aquatic plant check
Hymenophyllum eboracense	-	V	-	Fern
Jedda multicaulis	-	V	-	Shrub
Lasianthus hirsutus	-	NT	-	Shrub
Lepidagathis royenii	-	NT	-	Herb
Lepturus xerophilus	-	NT	-	Grass
Myrmecodia beccarii	Ant plant	V	V	Epiphyte
Pandanus zea	-	NT	-	Palm-like plant
Paramapania parvibractea	-	NT	-	Grass
Phalaenopsis rosenstromii (syn *Phalaenopsis amabilis var. rosenstromii*)	Native moth orchid	E	E	Orchid
Phlegmariurus carinatus (syn. Huperzia carinatus)	Keeled tassel-fern	E	E	Fern / Epiphyte
Phlegmariurus dalhousieanus (syn *Huperzia dalhousieana*)	Blue tassel-fern	E	E	Fern / Epiphyte
Phlegmariurus phlegmarioides (syn *Huperzia phlegmarioides*)	Layered tassel-fern	V	-	Fern/ Epiphyte
Phlegmariurus squarrosus (syn Huperzia squarrosus)	Rock tassel-fern	E	CE	Fern/ Epiphyte
Rhinerrhizopsis matutina	Cupped freckle orchid	V	V	Orchid
Robiquetia wassellii	Green pouched orchid	NT	-	Orchid

SCIENTIFIC NAME	COMMON NAME	NC ACT 1992 STATUS	EPBC ACT 1999 STATUS	GROWTH FORM
Samadera sp. (Kennedy River J.R. Clarkson 5645)	-	NT	-	Shrub
Sarcochilus hirticalcar	Harlequin orchid	V	V	Orchid
Schefflera bractescens	-	NT	-	Tree
Schoenorchis sarcophylla	Fleshy flea orchid	NT	-	Orchid
Senegalia albizioides	-	NT	-	Tree
Solanum angustum	-	E	-	Small tree
Stemona angusta	-	V	-	Vine / scrambling shrub
Streblus pendulinus	Siah's backbone Prickly fig	-	E	Small tree/shrub
Stylidium longissimum	-	V	-	Herb
Stylidium trichopodum	-	NT	-	Herb
Syzygium macilwraithianum	-	NT	-	Tree
Thelasis carinata	Triangular fly orchid	NT	-	Orchid
Trichoglottis australiensis	Weeping cherub orchid	V	-	Orchid
Vanda hindsii	Cape York vanda / Native strap orchid	V	V	Orchid
Zeuxine polygonoides	Velvet jewel orchid	V	V	Orchid
FAUNA				
Casuarius casuarius johnsonii (southern population)	Southern cassowary (southern population)	E	E	Bird
Cophixalus crepitans	Northern nursery frog	V	-	Amphibian
Cophixalus peninsularis	Cape York nursery frog	V	-	Amphibian
Dasyurus hallucatus	**Northern quoll**	**-**	**E**	**Mammal**
Egernia rugosa	**Yakka skink**	**V**	**V**	**Reptile**
Eclectus roratus macgillivrayi	Eclectus parrot	V	-	Bird
Erythrotriorchis radiatus	**Red goshawk**	**E**	**V**	**Bird**
Erythrura gouldiae	Gouldian finch	E	E	Bird
Hipposideros cervinus	**Fawn leaf-nosed bat**	**V**	**-**	**Mammal**
Hipposideros diadema reginae	**Diadem leaf-nosed bat**	**NT**	**-**	**Mammal**
Hipposideros semoni	**Semon's leaf-nosed bat**	**E**	**E**	**Mammal**
Litoria longirostris	Long snouted treefrog	NT	-	Amphibian
Macroderma gigas	**Ghost bat**	**V**	**-**	**Mammal**

SCIENTIFIC NAME	COMMON NAME	NC ACT 1992 STATUS	EPBC ACT 1999 STATUS	GROWTH FORM
Morelia viridis	Green python	NT	-	Reptile
Murina florium	Tube-nosed insectivorous bat	V	-	Mammal
Ninox rufa meesi	Rufous owl (Cape York subspecies)	NT	-	Bird
Orraya occultus	Long-tailed northern leaf-tailed gecko	V	-	Reptile
Petrogale coenensis	**Cape York rock-wallaby**	**NT**	**-**	**Mammal**
Pristis pristis	Largetooth sawfish	-	V	Shark
Probosciger aterrimus	**Palm cockatoo**	**NT**	**-**	**Bird**
Psephotus chrysopterygius	**Golden-shouldered parrot**	**E**	**E**	**Bird**
Pteropus conspicillatus	**Spectacled flying-fox**	**-**	**V**	**Mammal**
Rhinolophus philippinensis (large form)	**Greater large-eared horseshoe bat**	**E**	**E**	**Mammal**
Saccolaimus saccolaimus nudicluniatus	Bare-rumped sheathtail bat	E	CE	Mammal
Taphozous australis	Coastal sheathtail bat	NT	-	Mammal
Turnix olivii	**Buff-breasted button-quail**	**V**	**E**	**Bird**
Tyto novaehollandiae kimberli	Masked owl (northern subspecies)	V	V	Bird
Xeromys myoides	Water mouse	V	V	Mammal

Source: Biotropica Australia (2015) – see also **Appendix D**.

In addition, a variety of migratory fauna were listed as potentially occurring across all of the sites (refer **Appendix D**).

Actually occurring species are described below.

b) Ground Survey

Regional Ecosystems (Section B)

At the time of writing, fieldwork for Section B has not commenced.

Regional Ecosystems (Section C)

Ten regional ecosystems (REs) have been allocated to the vegetation occurring within the six study sites in Section C. All of these polygons were mapped as a mixture of two or more REs. Within five of the six sites, the vegetation community recorded during the ground survey closely aligned to those prescribed by the RE mapping. For part of site 90C_213, an RE that more close matches the vegetation on site has been suggested. The suggested replacement RE is of the same VM Act category as that originally mapped on site.

Flora species lists are provided in **Appendix B**.

Flora and Fauna (Section B)

At the time of writing, fieldwork for Section B has not commenced.

Flora and Fauna (Section C)

Significant Flora Species

Two significant flora species were located:

- *Cajanus mareebensis* is listed as endangered under both the NCA and the EPBC Acts. This plant species was recorded on sites 90C_210, 90C_222, 90C_240C, and 90C_241.
- The orchid (*Cepobaculum tattonianum syn. Cymbidium canaliculatum*) was recorded on sites 90C_213, 90C_222, 90C_240C, and 90C_241. Plants from the *Orchidaceae* (Orchids) family are listed as 'Special Least Concern' plants under the regulations and are restricted plants.

Exotic Flora Species

Weeds identified during the site surveys are shown in the following table.

Table 3-11 Weed Species Recorded on Site

SPECIES	COMMON NAME	SITE	WONS	LP Act (Class)	FNQROC (Category)	CPMP (priority)	LNCS
State-declared Species							
Senna obtusifolia	Sicklepod	90C_241 90C_245	-	2	3	High	one of the worst four
Sporobolus pyramidalis	Giant rat's tail grass	90C_210 90C_240C 90C_245	-	2	3	-	n/a
Locally-listed Species							
Sida cordifolia	Sida	90C_210 90C_241 90C_245	-	-	-	Low	n/a
Sida rhombifolia	Sida	90C_241 90C_245	-	-	-	Low	n/a
Stachytarpheta jamaicensis	Snakeweed	90C_241	-	-	4	-	significant

(Continued over)

SPECIES	COMMON NAME	SITE	WONS	LP Act (Class)	FNQROC (Category)	CPMP (priority)	LNCS
Themeda quadrivalvis	Grader grass	90C_210 90C_213 90C_222 90C_241 90C_245	-	-	4	Medium	n/a

Source: Biotropica Australia (2015).

Key:

LP Act: *Land Protection (Pest and Stock Route Management) Act* 2002

FNQROC: Far North Queensland Regional Organisation of Councils Regional Pest Management Plan

CPMP: Cook Shire Pest Management Plan

LNCS: Laura Normanby Catchment Strategy.

A total of 22 weed species were recorded during the surveys (see detailed sheets in **Appendix B**). The most significant of these are described below:

- *Senna obtusifolia* (Sicklepod) and *Sporobolus pyramidalis* (Giant rats-tail grass) are both declared weeds, listed as Class 2 under the *Land Protection (Pest and Stock Route Management) Act* 2002 (LP Act), Category 3 under the Far North Queensland Regional Organisation of Councils Regional Pest Management Plan (FNQROC), a high priority under the Cook Shire Pest Management Plan (CPMP) and mentioned in the Laura Normanby Catchment Strategy (LNCS) (Howley & Stephan 2005).
- Either one or both declared species were recorded at sites 90C_210, 90C_240C, 90C_241 and 90C_245. Fact sheets for these two species of weeds are included in **Appendix C** and as an appendix to **Part C** (Environmental Management).
- The other weeds recorded on site are environmental weeds and are assigned a lower priority for control.

Fauna

No rare or threatened listed fauna species were recorded on any of the proposed sites.

Each survey area was surveyed for habitat values for fauna species. Features with minor habitat values such as termitaria, mature hollow-bearing trees, and nest trees were recorded on each of the sites (except for 90C_245 which is mostly cleared). Although these habitat features should be preserved where possible, there were no examples of very high value or specialised refugia that would not be available outside of the study area.

Nonetheless, they are shown on the detailed surveys in **Part B** and should be avoided where possible.

3.5 FINDINGS AND RECOMMENDATIONS

3.5.1 Introduction

This section summarises the findings of the desktop and site studies and makes recommendations for design and construction.

It also deals with additional measures of biodiversity value, namely:

- significant environmental areas
- protected area values
- regional nature conservation values
- matters of state environmental significance
- high risk protected plant areas.

the legislative implications of these values is summarised in **Chapter 4**.

3.5.2 Summary of Site Findings and Implications – Section B

a) Findings

At the time of writing, the assessment for Section B has not commenced.

b) Implications

At the time of writing, the assessment for Section B has not commenced.

3.5.3 Summary of Site Findings and Implications – Section C

a) Findings

The following table summarises the principal findings of the biodiversity survey. Details of each site are included in **Part B**.

Table 3-12 Summary of Site Findings

ITEM	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
Regional ecosystems	Least concern	Least concern	Least concern	Least concern	Least concern	Least concern
Listed flora						
Cajanus mareebensis	x (Note 1)	-	x (Note 1)	x (Note 1)	x (Note 1)	-
Cepobaculum tattonianum syn. Cymbidium tattonianum	-	x (Note 2)	x (Note 2)	x (Note 2)	x (Note 2)	-
Exotic flora (main species only)	*Sporobolus pyramidalis*	-	-	*Sporobolus pyramidalis*	*Senna obtusifolia*	*Senna obtusifolia*
Listed fauna	-	-	-	-	-	-
Fauna habitat	Note 3	Note 3	Note 3	Note 3	Note 3	Note 3

Notes:

1. Species located in survey area but not within infrastructure footprint.
2. Species located on trees likely to be cleared.
3. All sites contain some habitat of local value.

b) Implications

EVNT Plants

Cajanus mareebensis was recorded in four of the six proposed water storage locations (90C_210, 90C_222, 90C_240C, and 90C_245). The recorded distribution of *C. mareebensis* on these sites is such that it will be possible to construct the water storage facilities in areas of the site that did not contain this species.



Photo 3-2 *Cajanus mareebensis*.

Source: Biotropica Australia (S Holt pers. comm.10 June 2015).

If the proposed construction were to impact on *C. mareebensis*, the requirements of the EPBC Act and the NC Act under which this species is listed as endangered would need to be considered. Refer to **Section 4.1** and **Section 4.3** respectively.

Weed species

Senna obtusifolia (Sickle pod) and *Sporobolus pyramidalis (Giant rat's tail grass)* are Declared Class 2 Weeds under the *Land Protection (Pest and Stock Route Management) Act* 2002 (Qld). These species were recorded on sites 90C_210, 90C_240, 90C_241, and 90C_245.

Under this Act, landowners must take reasonable steps to keep land free of Class 2 pests (refer to **Section 4.4**).

Animal breeding places

TMR holds an exemption under Section 88 of the NC Act and Section 332 of the regulations (DERM 2013b) that allows them to tamper with animal breeding places. Under the associated species management plan, TMR is authorised to tamper with breeding places under certain conditions (refer to **Section 4.3**).

3.5.4 Significant Environmental Areas

a) Overview

Significant Environmental Areas (SEAs) are areas where high ecological values may occur due to the combination of multiple biodiversity features in conjunction with the landscape's topographical and hydrological features. The Cape York SEA is mapped in the Cape York Regional Plan (DSDIP 2014) and protected under the *Regional Planning Interests Act 2014 (Qld)* (RPI Act) as further discussed in **Section 4.6**.

Designated Precincts within SEAs are areas of significant biodiversity value and/or areas of high cultural heritage significance exist and are to be afforded the highest level of protection in the SEA.

b) Coverage

Figure 3-11 extracted from the Cape York Regional Plan shows the Cape York SEA while **Figure 3-12** is a detail of the sites affected (affects Section C only).

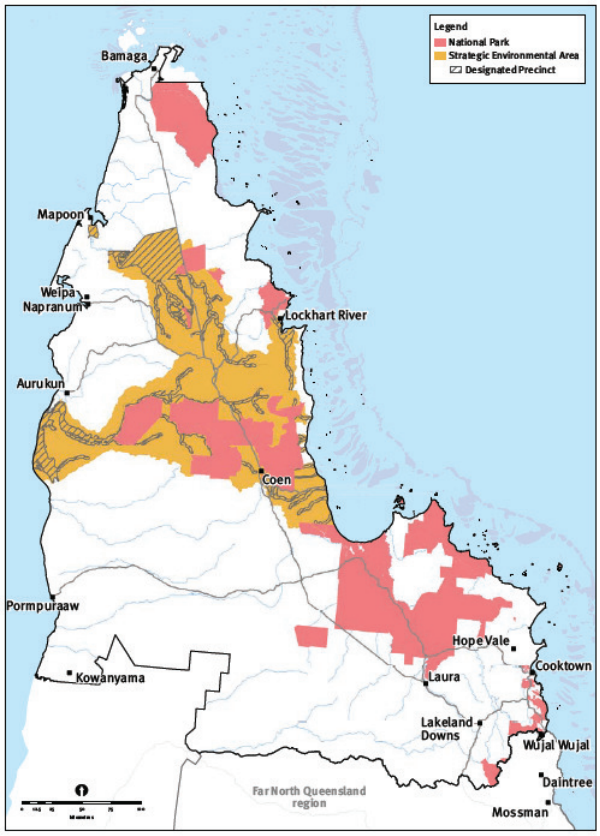


Figure 3-11 Regional land use categories including the Cape York SEA.

Source: DSDIP (2014) (Map 1).

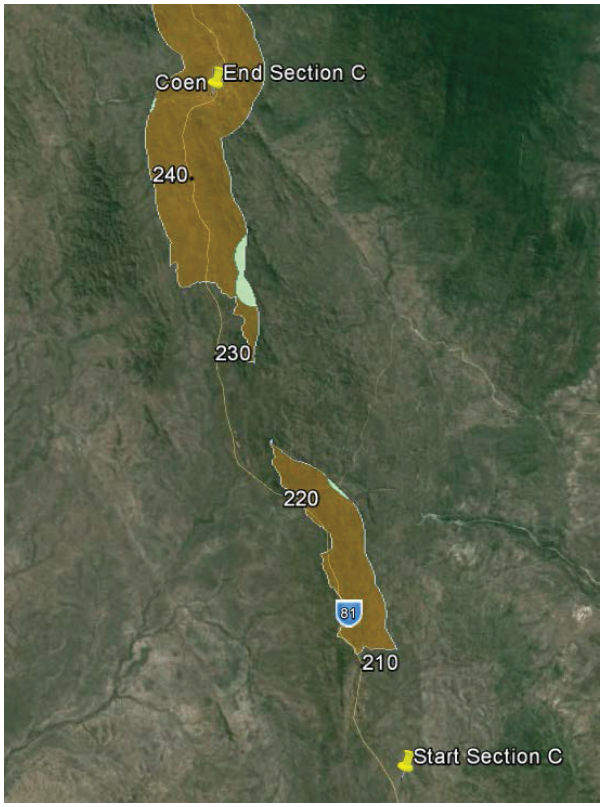


Figure 3-12 Detail of part of SEA relevant to project.

Legend: Brown = SEA, Green = designated precinct (both truncated where >2 km from PDR).

The assessment reveals that the following sites are within the Cape York SEA (this crosses the PDR between Chainages 210 to 221 and then again from Chainage 234 to north of Coen):

- Section B:
  - Nil.
- Section C:
  - 90C_210 (actually not in SEA but very close – advice from DILGP (J Ross pers. comm. 3 June 2015) is to include this site in the RIDA process
  - 90C_240C
  - 90C_241
  - 90C_245.

Refer to **Section 6.1** for more detailed maps (**Figure 6-1** to **Figure 6-3**). No sites are within designated precincts.

c) Values (Attributes)

Schedule 1 of the Cape York Regional Plan defines the attributes of the Cape York SEA as follows:

- the natural hydrologic processes of the area characterised by:
  - natural, unrestricted flows in and along watercourses and estuaries
  - overflow from watercourses onto the flood plains of the area, or the other way
  - natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area
  - natural flow in and from groundwater and springs
- the natural geomorphic processes of the area characterised by:
  - natural erosion
  - the transport and deposit of sediment by water throughout the catchments and along the watercourse systems and estuaries
- the functioning riparian processes of the area characterised by native riparian vegetation associated with watercourses, estuaries, lakes, flood plains and wetlands
- the functioning wildlife corridors of the area characterised by:
  - natural habitat in the watercourse systems
  - permanent waterholes and springs
- the natural water quality in the watercourse channels and aquifers and on flood plains in the area characterised by physical, chemical and biological attributes that support and maintain natural aquatic and terrestrial ecosystems
- beneficial flooding (although not mentioned in the Regional Plan or the RPI Regulations, Guideline 05/14 refers to a sixth attribute 'beneficial flooding' described as 'rejuvenation of vegetation (including native pastures upon which grazing operations rely), waterholes and wetlands associated with natural flood events that inundate floodplain areas'. (p12))

A detailed assessment of the presence of these attributes is provided in **Section 6.3** (**Table 6-1**).

3.5.5 Protected Area Values

a) Overview and Coverage

None of the sites are located on national parks (see **Figure 3-11**). However, the Yarraden Lease (Lot 10 SP113659) has been declared a Nature Refuge under section 46 of the NC Act and the following water storage sites are within this nature refuge:

- 90C_210
- 90C_213
- 90C_222.

b) Values

The relevant conservation agreement is intended to protect and enhance the values that are described in Schedule 2 (see **Appendix F** for extracts from the conservation agreement).

An assessment of the values of the relevant sites against these attributes has been undertaken as part of the assessment of impacts prepared in support of approval to construct the storages in the Yarraden Nature Refuge (**Section 7.5**).

3.5.6 Regional Nature Conservation Values (RNCV)

a) Background

The Draft Cape York Regional Plan (DSDIP 2013) proposed what were called Regional Nature Conservation Values. These were to identify areas of the highest biological importance based on an assessment of ecological criteria to support planning processes. EHP completed a Cape York Biodiversity Planning Assessment (BPA) and an Aquatic Conservation Assessment (ACA). To help inform the Regional Plan of the environmental values on Cape York Peninsula, the BPA and ACA assessments were refined to prioritise the Cape's most significant environmental values. The RNCV was designed to be used in conjunction with Matters of State Environmental Significance (MSES) (refer **Section 4.8.1**). This methodology and the associated GIS layer were specifically designed to provide input into the Draft Cape York Regional Plan.

As a result of feedback on the draft Regional Plan, the RNCV approach was not utilised in the final version of the Plan. Despite it not having a statutory basis, this mapping is included in this assessment for additional information purposes as a technical guide to biodiversity significance.

b) Assessment

The following table sets out details of the water storage sites with respect to mapped areas of RNCV (Section C only).

Table 3-13 Cape York RNCV – Section C

90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
None	None	at very edge of: cyp_fa_06	ar_r_fa_01	ar_r_fa_01	ar_r_fa_01

Key:

ar_r_fa_01	McIlwraith and Iron ranges: High endemism and richness of frog species.
cyp_fa_06	Significant fish habitat areas identified by Abrahams et al. (1995)[1] and Herbert et al. (1995)[1]. Rivers containing rare and uncommon fish taxa and fish communities include: f) Holroyd, Edward and Coleman rivers—area of transition between fish fauna assemblages of CYP and Gulf of Carpentaria.

The implications of this work are:

- Sites 90C_240C, 90C_241 and 90C_245 are potentially important for frogs
- Site 90C_222 is on the edge of an area important for fish habitat (of little relevance as the storage is clear of waterways).

3.5.7 Matters of State Environmental Significance

a) Background

Queensland's biodiversity that is considered to be of environmental importance at a state level is termed a 'matter of state environmental significance' (MSES). MSES are referenced in the biodiversity state interest under the State Planning Policy (SPP) (refer to **Section 4.8.1**). MSES include certain environmental values that are protected under Queensland legislation including:

- *Environmental Offsets Act 2014*
- *Environmental Protection Act 1994*
- *Fisheries Act 1994*
- *Marine Parks Act 2004*
- *Nature Conservation Act 1992*
- *Regional Planning Interests Act 2014*
- *Vegetation Management Act 1999*
- *Wild Rivers Act 2005* (now repealed).

MSES mapping is a representation of the definition for MSES under the SPP, generated using information from data including, but not limited to those shown on **Figure 3-13**.

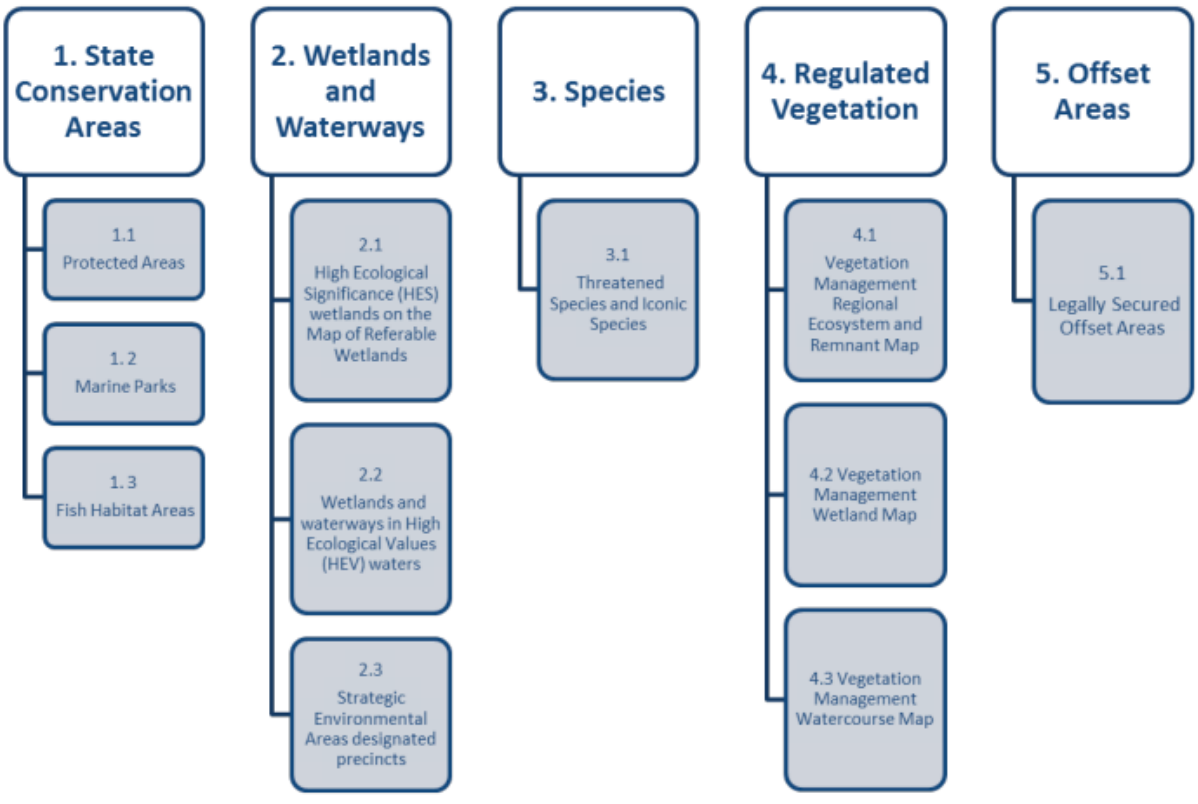


Figure 3-13 Matters considered in MSES mapping.

Source: EHP (2014).

b) Assessment

The following sites are located within mapped MSES areas:

- Section B [in preparation]
- Section C
  - 90C_210, 90C_240C, and 90C_222 (Protected areas – Yarraden Nature Refuge) – see **Chapter 7**
  - Small areas of MSES wildlife habitat for the species *Rhinolophus philippinensis / robertsi* (Large-eared Horseshoe Bat) mapped across the small areas of remnant vegetation on site 90C_245.

Refer to **Section 4.8.1**.

3.5.8 High Risk Protected Plant Areas

a) Overview

The Protected Plants Flora Survey Trigger Map shows high risk areas for protected plants and is used to help determine flora survey and clearing permit requirements for a particular location. Areas shown on the map as 'high risk' are subject to particular requirements under legislation. This has been addressed in **Section 3.4.1c)**.

Proponents need to do a comprehensive flora survey prior to undertaking any clearing of protected plants in an area identified as high risk on the map, unless the clearing can be done under a relevant exemption. The flora survey needs to comply with this or an alternative methodology that has been endorsed by the chief executive of EHP. As described in **Section 3.4.1**, TMR holds a transitional Protected Plant Exemption (EHP 2015). A clearing permit is required if EVNT plants are to be cleared or may be impacted by the proposed clearing. In addition, a clearing permit is required to clear EVNT plants in areas not shown as high risk on the map if it is known that such plants may be present in the area where it is proposed to clear or that may be impacted by the proposed clearing.

b) Coverage

Sites 90C_241 and 90C_245 are located within a high risk area under the Protected Plant regulations. As noted in **Section 3.4.1c)**, a flora survey has been undertaken and has identified that the protected plants for which the areas were listed (*Carmona retusa* and *Dendrobium bigibbum*) are not present on the sites. However *Cajanus mareebensis* (listed as Endangered under both the EPBC Act and NC Act) was recorded on both of these sites. Refer to **Section 4.1** and **Section 4.3** respectively.

3.6 CULTURAL HERITAGE (ALICE BUHRICH)

3.6.1 Details

A cultural heritage assessment for this project was completed by Alice Buhrich for Section A (north of Laura) in 2014 (Buhrich 2014). This includes a description of:

- history
- site descriptions
- proposed project activities
- legislation
- registers and databases
- previous studies
- consultation
- results
- recommendations.

A desktop addendum was produced in June 2015 (Buhrich 2015) to cover initial work for Sections B and C. A copy of both reports is included as **Appendix E**.

With respect to the detailed assessment of Sections B and C, the Addendum is a desktop study only as all fieldwork is awaiting the finalisation of negotiations with the Cape York Land Council (CYLC). Once complete, all findings and recommendations will be included in **Part C**.

3.6.2 Findings

a) Preliminary Findings (January 2015)

A search of the Cultural Heritage database has been conducted, and no Aboriginal sites are recorded within 10 km of the proposed water storages. However, the lack of recorded sites is likely to be due to a lack of formal surveys in the area, rather than an absence of actual cultural heritage sites. Previous heritage surveys on the Peninsula Development Road from Laura to Coen have identified scarred trees, and there is the potential for other sites, such as story places and stone artefact scatters to also exist.

Buddy Ahmat (Senior Heritage Liaison Officer, Transport and Main Roads) has provided advice on relevant Aboriginal Parties for the area. There are a number of groups and relevant individuals that need to be consulted. They are

- Olkola and Thaypan People – Musgrave area to Bamboo Range (Michael Ross, Fred Coleman, Olkola Aboriginal Corporation, Kyerrawanhdha Thingalkal Land Trust)
- Ayapathu – south of Coen to the Bamboo Range (Phillip Port via Billie Pratt).
- Joseph le Cheu, representing Possum People, has also expressed an interest in the southern part of the survey area.

There are two Qld Heritage Registered places near Sections B and C, although impacts to these places are unlikely:

- The Musgrave Roadhouse was built in 1886 as a telegraph station on the Cape York Telegraph Line.
- Ebagoolah Township and Battery is approximately 6 km west of the PDR, near Yarraden Homestead.

b) Additional Findings – Desktop Assessment (Sections B and C)

Recommendations of the desktop addendum (Buhrich 2015) are:

- Cultural heritage surveys should be conducted on the development footprints of the proposed water points.
- The new role of the CYLC in cultural heritage management of Aboriginal heritage within the Cape York United One Claim area requires new consultation processes. A process is needed for identifying relevant custodians 'on the ground' through the CYLC and for assessing significance of any cultural heritage places located in the proposed development areas.
- Consideration should be given to retaining the bushland setting of the (former) Musgrave Roadhouse, and views to the building from the PDR.

c) Detailed Findings – Field Assessment

[To come]

4 LEGISLATION AND APPROVALS

4.1 INTRODUCTION

This chapter describes the implications of the previous analysis with respect to legislation and approvals. This is in addition to the *State Development and Public Works Organisation Act 1971* (Qld) which underpins TMR's environmental processes manual (TMR 2013) and associated environmental assessments.

4.2 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1994

4.2.1 Introduction

The *Environment Protection and Biodiversity Conservation Act* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as matters of national environmental significance (MNES). Matters of NES are defined under Part 3 of the EPBC Act, namely:

- World Heritage properties (sections 12 and 15A).
- National Heritage places (sections 15B and 15C).
- Wetlands of international importance (sections 16 and 17B).
- Listed threatened species and communities (sections 18 and 18A).
- Listed migratory species (sections 20 and 20A).
- Protection of the environment from nuclear actions (sections 21 and 22A).
- Commonwealth marine environment (sections 23 and 24A) – includes listed marine species.
- Great Barrier Reef Marine Park (sections 24B and 24C).
- A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E).
- The environment, if the action involves Commonwealth land (sections 26 and 27A), including:
  - actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land)
  - actions taken on Commonwealth land that may have a significant impact on the environment generally.
- The environment, if the action is taken by the Commonwealth (section 28).
- Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C).

4.2.2 Assessment

a) Overview

Of the above MNES, the only controlling provisions that could potentially be involved are sections 18 and 18A (Listed threatened species and communities). Specifically, the endangered plant *Cajanus mareebensis* was recorded in four of the six proposed water storage locations (90C_210, 90C_222, 90C_240C, and 90C_245).

A person who proposes to take an action that will have, or is likely to have, a significant impact on a MNES must refer that action to the minister for a decision on whether assessment and approval is required under the EPBC Act. A 'significant impact' is an impact which is important, notable, or of

consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. Proponents should consider all of these factors when determining whether an action is likely to have a significant impact on matters of national environmental significance (DoTE 2013).

b) The Action

In terms of the EPBC Act, 'the action' is the construction of the storages and associated infrastructure (stockpiles, access tracks etc.) on the identified survey areas. This will involve clearing and stockpiling of native vegetation, earthworks, construction of an access track, and miscellaneous activities such as construction of overflows. Details are shown on the maps in **Part C**.

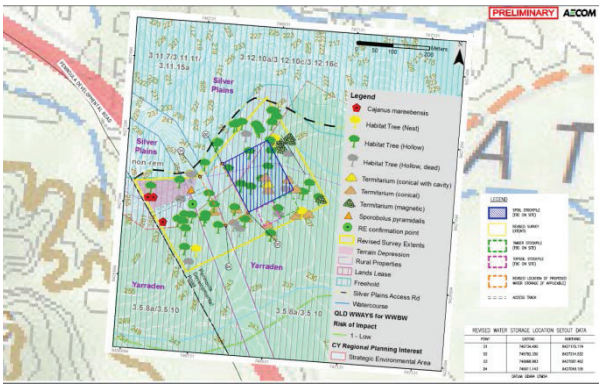


Figure 4-1 Site 90C_210.

Refer to larger maps in **Part C**.

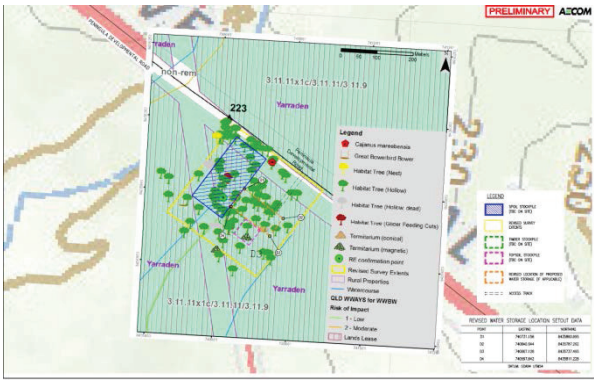


Figure 4-2 Site 90C_222.

Refer to larger maps in **Part C**.

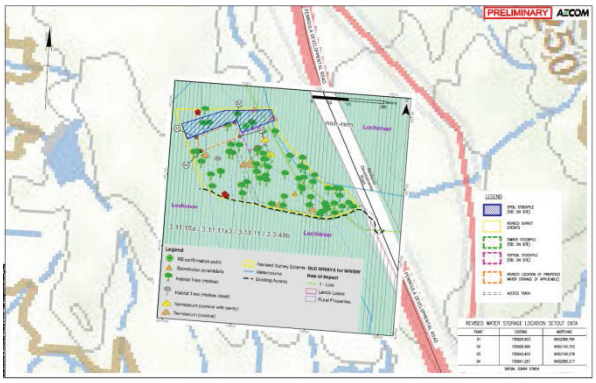


Figure 4-3 Site 90C_240C.

Refer to larger maps in **Part C**.

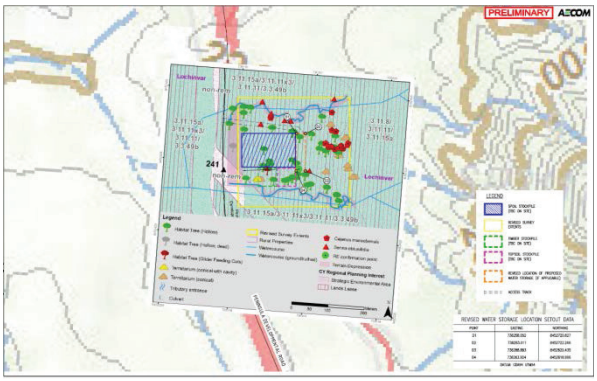


Figure 4-4 Site 90C_241.

Refer to larger maps in **Part C**.

c) Assessment

Whether or not the action removal of some of these individuals constitutes a controlled action under the EPBC Act depends on four criteria (DoTE 2013). These are listed in the following table, along with an assessment based on survey data and analysis.

Table 4-1 Assessment of the Actions

DOTE (2013) CRITERIA	ASSESSMENT
The species must be present in the area of the proposed action.	**Species present.** The detailed surveys involved a targeted search for *Cajanus mareebensis* on all sites. This confirmed its presence on four sites and detailed location were recorded by GPS. These locations were exported to GIS platform and plotted. Refer to **Part B**.
There must be the potential for impacts.	**Impacts avoided.** All infrastructure was located on the sites to avoid the need to clear the plotted individuals. However, without appropriate site management there is the potential for impacts due to construction activities. Refer to **Part C** (Environmental Management).
Any proposed measures to avoid or reduce impacts must be considered to be ineffective in reducing the level of impact below the 'significant impact' threshold.	**Mitigation effective.** The recommendations for site management include measures to clearly mark and fence off individuals of *Cajanus mareebensis* to protect them from construction activities. Refer to **Part C** (Environmental Management).
The impacts must be likely to be significant (important, notable, or of consequence, having regard to their context or intensity).	**Impacts insignificant.** It is most unlikely that any individuals will be impacted, given the avoidance and mitigation strategies employed. See discussion below.

Source: Study team compilation. Refer to maps in **Part C**.

4.2.3 Significance of Impacts

Specifically, for species listed as endangered, an action is likely to have a significant impact if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of the species
- disrupt the breeding cycle of a population
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline, or
- interfere with the recovery of the species.

In this context, a 'population' is defined as an occurrence of the species in a particular area. In relation to an endangered species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of populations, or
- a population, or collection of local populations, that occurs within a particular bioregion.

4.2.4 Population Details

Little of the required information is known about *C. mareebensis,* including:

- the population size and distribution of the species in the Coen locality or the greater Cape York area
- the habitat requirements for the species
- the sensitivity and timing of its reproductive cycle.

However, the following map has been produced from Queensland Herbarium records and modelling and is the best estimate available for the distribution of the species. This map does not include the individuals identified on the four affected sites and elsewhere during surveys undertaken for this report. Voucher specimens have been prepared and submitted to the Queensland Herbarium for inclusion in the database.

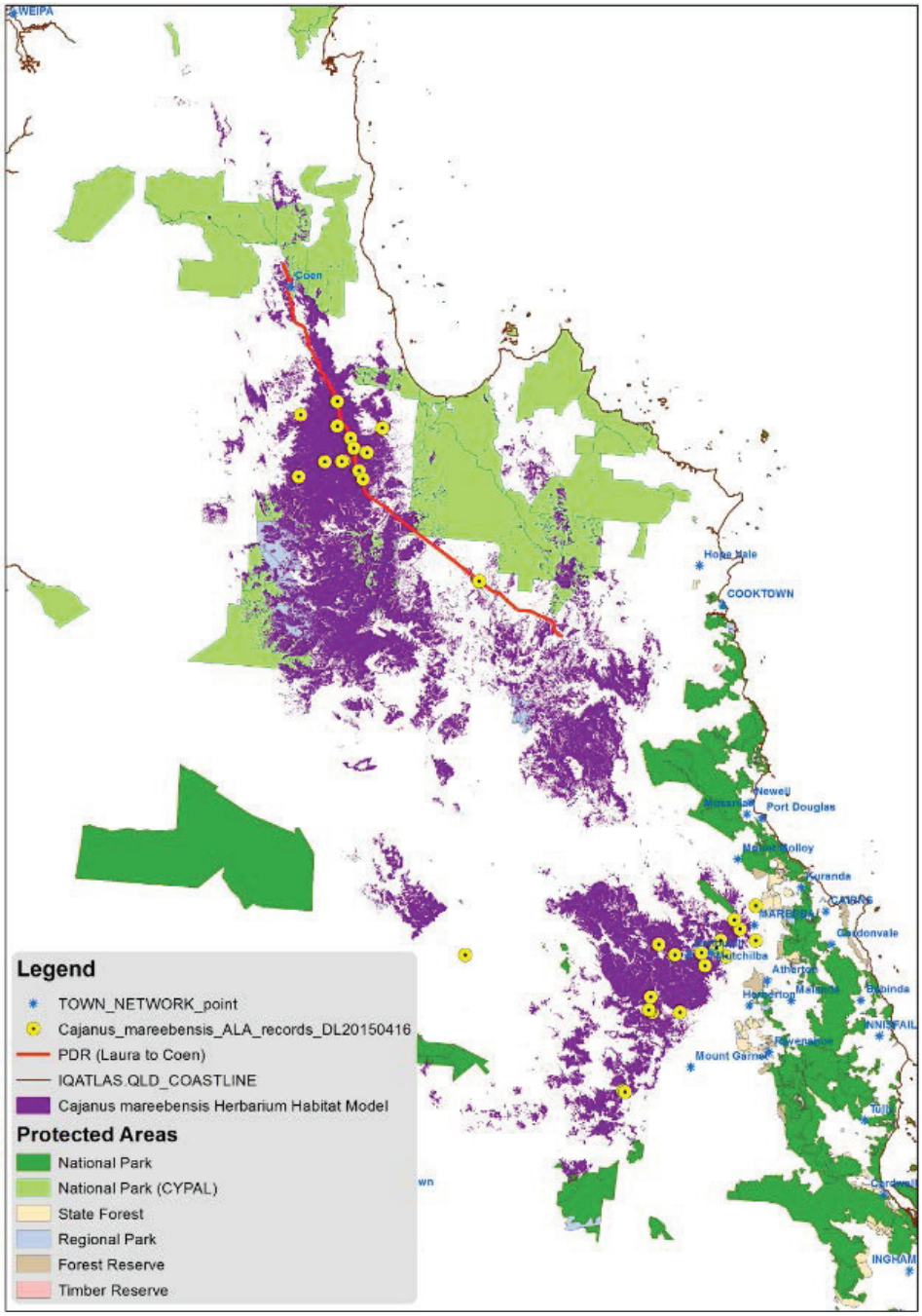


Figure 4-5 Distribution of *Cajanus mareebensis*.

Source: Queensland Herbarium.

This map does not include the individuals identified during surveys for this report. Voucher specimens have been prepared and submitted to the Queensland Herbarium for inclusion in the database.

4.2.5 Conclusions

The above discussion reveals that, in terms of the DoTE (2013) criteria:

- The species must be present in the area of the proposed action. **Confirmed on four sites.**
- There must be the potential for impacts. **Very unlikely, given the avoidance-by-design strategy.**
- Any proposed measures to avoid or reduce impacts must be considered to be ineffective in reducing the level of impact below the 'significant impact' threshold. **Mitigation very likely to be effective in protecting mapped individuals from general construction activities.**

- The impacts must be likely to be significant (important, notable, or of consequence, having regard to their context or intensity). **Any possible remaining impacts are not likely to be significant when measured against the stated criteria.**

It is therefore concluded that there is no need to refer the project to the Commonwealth minister under the EPBC Act.

4.3 NATURE CONSERVATION ACT 1992

4.3.1 Nature Conservation (Protected Areas) Regulation 1994

a) Discussion

The PDR passes through the Yarraden Nature Refuge (Lot 10 SP113659) between the following chainages (kilometres measured north of Laura):

- 190.7 to 210.8
- 217.1 to 218.5
- 219.9 to 234.1.

Three sites in Section C (90C_210, 90C_213, and 90C_222) are located within the Yarraden Nature Refuge.

The Yarraden Nature Refuge is listed under the Nature Conservation (Protected Areas) Regulation 1994, Schedule 5. A nature refuge is a voluntary agreement between a landholder and the Queensland Government to commit to protect land with significant conservation value, while allowing compatible and sustainable land uses to continue. Small scale development such as the water storage facilities are likely to be permissible subject to not impacting on the values of the Nature Refuge.

This layer is incorporated into and mapped as part of the MSES under the State Planning Policy (refer **Section 4.8.1**) and the specific values listed under the relevant conservation agreement in **Table 7-2**.

Refer to **Chapter 7** for details regarding required approvals for the above sites. In summary, no specific approval is required providing that the matters discussed are attended to, namely:

- TMR demonstrate that the proposed storages do not result in a significant impact on the values for which the refuge was listed.
- TMR obtains approval/agreement from land holder (normally undertaken with EHP staff present).
- TMR send signed agreement (TMR / land holder) to EHP and obtain written confirmation that the works can proceed.

b) Conclusions

No specific approval is required providing that the process undertaken follows the approved steps. TMR is committed to this process which will be undertaken separate from this report.

4.3.2 Listed Threatened Plant Species

a) Discussion

TMR has a 'Protected plant exemption' under Section 89 of the NCA and Section 41(1)(a)(ii) of the Nature Conservation (protected Plants) Conservation Plan 2000 (now repealed) (EHP 2013a). This exemption grants TMR an approval for taking whole near threatened plants and parts of endangered plants where this does not and is not reasonably expected to cause the death of the plant. The

exemption also grants TMR an approval for the taking of whole endangered plants in areas which have been previously cleared by TMR or a landholder, where the vegetation on the area has not regrown to a state that meets the criteria of 'remnant vegetation' under the VMA.

Near Threatened Plants

No near threatened plants were identified during the surveys.

Endangered Plants

Cajanus mareebensis (Endangered) was recorded on four sites (90C_210, 90C_222, 90C_240C, and 90C_241) as described in **Section 4.2**. The Protected Plants guidelines state that where EVNT plants are present in the clearing impact area and cannot be avoided, a clearing permit will be required.

As described in **Section 4.2.2**, the detailed surveys involved a targeted search for *Cajanus mareebensis* on all sites and this confirmed its presence on the above four sites and detailed location were recorded by GPS. All infrastructure was located on the sites to avoid the need to clear the plotted individuals. In addition to this avoidance strategy, recommendations for site management include measures to clearly mark and fence off individuals of *Cajanus mareebensis* to protect them from construction activities. Refer to **Part C** (Environmental Management).

b) Conclusions

In summary, although EVNT species exist on four sites, infrastructure has been sited so that clearing is not required. In addition, recommendations for site management include measures to clearly mark and fence off individuals of *Cajanus mareebensis* to protect them from construction activities.

4.3.3 Special Least Concern Plants

a) Discussion

Under Section 261 of the regulations, the clearing of special least concern plants is exempt from the regulations if the plant is 'transplanted somewhere else within the vicinity of the land from which it is taken'. However, TMR internal advice is that special least concern plants should be treated in the same manner as least concern plants. Where possible, they can be transplanted. The recommendations included in **Part C** (Environmental Management) are that the orchid species recorded on sites 90C_213, 90C_222, 90C_204C, and 90C_241 should be transplanted onto suitable trees.

b) Conclusions

Although not strictly required, it is recommended that the orchid species recorded on sites 90C_213, 90C_222, 90C_204C, and 90C_241 be transplanted onto suitable trees.

4.3.4 High Risk Protected Plant Areas

a) Discussion

The following sites are located within 'High Risk' Protected Plant areas, designated under the Nature Conservation (Wildlife Management) Regulation 2006:

- Section B [In preparation]
- Section C
  - 90C_241
  - 90C_245.

Areas shown as high risk are subject to particular requirements under the NC Act legislation. The flora surveys for the proposed storages have identified that the protected plants for which the areas were listed (*Carmona retusa* and *Dendrobium bigibbum*) are not present on the sites.

However *Cajanus mareebensis* (listed as Endangered under both the EPBC Act and NC Act) was recorded on site 90C_241 as discussed above.

b) Conclusions

The flora surveys for the proposed storages have identified that the protected plants for which the areas were listed (*Carmona retusa* and *Dendrobium bigibbum*) are not present on the sites and therefore no approval is required.

4.3.5 Animal Breeding Places

a) Discussion

TMR (who will be undertaking the works) holds an exemption under Section 88 of the NCA and Section 332 of the regulations that allows them to tamper with animal breeding places (EHP 2013b). Under the associated species management plan, TMR is authorised to tamper with breeding places as set out below.

Table 4-2 Authorised Species Management Actions with respect to Animal Breeding Places

Table 1. Authorised species management actions with respect to animal breeding places

Species group	Breeding place status	Action
Least concern – special least concern animal or colonial breeding	All	Consult with DERM. Specific authority to take[#] is required (either by way of a damage mitigation permit or separate SMP under the *Nature Conservation (Wildlife Management) Regulation 2006*..
Other least concern species	Contains young or eggs	Avoid unnecessary disturbance. Breeding place may be removed and eggs/young handed over to a licensed wildlife carer/facility. It is preferable to allow eggs to hatch and/or young to mature and move away from a breeding place. As a last resort, eggs may be destroyed°.
Other least concern species	No eggs or young	Proceed with caution. Remove breeding place if applicable.

Table Notes:

[#] Where the removal or translocation of wildlife is required, the 'take' must be facilitated by a suitably licensed and experienced person.

° There are two acceptable methods for destroying or terminating eggs: quickly breaking an egg and crushing its contents; or reducing the temperature of the egg to less than 4 degrees Celsius for at least 4 hours.

All nests recorded on site were of 'least concern' species. Nests may contain eggs and young at the time of construction. The actions in **Table 4-2** must be followed for any nests that are found to contain eggs or young at the time of construction.

b) Conclusions

Although all nests recorded on site were of 'least concern' species, they may contain eggs and young at the time of construction. The actions covered by the species management program must be followed for any nests that are found to contain eggs or young at the time of construction. This is a recommendation of **Part C** (Environmental Management).

4.4 LAND PROTECTION (PEST AND STOCK ROUTE MANAGEMENT) ACT

4.4.1 Discussion

Senna obtusifolia (Sickle pod) and *Sporobolus pyramidalis (Giant rat's tail grass)* are Declared Class 2 Weeds under the *Land Protection (Pest and Stock Route Management) Act* 2002 (Qld). These species were recorded on sites 90C_210, 90C_240, 90C_241, & 90C_245.

Under this Act, landowners must take reasonable steps to keep land free of Class 2 pests.

This is a recommendation of **Part C** (Environmental Management).

4.4.2 Conclusions

During the construction and operation the storages, reasonable steps must be taken to keep land free of *Senna obtusifolia* (Sickle pod) and *Sporobolus pyramidalis (Giant rat's tail grass)*. This is a recommendation of **Part C** (Environmental Management).

4.5 VEGETATION MANAGEMENT ACT

4.5.1 Regional Ecosystems

a) Discussion

All Regional Ecosystems on each site are listed as 'Least Concern' systems under the *Vegetation Management Act 1999* (Qld) (VM Act).

No approval to clear is required under the VM Act (SP Regulations Schedule 24 Part 1(16) 'Clearing vegetation for community infrastructure mentioned in schedule 2' (10 State Controlled Roads).

b) Conclusions

All Regional Ecosystems on each site are listed as 'Least Concern' systems under the VM Act. No approval to clear is required under this act.

4.5.2 Essential Habitat

a) Discussion

Essential habitat mapping identifies sites and locations considered to contain important habitat for flora and fauna species of conservation significance. Site 90C_245 in Section C has essential habitat mapped on the site for the species *Rhinolophus philippinensis / robertsi* (Large-eared Horseshoe Bat).

This layer is incorporated into and mapped as part of the MSES under the State Planning Policy (refer **Section 4.8.1**). The detailed survey for this site (**Part B**) recommends that this vegetation be avoided. This is a recommendation of **Part C** (Environmental Management) and has been given effect in the design of infrastructure (see Figure SK-12_C in **Part C**).

b) Conclusions

Essential habitat is shown on Site 90C_245 in Section C and should be avoided. This is a recommendation of **Part C** (Environmental Management) and has been given effect in the design of infrastructure (see Figure SK-12_C in **Part C**).

4.6 FISHERIES ACT 1994 (QLD)

4.6.1 Discussion

Waterway barrier works are regulated under *the Fisheries Act 1994* and the *Sustainable Planning Act 2009* when barriers to fish movement, including partial barriers, are installed across waterways. Barrier works include construction, raising, replacement and some maintenance works on structures such as culvert crossings, bed level and low level crossings, weirs and dams, both permanent and temporary.

This legislation applies to the watercourse on site 90C_213 which is mapped as having a *Low* potential level of impact on fish passage from barriers. The development of a low impact dam/weir in a low risk watercourse is allowable under a self-assessable code. An approval is not required for works

performed under a self-assessable code if completed within the code's restrictions. However pre-works notification and on-site signage requirements do apply. Consideration of the proposal to create a dam on the site should be undertaken with respect to the Code for self-assessable development, Minor waterway barrier works, Part 1: low impact dams and weirs (Code number WWBW01).

4.6.2 Conclusions

The works proposed for site 90C_213 are to be assessed under the Code for self-assessable development, Minor waterway barrier works, Part 1: low impact dams and weirs (Code number WWBW01).

4.7 REGIONAL PLANNING INTERESTS ACT

4.7.1 Discussion

The *Regional Planning Interests Act 2014* (RPI Act) identifies and protects areas of Queensland that are of regional interest. An area of regional interest has been identified because of its contribution, or likely contribution to Queensland's economic, social and environmental prosperity. The RPI Act provides the framework for implementing the policies of the Cape York Regional Plan (DSDIP 2014). 'Areas of regional interest' are defined in the RPI Act as involving:

- Strategic Environmental Areas (SEAs)
- Priority Agricultural Areas (PAAs)
- Priority Living Areas (PLAs)
- Strategic Cropping Areas (SCAs)

Of relevance to this project:

- SEAs (see **Figure 3-11** extracted from the Cape York Regional Plan (DSDIP 2014) and **Figure 3-12** which is a detailed map prepared from GIS data) are areas where high ecological values may occur due to the collocation of multiple biodiversity features in conjunction with the landscape's topographical and hydrological features. Activities that risk irreversible or widespread impacts to the ecological integrity of the attributes detailed in the Regional Plan will not be allowed. Designated precincts within SEAs are areas of significant biodiversity value and/or areas where high cultural heritage significance exist and should be afforded the highest level of protection in the SEA. Some storage sites are within the Cape York SEA (see **Section 3.5.3b)**) but none within designated precincts.
- Priority Agricultural Areas (PAAs). Not relevant to this project.
- Priority Living Areas (PLAs). Not relevant to this project.
- Strategic Cropping Areas (SCAs). Not relevant to this project.

a) Assessment – Significant Environmental Area

As the construction of storages with an SEA requires approval under the RPI Act, the assessment of impacts is documented in **Chapter 6** where all information relevant to the assessment is consolidated.

b) Assessment – Designated Precincts

None of the proposed sites is located within designated precincts.

4.7.2 Conclusions

The construction of storages with the Cape York SEA requires approval under the RPI Act. This is documented in **Chapter 6** where all information relevant to the assessment is consolidated.

4.8 PLANNING ISSUES

4.8.1 State Planning Policy

a) Discussion

Further to the discussion in **Section 3.5.7**, the State Planning Policy (SPP) includes protecting Matters of SES. These are:

- protected area estates (including all classes of protected area except nature refuges and coordinated conservation areas) under the *Nature Conservation Act 1992*
- marine parks (including 'marine national park', 'marine conservation park', 'scientific research', 'preservation' and 'buffer' zones) under the *Marine Parks Act 2004*
- fish habitat areas A and B under the *Fisheries Act 1994*
- threatened species (including plants, animals and animal breeding places) under the *Nature Conservation Act 1992*
- regulated vegetation under the *Vegetation Management Act 2009* including:
  - regional ecosystems identified as 'endangered', 'of concern', 'connectivity areas', 'critically limited', 'threshold' and 'wetland'
  - 'high value regrowth' areas containing 'endangered' or 'of concern' regional ecosystems
  - regional ecosystems identified as 'watercourse'
- high preservation areas of wild rivers under the *Wild Rivers Act 2005* (repealed – now covered in the *Regional Planning Interests Act 2014*)
- high conservation value wetlands under the *Environment Protection Act 1994* including:
  - wetlands assessed as containing 'high' or 'very high' values via a conservation assessment, or
  - where a conservation assessment has not yet been completed; wetlands that intersect with areas shown in the 'Directory of Important Wetlands' and high ecological value wetlands and waterways declared under the Environmental Protection (Water) Policy 2009
- legally secured offset areas.

MSES mapping is a representation of the definition for MSES under the SPP, generated using information from data including, but not limited to those shown in **Table 3-8**.

The only Matters of SES identified are:

- 90C_210, 90C_240C, and 90C_222 (Protected areas – Yarraden Nature Refuge)
- essential habitat mapped on the site for the species *Rhinolophus philippinensis / robertsi* (Large-eared Horseshoe Bat).

These are discussed below.

<u>Yarraden Nature Refuge</u>

Issues associated with the Yarraden Nature Refuge are discussed in **Chapter 7**.

Essential Habitat

The SPP employs a 'maintain and enhance' approach to managing MSES values. It states that development should not proceed in areas mapped as MSES until a site investigation establishes what values are present on site. Where MSES values are confirmed as present on site, the SPP requires that development maintains or enhances these values through minimising potential impact on these values. This may include careful consideration of site selection and the location of buildings or activities on the select site, the timing of the development, and the design of structures. Where development does occur that may have an impact on MSES, the extent of the MSES and the level of impact should be determined so that appropriate mitigation measures (such as retention of habitat trees) or environmental offsets can be provided as required.

The construction of the proposed water storage at the recommended location on site 90C_245 would not directly impact on this habitat. There may be some small indirect disturbance (such as noise and vibrations) during construction, but this would only be on a temporary basis and there is sufficient suitable habitat in proximity to the site that could be utilised by any temporarily disturbed species.

The detailed survey for this site (**Part B**) recommends that this vegetation be avoided. This is a recommendation of **Part C** (Environmental Management) and has been given effect in the design of infrastructure (see Figure SK-12_C in **Part C**).

b) Conclusions

Issues associated with the Yarraden Nature Refuge are discussed in **Chapter 7**.

Essential habitat is shown on Site 90C_245 in Section C and should be avoided. This is a recommendation of **Part C** (Environmental Management) and has been given effect in the design of infrastructure (see Figure SK-12_C in **Part C**).

4.8.2 Cape York Regional Plan

The main items of relevance of the Cape York Regional Plan to this project are:

- various statements supporting the upgrading of the PDR (and hence the development of the network of storages for storing construction water) – see **Section 6.5.4**
- the need to protect the Cape York SEA (see below).

a) Details

Strategic Environmental Areas (SEAs) are areas of regional interest under the RPI Act as described above (see **Section 4.6**). As noted in **Section 3.5.3b)**, four sites in Section C are within the Cape York Strategic Environmental Area and none is located within a designated precinct.

b) Assessment

Refer to **Chapter 6**.

4.8.3 Queensland State Corridors

a) Discussion

This data represents non-statutory Biodiversity Planning Assessment (BPA) derived terrestrial and riparian corridor datasets. This data was also considered during the derivation of Cape York RNCVs (refer **Section 3.5.5**). The following sites are located within Queensland State Corridors.

- Section B
  - Nil.

- Section C
  - 90C_210
  - 90C_213
  - 90C_222
  - 90C_240C
  - 90C_241
  - 90C_245.

b) Conclusions

This is a non-statutory measure of biodiversity value that guided the selection of sites. However, it was not possible to avoid the mapped areas.

4.8.4 *Sustainable Planning Act 2009*

a) Discussion

Site 90C_245 is located on Lot 18 SP142881 which is a reserve under the *Land Act 1994* (Qld). It is a "Reserve for Township Coen" under the trusteeship of Cook Shire Council.

TMR (and its contractors working on the PDR) are exempt from gaining an approval for 'Community Infrastructure – dam building' under the SPA Regulations Schedule 4 Table 5 Item 7(c).

b) Conclusions

No approval is required under the SP Act / CSC Planning Scheme.

4.9 ABORIGINAL CULTURAL HERITAGE ACT 2003 (QLD)

4.9.1 Discussion

The *Aboriginal Heritage Cultural Act 2003* (Qld) (ACH Act) protects all significant Aboriginal sites in Queensland. Under the Act all land users have a Duty of Care to minimise harm to Aboriginal cultural heritage places. The following steps were taken or are planned to meet the duty of care requirements:

- consulting the relevant Aboriginal Party about potential to harm nontangible cultural heritage during the project
- seeking information from the state-managed Cultural Heritage database about previous cultural heritage recorded in the area
- conducting a survey of the area, with the relevant Aboriginal Party, to identify any cultural heritage sites that may be impacted
- developing management strategies with the Aboriginal Party to manage impacts to cultural heritage.

The final two steps have not been undertaken, pending negotiations with the CYLC (see **Section 3.6.1**).

The Aboriginal Party has a specific role for management of cultural heritage, identified in the Duty of Care Guidelines. The Aboriginal Party:

- have a key role in assessing potential of an activity to harm Aboriginal cultural heritage
- should be consulted prior to any activities likely to harm Aboriginal cultural heritage

- should be notified if any cultural heritage material is located during development activities
- are responsible for making agreements with land users if there is proposal to harm Aboriginal cultural heritage
- are responsible for assessing the significance of Aboriginal cultural heritage.

Where agreement cannot be reached with the Aboriginal Party the land user continues to have a duty of care to protect Aboriginal cultural heritage from harm. If Aboriginal cultural heritage is harmed from any development activities the extent to which the land user met the duty of care, including outcomes of consultation with the Aboriginal Party, would be an important consideration.

The Australian Burra Charter (Australia ICOMOS 2013) outlines best practice for management of heritage places. With regard to Aboriginal heritage, these principles are:

- avoid impacts to the place if possible
- involve relevant Aboriginal people
- understand the significance of place
- make decisions based on significance.

Burra Charter principles are incorporated into the management recommendations provided in this report.

4.9.2 Conclusions

The Duty of Care provisions of the Act have been followed to the greatest extent possible. As noted in the cultural heritage Addendum (**Appendix E**), the new role of the CYLC in cultural heritage management of Aboriginal heritage within the Cape York United One Claim area requires new consultation processes. A process is needed for identifying relevant custodians 'on the ground' through the CYLC and for assessing significance of any cultural heritage places located in the proposed development areas.

Cultural heritage surveys should be conducted on the development footprints of the proposed water points and these are proposed to be undertaken once negotiations with the CYLC allow. Values identified during these surveys and agreed management needs will be incorporated into site planning and management (**Part C** – to be updated when possible).

4.10 IMPLICATIONS

4.10.1 Section B

[In preparation]

4.10.2 Section C

In summary, the following approvals are or may be required for Section C. Where relevant, exemptions or other reliefs are stated.

Table 4-3 Summary of Approvals Required – Section C

LEGISLATION	SITE					
	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
EPBC Act	Nil	Nil	Nil	Nil	Nil	Nil
NC Act	Works in Yarraden Nature Refuge – EHP protocol to be followed	Works in Yarraden Nature Refuge – EHP protocol to be followed	Works in Yarraden Nature Refuge – EHP protocol to be followed	Nil	Nil	Nil
EVNT Plants	Nil		Nil	Nil	Nil	Nil
Orchids	Nil	Nil (however, recommended that orchids are relocated)	Nil (however, recommended that orchids are relocated)	Nil (however, recommended that orchids are relocated)	Nil (however, recommended that orchids are relocated)	
Animal breeding places	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan	Covered by Species Management Plan
LP Act	Management of Class 2 weeds required	Nil	Nil	Management of Class 2 weeds required	Management of Class 2 weeds required	Management of Class 2 weeds required
VM Act	Nil	Nil	Nil	Nil	Nil	No – avoid mapped essential habitat.
Fisheries Act	Nil	Assessment required under self-assessable waterway barriers code	Nil	Nil	Nil	Nil

(Continued over)

LEGISLATION	SITE					
	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
RPI Act	RIDA required	Nil	Nil	RIDA required	RIDA required	RIDA required
SP Act	Nil	Nil	Nil	Nil	Nil	Exempt
ACH Act	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required	Fieldwork and consultation required

Source: Study team compilation.

5 IMPACTS AND MITIGATION

5.1 POTENTIAL CONSTRUCTION IMPACTS AND MITIGATION

5.1.1 Impacts

The main potential impacting processes during the construction phase and associated mitigation are outlined below:

- **Clearing of vegetation**. Clearing of natural vegetation is required for the storage footprint, access track, machinery / laydown areas, and stockpiles. Vegetation to be removed includes woodland and open grass areas and some orchids. Individuals of the endangered (EPBC Act, NC Act) *Cajanus mareebensis* were located on many sites but will be able to be avoided. The removal of vegetation has the potential to provide open areas for colonisation by weeds, destabilise banks of watercourses, and increase the risk of erosion. Some trees contain hollows that may be colonised by native fauna and this habitat will be lost. No EVNT fauna species are likely to be present.
- **Earthmoving**. Earthmoving during construction will be required for the removal of topsoil, establishment of access tracks, and construction of the storages and bypass structures. This assessment reveals that four soils have high erosivity (*Chlory*, *Deighton*, *Dixie*, *Ginger* (mixed soil site only). These soils may not be ideal due to potential erosion problems. However, a review of existing storages (Environment North 2010a) reveals that several storages are built on soils identified in the above mapping without any apparent problems. Special care is indicated during earthworks when handling this soil type. In general, earthmoving has the potential to cause erosion resulting in the destabilisation of landforms. This can contribute to movement of sediment from the disturbed area and subsequent loss of water quality in seasonal creeks. Special care is indicated during earthworks when handling this soil type. Vehicle washdown and other management actions are required to prevent the spread of weeds during construction.
- **Other construction activities**. In addition to the above works, other construction impacts often occur due to unplanned peripheral disturbance. Such works include the construction of access tracks, works areas, and temporary works (including drainage diversions). These works are generally not as well planned as core project activities and so have a higher potential for environmental impact.

5.1.2 Mitigation

Recommended mitigation for each storage site is outlined in **Part C**.

The site-specific recommendations of this report (**Part C)** will be used to inform the Contractor's EMP (Construction) that is required to be developed for the construction process. This EMP (Construction) will include a range of general best-practice environmental measures that are appropriate for all earthworks projects.

Regarding soils:

- Constructing water storages on soils with a potential high erosivity is practical, as long as attention is given to standard soil conservation measures such as:
  - limiting slope of land over which water will run
  - installing suitable erosion protection works (e.g. dumped rock, rock mattresses) where warranted
  - quickly re-establishing vegetation cover on disturbed soils.

- Constructing water storages on soils with a potential high permeability is practical, as long as attention is given to carefully selecting layers of soil within the excavation that have desirable priorities when constructing storage floors and walls and spillways etc.
- Recent experience from storages north of Coen suggests that the above measures are practical.

5.2 POTENTIAL OPERATIONAL IMPACTS AND MITIGATION

5.2.1 Impacts

a) Overview

The water storages are relatively small structures located to collect overland flow, in most cases principally arising from road runoff. They have been deliberately located clear of major depressions / formal watercourses (see recommendations for minor adjustments to original locations provided to improve performance in this regard) in order to limit impacts on hydrology and ecological function.

On all sites the clearing required for storage construction involves an insignificant loss of grazing area and a future benefit in terms of cattle watering. As part of the standard landholder agreement, the lessee has rights to share stored water during the construction period and has exclusive use of the storages once no longer required by TMR. Under these circumstances, the storages provide a net beneficial impact on existing agricultural enterprises.

As observed below, ongoing management of weed and stock use will be required. This will be the responsibility of the landholder once TMR completes fencing and hands over the storages at the end of the construction period.

b) Recorded Sustainability Issues

The review of 67 existing dams along the PDR between Laura and Weipa (Environment North 2010a) found that, without effective management, there were several threats to biodiversity values arising from:

- weeds including ponded pasture species
- feral and native animals
- fire.

The following is an extract from that study:

- Dam construction has expanded the diversity and abundance of weeds at the expense of native species. Both terrestrial and semi-aquatic weeds displace native species and communities, and disrupt ecological processes.
- The new habitat created by dam construction can be expected to become colonised by semi-aquatic grasses deliberately introduced to CYP as ponded pasture. An example of ponded pasture species is Olive Hymenachne (*Hymenachne amplexicaulis*) which was recorded at several of the existing dams. There is potential for invasion of other ponded pasture species. These species are significant potential invaders of natural wetlands, and in particular the wetlands and billabongs of Lakefield and Mungkan Kandju (now Oyala Thumotang) National Parks. Their rampant growth quickly chokes the waterbody and out-competes native species such as water lilies, as well as interfering with the hydraulic operation of the dams.

- Regular disturbance around the dam and increased soil moisture at the dam edge also allows invasion and/or increase in abundance of terrestrial weeds. Rubber Vine (*Cryptostegia grandiflora*) is a Class 2 declared plant that was recorded around several existing dam sites in this report. This weed is known to favour riparian (=dam edge) habitats. Grader Grass (*Themeda quadrivalvis*) was recorded at several sites, and is easily spread on machinery and vehicles.
- Invasive broad leaf weeds, including the Class 2 Declared plant Sicklepod (*Senna obtusifolia*), are also already established around dams.
- Concentrated stock grazing around waterpoints produces trails which become erosion points during heavy rainfall events. Over larger areas (including beside water points) stock grazing causes both rill and sheet erosion.
- Existing areas of erosion have been identified within site assessments, and specific recommendations provided where appropriate. It is recommended that these areas be managed to ensure that existing erosion problems do not worsen. In particular, it will be necessary to ensure that run-off is contained on site and not directed into adjacent undisturbed areas, watercourses or table drains.
- Grazing and/or soil disturbance caused by concentrations of feral animals contributes to soil erosion. Impacts vary depending on the species and their reliance on, or preference for, permanent water. Feral pigs make a major contribution to soil disturbance and weed spread, and also degrade the quality of aquatic habitat. In addition to soil compaction and erosion, feral/domestic cattle and horses are major dispersers of weed seeds through ingestion and passive dispersal. It is likely that the Cane Toad will be a beneficiary of dam construction, but the effects of this cannot be predicted.
- Native animals will also spread the seed of weed species that are concentrated around dam sites. Spread is facilitated by ingestion or by seeds, or mud containing seeds, adhering to fur.
- Changes to fire regimes can occur with changes to vegetation composition. Grader Grass and Gamba Grass induce very hot fires which alters the distribution and occurrence of native plants. Fire can also destroy fences and yards of timber construction.

c) EHP Issues

In correspondence with EHP regarding the Yarraden Nature Refuge (see **Section 7.3**) the following issues were raised:

- impacts on natural drainage patterns and subsequent erosion
- the introduction and spread of weed species not already present on the properties
- the impact of constructed permanent water sources on cattle management and feral animal distribution and behaviour
- the impact by travellers who use quarry sites, borrow pits and water storage areas as a rest stop (including overnight camping) – in particular introduction of weeds and unauthorised pig hunting (further spreading weeds with bikes and quads).

With the exception of traveller impacts, all of these are already discussed above.

5.2.2 Mitigation

It is clear that ongoing management of weeds and stock use will be required and that the fencing to be provided by TMR is essential. Surveillance will be required to mitigate any traveller-related impacts. This on-going management will be the responsibility of the landholder once TMR hands over the storages at the end of the construction period. Special on-going management is required for the Yarraden Nature Refuge storages as described in **Section 7.5.2**.

6 INFORMATION FOR RIDA

6.1 INTRODUCTION

As noted above, the following sites are included in the Cape York Strategic Environmental Area declared for CYP under the RPI Act:

- 90C_210
- 90C_240C
- 90C_241
- 90C_245.

Site 90C_213 is just outside the SEA. Refer to detailed maps below. These show the 300 m x 300 m (nominal) survey area, recommended storage location, and the SEA boundary. Approval is required to construct the proposed water storages as they fall within the definition of a water storage dam under RPI Act Guideline 05/14:

> A water storage dam includes any barrier that may impound water, plus the water storage area created by the barrier, plus any embankment or other structure that is associated with the barrier and controls the flow of water. (p 3)

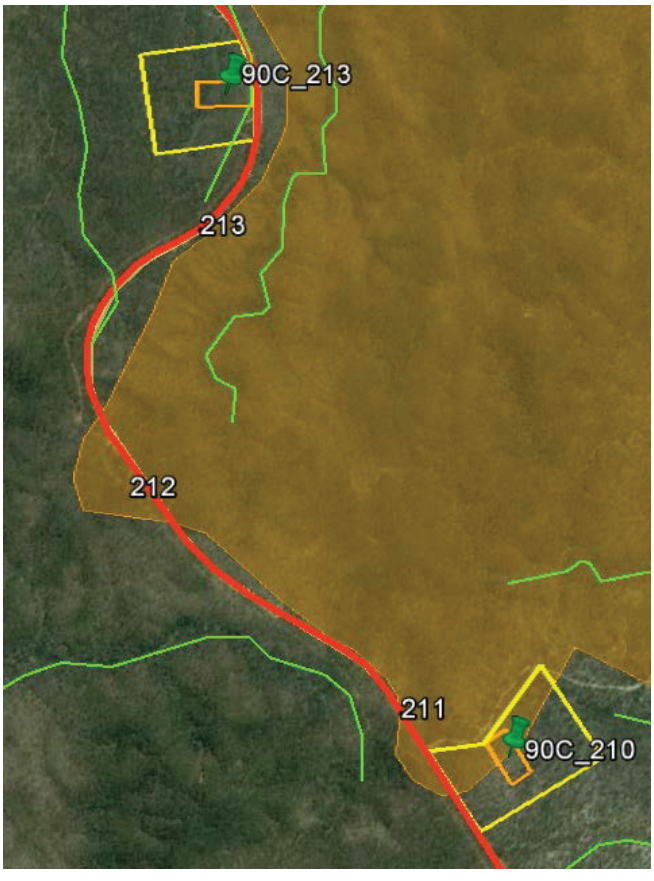


Figure 6-1 Sites 90C_210 and 90C_213.

Site 90C_210 is partly within the SEA as mapped (see **Section 3.5.3b)**) (shaded brown) and a RIDA is required. 90C_213 is on the opposite side of the road from the SEA and is therefore not included.

Legend:

90C_210 **Site Name**

Revised Survey Extents

Recommended Water Storage

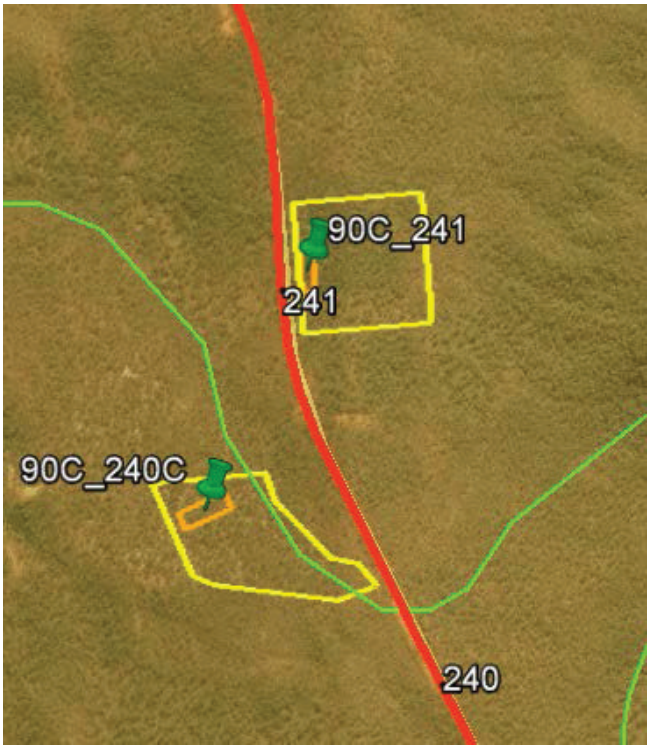


Figure 6-2 Sites 90C_240C and 90C_241.

Sites are located inside the SEA (shaded brown) and a RIDA is required.

Legend:

90C_210 **Site Name**

Revised Survey Extents

Recommended Water Storage

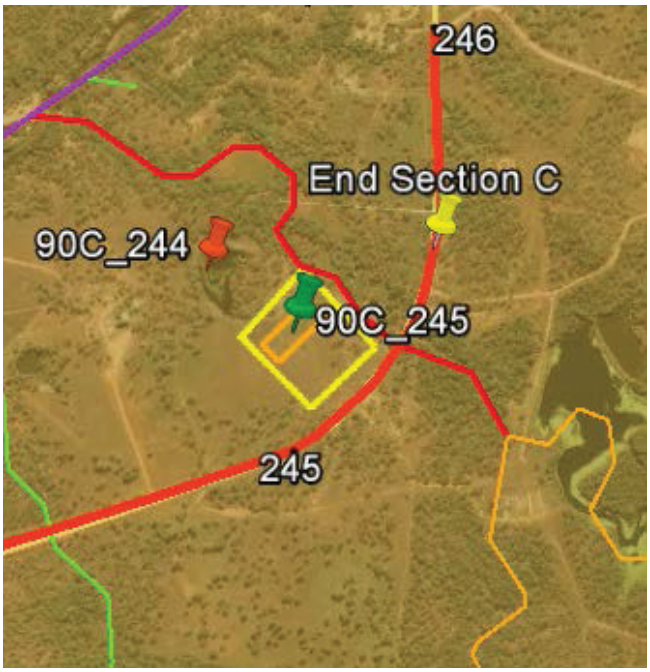


Figure 6-3 Site 90C_245.

Site is located inside the SEA (shaded brown) and a RIDA is required.

Legend:

90C_210 **Site Name**

Revised Survey Extents

Recommended Water Storage

For these sites, the construction of storages requires a Regional Interests Development Approval (RIDA). The balance of this chapter provides all information required to support the RIDA (a single application is to be made covering multiple sites), including summaries of detailed material already provided within this report. As required by the RPI Act Guideline 05/14, this report must assess the activity's impact on the SEA and identify any constraints on the configuration or operation of the activity.

Specifically, the balance of this chapter documents for sites within the Cape York SEA:

- Required outcome/prescribed solution.
- Identified Environmental Attributes.
- Other information required by the Guideline as relevant, namely:
  - constraints analysis and assessment of alternative sites
  - analysis of the existing agricultural enterprise
  - soil analysis report
  - hydrology and water quality report
  - subsidence report
  - engineering report
  - traffic and access report
  - fauna and flora reports.
- Summary of impact assessment (and associated environmental management regime).

6.2 REQUIRED OUTCOME/PRESCRIBED SOLUTION

6.2.1 Details

Required outcome (RPI Act Regulations) (Schedule 2)

The activity will not result in a widespread or irreversible impact on an environmental attribute of a strategic environmental area.

Prescribed solution

- (1) The application demonstrates either—
  - (a) the activity will not, and is not likely to, have a direct or indirect impact on an environmental attribute of the strategic environmental area; or
  - (b) all of the following—
    - (i) if the activity is being carried out in a designated precinct in the strategic environmental area—the activity is not an unacceptable use for the precinct;
    - (ii) the construction and operation footprint of the activity on the environmental attribute is minimised to the greatest extent possible;
    - (iii) the activity does not compromise the preservation of the environmental attribute within the strategic environmental area;
    - (iv) if the activity is to be carried out in a strategic environmental area identified in a regional plan—the activity will contribute to the regional outcomes, and be consistent with the regional policies, stated in the regional plan.

The RPI Act Guideline 05/14 provides guidance on how this prescribed solution (the only way to meet the required outcome) may be achieved. It will be demonstrated that the sites can meet Prescribed solution (1)(a).

6.2.2 Assessment

Refer to **Section 6.5**.

6.3 IDENTIFIED ENVIRONMENTAL ATTRIBUTES

Schedule 1 of the Cape York Regional Plan defines the attributes of the Cape York SEA as follows:

- hydrologic processes
- geomorphic processes
- riparian processes
- wildlife corridors
- water quality.

A sixth attribute (beneficial flooding) is included in the RPI Act Guideline 05/14. The following (**Table 6-1**) is an assessment of the values of the relevant sites against these attributes. These values are used in the assessment of impacts prepared in support of the RIDA (**Section6.5**). Where relevant, further information is provided in **Section 6.4**. Refer also to the detailed maps and site descriptions included in **Part B**.

Table 6-1 Identified Environmental Attributes

ATTRIBUTE	SITE 90C_210	SITE 90C_240C	SITE 90C_241	SITE 90C_245
Hydrologic processes • natural, unrestricted flows in and along watercourses and estuaries	No watercourse exists within 100 m of the recommended water storage site (WSS).	No watercourse exists within 100 m of the site.	Stream Order 2 watercourses exist within 100 m of the recommended WSS.	Stream Order 3 watercourse exists within 100 m of the recommended WSS.
• overflow from watercourses onto the flood plains of the area, or the other way	During flood events the watercourses will overflow onto the surrounding flood plains. The WSS is not within a mapped floodplain area.	During flood events the watercourses will overflow onto the surrounding flood plains. The WSS is not within a mapped floodplain area.	During flood events the watercourses will overflow onto the surrounding flood plains. The WSS is not within a mapped floodplain area.	During flood events the watercourses will overflow onto the surrounding flood plains. The WSS is partially within a mapped floodplain area (Queensland Floodplain Assessment Overlay).
• natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area	The recommended WSS is not within a mapped floodplain area.	The recommended WSS is not within a mapped floodplain area.	The recommended WSS is not within a mapped floodplain area.	The recommended WSS is partially within a mapped floodplain area (Queensland Floodplain Assessment Overlay).
• natural flow in and from groundwater and springs	Depth of groundwater on site is unknown. No groundwater discharge areas or springs were recorded within the site.	Depth of groundwater on site is unknown. No groundwater discharge areas or springs were recorded within the site.	Depth of groundwater on site is unknown. No groundwater discharge areas or springs were recorded within the site.	Depth of groundwater on site is unknown. No groundwater discharge areas or springs were recorded within the site.

(Continued over)

ATTRIBUTE	SITE 90C_210	SITE 90C_240C	SITE 90C_241	SITE 90C_245
Geomorphic processes • natural erosion	No significant erosion was recorded within the recommended WSS.	No significant erosion was recorded within the recommended WSS.	No significant erosion was recorded within the recommended WSS.	No significant erosion was recorded within the recommended WSS.
• the transport and deposit of sediment by water throughout the catchments and along the watercourse systems and estuaries	No significant sediment deposition was recorded within the recommended WSS.	No significant sediment deposition was recorded within the recommended WSS.	No significant sediment deposition was recorded within the recommended WSS.	No significant sediment deposition was recorded within the recommended WSS.
Riparian processes (The functioning riparian processes characterised by native riparian vegetation associated with watercourse, lakes, floodplains and wetlands)	There is no riparian vegetation within the recommended WSS.	There is no riparian vegetation within the recommended WSS.	There is no riparian vegetation within the recommended WSS.	There is no riparian vegetation within the recommended WSS.
Wildlife corridors • natural habitat in the watercourse systems	There are no watercourses within the WSS.	There are no watercourses within the WSS.	There are no watercourses within the WSS.	There are no watercourses within the WSS.
• permanent waterholes and springs	There are currently no waterholes or springs within the recommended WSS. The creation of the WSS will result in a permanent waterhole.	There are currently no waterholes or springs within the recommended WSS. The creation of the WSS will result in a permanent waterhole.	There are currently no waterholes or springs within the recommended WSS. The creation of the WSS will result in a permanent waterhole.	There are currently no waterholes or springs within the recommended WSS. The creation of the WSS will result in a permanent waterhole.

ATTRIBUTE	SITE 90C_210	SITE 90C_240C	SITE 90C_241	SITE 90C_245
Natural water quality in watercourses, aquifers and on flood plains is characterised by attributes that support and maintain natural aquatic and terrestrial ecosystems.	There are no watercourses, aquifers or mapped floodplains within the recommended WSS.	There are no watercourses, aquifers or mapped floodplains within the recommended WSS.	There are no watercourses, aquifers or mapped floodplains within the recommended WSS.	Part of the WSS is located within a mapped floodplain (Queensland Floodplain Assessment Overlay). No water quality testing has been undertaken at this site.
Beneficial flooding	Not applicable.	Not applicable.	Not applicable.	Not applicable.

Source: Study team compilation.

In summary:

- Although a 2nd order stream exists within 100 m of site 90C_241 and a 3rd order within 100 m of site 90C_245, the water storage sites themselves are clear of any watercourses.
- During flood events, all of the watercourses will overflow onto the surrounding flood plains. No water storage is within a mapped floodplain area.
- No groundwater discharge areas or springs were recorded within any site.
- No significant erosion or sedimentation was recorded within any recommended water storage site.
- There is no riparian vegetation within any recommended WSS.
- There are currently no waterholes or springs within any recommended water storage – the creation of the water storage will result in a permanent waterhole with likely biodiversity benefits.
- Water quality is unknown but, with the exception of 90C_245, all sites are in areas of natural vegetation with an intact ground cover. Presumably, water quality would be generally high although road runoff during periods of heavy rainfall could carry sediments (applies to all but site 90C-241 which is upstream of the PDR). See also **Section 6.4.4c)**.

6.4 OTHER INFORMATION REQUIRED BY THE GUIDELINE

6.4.1 Constraints Analysis and Assessment of Alternative Sites

a) Overview – Pre-survey Screening

Section 2.3 details the methodology undertaken in finalising all storage sites (and this includes those subject to the RIDA). The overall methodology involved best practice environmental planning to protect values, namely:

- avoid sites with high values
- minimise impacts on values by relocating works clear of constrained areas within survey sites
- mitigate impacts on values by environmental management
- restore values where possible by rehabilitation.

In summary (refer to **Table 2-8**):

- 2009 RoadTek investigation. Fourteen sites in Sections B and C were selected for further consideration, along with some existing storages that could potentially be expanded. Three new existing storages were constructed in 2010 in Section B and were selected for further investigation / consideration of expansion.
- October 2014 reconnaissance survey. Eight sites in Section C were selected for further consideration, along with some existing storages that could potentially be expanded. Work involved landholder consultation and assessment of soils, hydrology, biodiversity, and access.
- January 2015 desktop study. Fourteen sites (seven each in Sections B and C) were assessed for further consideration, along with some existing storages that could potentially be expanded.
- April 2015 reconnaissance survey. Sixteen sites (nine in Section B and seven in Section C) were selected for further consideration, along with some existing storages that could potentially be expanded. Work involved landholder consultation and assessment of soils, hydrology, biodiversity, and access.
- May 2015 soils exploratory survey. Six sites (four in Section B and two in Section C) were selected for further investigation of soil depth. This ruled three sites in and three out.

Table 2-8 reveals that:

- 25 sites were assessed overall to end up with the 14 finally selected.
- 14 were assessed in detail in the 2009 desktop / survey assessment.
- 8 were assessed in the October 2014 reconnaissance survey.
- 14 were assessed in detail in the 2015 desktop assessment.
- 16 were assessed in the April 2015 reconnaissance survey.
- 6 were assessed in the May 2015 soils investigation.
- 6 were assessed in detail in the Section C June 2015 desktop / survey assessment.
- 8 are proposed to be assessed in detail in the Section B June 2015 desktop / survey assessment.

Regarding the June 2015 surveys – as detailed in **Part B**, refinements were made to the location of proposed storages based on site constraints identified during detailed surveys. The intent was to minimise impacts.

b) Details

The above tasks resulted in the selection of the 14 final sites (including those in the SEA and the detailed site surveys focused on detailed investigations to identify any constraints and, based on these, recommendations for relocation of the storages and associated infrastructure (i.e. access tracks, stockpiles) as required. These recommendations are included in **Part B** of this report (Detailed Site Surveys) and consolidated in **Part C** (Environmental Management). A sample map extracted from **Part B** of this report is shown below.

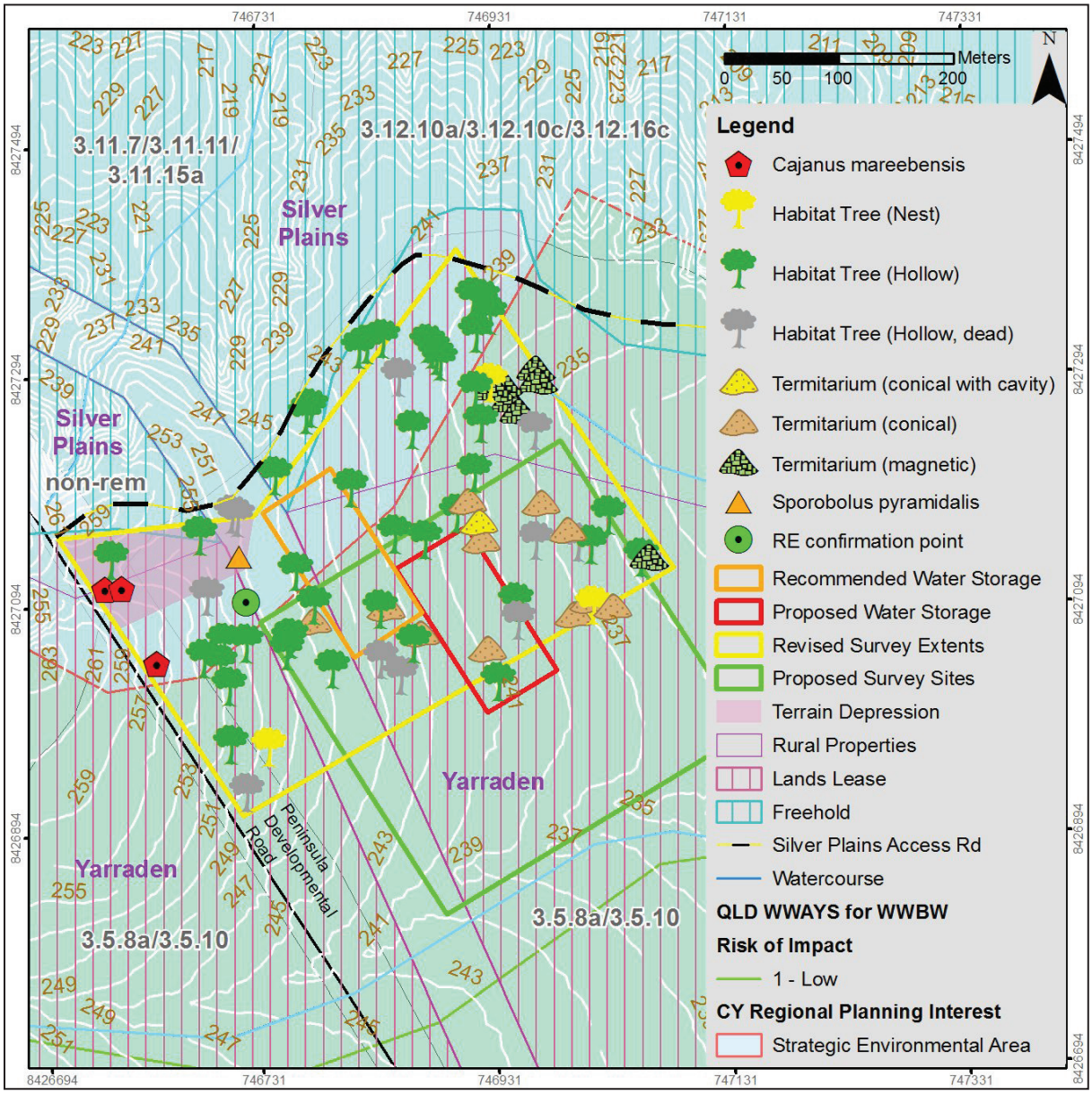


Figure 6-4 Sample constraints map.

Refer to **Part B** (Detailed Site Surveys) for larger plans covering all sites. proposed infrastructure layouts in all sites are shown in **Part C** (Environmental Management).

The overall focus was to protect identified values to the greatest possible extent, firstly in selecting the survey areas and secondly, in siting the storages etc. within the surveyed sites to minimise likely impacts. Further, **Part C** documents additional tasks required to further mitigate impacts during the construction phase.

Constraints assessed included:

- threatened vegetation communities
- EVNT plants
- habitat for EVNT animals
- general habitats (e.g. tree hollows, large termite mounds)
- waterways and wetlands
- steep slopes and areas with erosion risk.

Where necessary, storage sites were relocated within the surveyed area to minimise impact on constraints. The pre-screening undertaken in the desktop assessment and reconnaissance survey meant that no sites had to be abandoned.

6.4.2 Analysis of the Existing Agricultural Enterprise

a) Overview

All sites lie on grazing land:

- Site 90C_210 lies on Yarraden Lands lease (this is also Yarraden Nature Refuge)
- Sites 90C_240A and 90C_241 lie on the Lochinvar Lands Lease
- Site 90C_245 lies within a Reserve operated by the Lochinvar lessee and under the trusteeship of Cook Shire Council, although it is used for grazing.

The agricultural activity undertaken on all of these sites is extensive cattle grazing on native pasture. In the case of Site 90C_245, extensive clearing has been undertaken and the lot contains a small storage used by the lessee for cattle watering. Pasture on that site is limited.



Photo 6-1 Typical native pasture on Yarraden (90C_210).

Source: April 2015 reconnaissance survey.

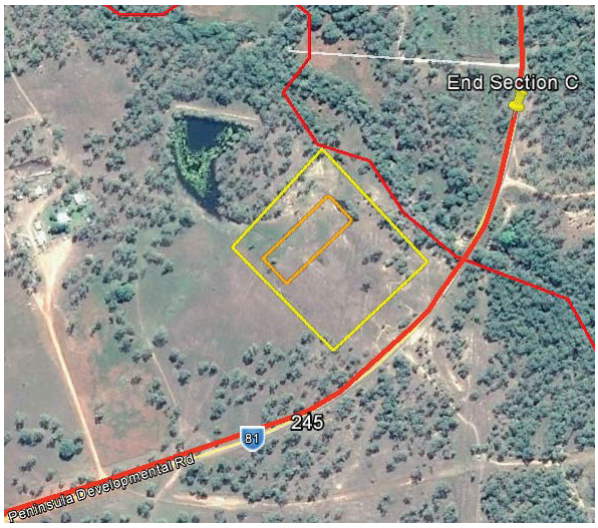


Photo 6-2 Cleared land at Site 90C_245.

Legend:

90C_210 **Site Name**

Revised Survey Extents

Recommended Water Storage

On all sites, the clearing required for storage construction involves an insignificant loss of grazing area and a future benefit in terms of cattle watering.

b) Details

All sites were selected with the assistance of and supported by the lessee (reconnaissance surveys October 2014 and April 2015).

As part of the standard agreement, the lessee has rights to share stored water during the construction period and has exclusive use of the storages once no longer required by TMR. Under these circumstances, the storages provide a net beneficial impact on the existing agricultural enterprise.

6.4.3 Soil Analysis Report

a) Overview

No detailed soils report was prepared for the SEA sites. Soils information was derived from the comprehensive mapping of the soils of CYP undertaken by Biggs and Philip (1995) documented in **Section 3.2.2**. The following is an extract from **Table 3-1** for the SEA sites.

Table 6-2 Geology and Soils by Site (SEA sites only)

SECTION	SITE	GEOLOGY	SOIL	PERMEABILITY	EROSIVITY
C	90C_210	Dg	Gail	Moderate	Low
C	90C_240C	Put	Chlory	Low-Moderate	High
C	90C_241	Pcn	Chlory	Low-Moderate	High
C	90C_245	Put	Drop	Moderate	Low

Source: Extract from **Table 3-1** (from Biggs and Philip 1995).

As described in **Section 3.2.3a)** and **Section 3.2.3b)**, despite the apparently undesirable properties of permeability and erosivity at some sites, experience in constructing and operating storages in areas containing these soils reveals that these undesirable properties can be effectively managed.

Soil profile testing was undertaken at several storage sites to determine the depth to rock but no SEA sites were involved. Visual inspections confirm that adequate depth for storage construction can be expected.

b) Details

Although no detailed soils report was prepared for the SEA sites, RoadTek's experience in constructing and operating storages in areas containing the soils shown by mapping to occur on the sites reveals that soils to be encountered can be effectively managed.

6.4.4 Hydrology and Water Quality Report

a) Overview

Sections 2.2.3 and **2.2.4** describe the hydrology and hydraulics calculations undertaken to support the sizing of the proposed storages. In addition, **Section 3.3.2** details the analysis of waterways in terms of the DAFF spatial layer while **Section 3.3.3** deals with streams under the *Water Act 2000* (Qld).

b) Details – Hydrology

Hydrology calculations use regional yield and evaporation parameters to estimate the required storage catchments to support the required storage volumes while spillways / bypasses are designed to pass 50% Annual Exceedance Probability (2 year Average Recurrence Interval) flows as is normal practice.

It is stressed that the proposed storages are designed to capture overland flow (and in most cases, road runoff) and are not dams in the normal sense of the word (i.e. barrages on waterways) and do not precisely fall within the definition quoted in RPI Act Guideline 5/14 (see **Section 6.1** above).

c) Details – Water Quality

As noted above, existing water quality is unknown quantitatively. With the exception of 90C_245, all sites are in areas of natural vegetation with an intact ground cover. Presumably, water quality would be generally high although road runoff during periods of heavy rainfall could carry sediments (applies to all but site 90C-241 which is upstream of the PDR). regarding this issue, one of the reasons for considering upgrading the PDR (i.e. the need for the current project) is to address environmental sustainability concerns arising from the unsealed road and in particular:

- water quality
- dust
- habitat disturbance.

With respect to water quality, these sustainability issues arise from:

- runoff from the unsealed road
- continual disturbance of table drains due to the need for re-grading the eroded formation
- runoff from areas disturbed for sourcing gravel – an ongoing operation for as long as the road remains unsealed.

All of these issues will be effectively negated by the sealing of the road.

In an environmental assessment of the PDR undertaken in support of the PDR Action Plan (Environment North 2014b), a comparison was made between the following

- Option A: no upgrade
- Option B: upgrade (raised embankment but unsealed)
- Option C: upgrade (raised embankment, sealed).

The following is an extract with respect to water quality and soils.

Table 6-3 Comparison of Options

ENVIRONMENTAL ELEMENT	A: NO UPGRADE	B: UPGRADE (UNSEALED)	C: UPGRADE (SEALED)
Water	• Highest level of sediment discharged from the road reserve. • Highest demand for water to undertake maintenance.	• High sediment load in road runoff. • Higher demand on water supply for maintenance and re-construction.	• Reduction in sediment load of road runoff. • Significantly decreased water demand.
Soils	• Higher rate of sediment loss from the road reserve. • Highest levels of landform instability.	• Higher rate of sediment loss from the road reserve. • Increased erosion within borrow areas and access tracks.	• Reduced sediment exported from the road and deposited on the surrounding land. • Temporarily increased erosion within borrow areas and access tracks.

Source: Extract from Environment North (2014b).

These findings are supported by the following images. These demonstrate that an unsealed cross section (left) quickly degrades when wet and considerable embankment material ends up in the table drains. This material must be returned to the formation during maintenance and the table drain re-established. This annual disturbance prevents the revegetation of the shoulders and table drains. In contrast, a sealed section (right) is more stable, allowing the shoulders and table drains (if needed) to revegetate. Qualitatively, water quality benefits.



Photo 6-3 Unsealed section.

Photo: A Yates January 2014.



Photo 6-4 Sealed section.

Photo: A Yates January 2014.

The following images show (left) another example of an unsealed section where annual maintenance precludes revegetation and (right) how regrowth is regularly lost.

	
Photo 6-5 Table drain required annual grading, preventing revegetation. **Photo:** D Rivett December 2012. Note build-up of sediment – each year this material must be returned to the embankment, resulting in the loss of regrowth that become established.	**Photo 6-6** Table drain of standard type cross section after only a light January shower. **Photo:** D. Rivett January 2012. Note build-up of sediment and regrowth – each year this material must be returned to the embankment, resulting in the loss of regrowth.

Again, water quality benefits.

The above discussion reveals that, qualitatively:

- water quality is locally poor for unsealed sections of road
- water quality can be expected to improve once the road is sealed.

Although this discussion only tangentially addresses existing water quality, it does reveal that water quality will improve due to the sealing of the road and this is a consequence of the construction of the water storages.

Other water quality issues that are relevant are:

- There is the potential for some minor temporary reduction in water quality due construction of the storages. This will be mitigated by attention to soil and water management during construction.
- Once the storages are built, they will act as large sediment traps and will actually reduce the export of road-based sediment for all sits downstream of the PDR (i.e. all but 90C_241). Once the road is sealed and the storages revert to grazing use, water quality issues will become largely irrelevant. See photo below.
- Compared with the extensive, landscape-level values of the SEA, the small areas feeding the proposed storages (typically 10 ha) are insignificant, both beneficially and adversely.



Photo 6-7 Typical existing storage (90C_118 - Windmill Dam).

Source: April 2015 reconnaissance survey.

This image shows how water storages for road construction quickly become valuable waterbodies, providing that management of weeds and feral animals is maintained.

6.4.5 Subsidence Report

Not applicable.

6.4.6 Engineering Report

a) Overview

No detailed engineering report has been produced. Engineering information provided within this report has been provided by AECOM and this provides all required engineering details regarding site selection, hydraulics, and impacts.

b) Details

Design information required by RoadTek to construct all storages involves:

- storage sizing calculations and dimensions (**Table 2-11** and **Table 2-12**) based on identified storage needs and catchment analysis (including yield and evaporation)
- drawings showing survey site constraints (**Part B**)
- drawings showing storage locations and other infrastructure within each survey area (**Part C**)
- typical details (**Part C**).

6.4.7 Traffic and Access Report

a) Overview

No formal Traffic and Access Report has been prepared. Traffic on the PDR is low (Annual Average Daily Traffic at the Kendell River is around 114) and RoadTek has extensive experience in designing works to minimise impacts on road users and ensure safety.

Access to the storages was evaluated during the April 2015 reconnaissance trip and confirmed during the May / June 2015 detailed biodiversity surveys.

b) Details

Access tracks to the storages are indicated on the site maps contained in **Part B**. Standard traffic control will be adopted to ensure safety for road users when storage construction and operation traffic leaves and enters the PDR.

6.4.8 Fauna and Flora Reports

a) Overview

Chapter 3 of this report and appendices document the detailed flora and fauna studies undertaken in support of this project while various appendices provide additional data.

b) Details

As noted above, the detailed flora and fauna studies undertaken in support of this project were used firstly, to identify constraints to storage construction and secondly, to relocate storage infrastructure within the surveyed areas to minimise any impacts. Additional recommendations for construction management are provided in **Part C**. Based on these recommendations, RoadTek will prepare a detailed EMP (Construction) to cover the construction of the works.

6.5 ASSESSMENT OF IMPACTS

6.5.1 Prescribed Solution

The RPI Act Guideline 05/14 provides guidance on how this prescribed solution (the only way to meet the required outcome) may be achieved. The application is required to demonstrate either part (a) or (b) of the Prescribed Solution below:

(a) the activity will not, and is not likely to, have a direct or indirect impact on an environmental attribute of the SEA

(b) all of the following [not listed] (i.e. if compliance with (a) cannot be demonstrated).

6.5.2 Guideline – Demonstration of Compliance Part (a) of the Prescribed Solution

To demonstrate compliance with solution (a), the application may provide evidence that:

- the activity is not located on land or a property that has the listed environmental attributes (e.g. such as a wetland, watercourse, regional ecosystems etc.) or is located a sufficient distance away from such environmental attributes that there will be no direct or indirect impact to those attributes from the activities being undertaken on the land **[see below]**, or
- if the activity is of a temporary nature—undertaking the activity will not have any direct or indirect impact on the listed environmental attributes either at the time of undertaking the activity, or in the future (due to seasonal variations). **[Not applicable]**

a) Water Quality and Riparian Processes

Examples of how activities would meet part (a) of the Prescribed Solution in relation to water quality and riparian processes

- The activity will be carried out with an appropriate buffer area around all watercourses[1], lakes, wetlands or springs AND defined riparian vegetation zones
  - for example in any other area (no storage is within a designated precinct) of the:
    - Cape York SEA –.100 metre buffer (see footnote 2)
- The activity will not have any direct or indirect release of contaminants to waters including groundwater from the operation of the activity.
- The activity will not result in any potential or actual adverse effect on a wetland, lake, watercourse or spring.
- Water storage dams are located off stream or not in major watercourses[2].

b) Hydrologic and Geomorphic Processes

Examples of how activities would meet part (a) of the Prescribed Solution in relation to hydrologic and geomorphic processes

- Undertaking construction activities in times when there is no water present.
- The activity will not inhibit the overflow or flow of surface water in or out of the wetland or watercourse (e.g. wells on stilts) post-construction.
- Operation of the activity will not result in actual or potential adverse effects on groundwater.
- The activity will not:
  - result in the clearing of native vegetation within or adjoining watercourses, lakes, wetlands or springs
  - cause disruption to soil profiles through earthworks or excavation
  - result in disturbance to land which cannot be rehabilitated immediately after the activity is completed.
- • Water storage dams are located off stream or not in major watercourses.

c) Wildlife Corridors

Example of how activities would meet part (a) of the Prescribed Solution in relation to wildlife corridors

- The activity is separated from wildlife corridors by an appropriate buffer (e.g. 200 metres) and will not result in actual or potential adverse effects onto the integrity or functioning of the corridor.

6.5.3 Assessment

The following is an assessment of impacts in terms of the identified environmental attributes listed in **Table 6-1** and making reference to the above solutions.

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1 A 'watercourse' is defined in the RPI Act as being that defined in the *Water Act 2000* (Qld).

2 'Major watercourse' is not defined in the guideline or the RPI Act / Regulations or the *Water Act 2000* (Qld). Advice received from DILGP (J Ross pers. comm. 3 June 2015) is that this is taken to be a third or greater order stream.

Table 6-4 Assessment Against RPI Act Guideline 05/11 Solutions for Part (a)

PRESCRIBED SOLUTION	SITE 90C_210 (CH 210.8)	SITE 90C_240C (CH 240.3)	SITE 90C_241 (CH 240.9)	SITE 90C_245 (CH 245.3)
Water Quality and Riparian Process				
The activity will be carried out with an appropriate buffer area around all watercourses (see Note 1), lakes, wetlands or springs AND defined riparian vegetation zones.	Compliant. Recommended WSS is >100 m from a stream order 1 watercourse.	Compliant. Recommended WSS is >100 m from a stream order 1 watercourse.	Compliant. Recommended WSS is <100m from a stream order 2 watercourse	Technically non-compliant. Recommended WSS is <100 m from a stream order 3 watercourse. However the topography of the intervening land suggests that the recommended WSS will not impact on this watercourse.
The activity will not have any direct or indirect release of contaminants to waters including groundwater from the operation of the activity.	An EMP (Construction) will be developed to ensure that no contaminants are released into waters during the construction phase. During operation there will be no contaminants stored in or released from the water storage facilities. See Note 2.			
The activity will not result in any potential or adverse effect on a wetland, lake, watercourse or spring.	Compliant.	Compliant.	Compliant.	Compliant.
Water storage dams are located off stream or not in major watercourses.	Compliant.	Compliant.	Compliant.	Compliant.

(Continued over)

PRESCRIBED SOLUTION	SITE 90C_210 (CH 210.8)	SITE 90C_240C (CH 240.3)	SITE 90C_241 (CH 240.9)	SITE 90C_245 (CH 245.3)
Hydrologic and Geomorphic Processes				
Undertake construction activities in times when no water is present.	Construction will be undertaken in the dry season.			
The activity will not inhibit the overflow or flow of surface water in or out of the wetland or watercourse (e.g. wells on stilts) post-construction.	Will collect surface water that would otherwise flow into watercourse.	Will collect surface water that would otherwise flow into watercourse.	Compliant.	Will collect surface water that would otherwise flow into watercourse.
Operation of the activity will not result in actual or potential adverse effects on groundwater.	The capture and holding of surface water in storage will not impact on groundwater.			
The activity will not: • result in the clearing of native vegetation within or adjoining watercourses, lakes, wetlands or springs • cause disruption to soil profiles through earthworks or excavation • result in disturbance to land which cannot be rehabilitated immediately after the activity is completed.	A limited amount of least concern native vegetation outside/away from a watercourse (>100 m) will be cleared; soil profiles will be disrupted by excavation. Completed works will result in a permanent waterbody, which although not immediately rehabilitated, has with the potential to naturalise over time. See Note 3.	A limited amount of least concern native vegetation outside/away from a watercourse (>100 m) will be cleared; soil profiles will be disrupted by excavation. Completed works will result in a permanent waterbody, which although not immediately rehabilitated, has with the potential to naturalise over time. See Note 3.	A limited amount of least concern native vegetation outside/away from a watercourse (>30 m) will be cleared; soil profiles will be disrupted by excavation. Completed works will result in a permanent waterbody, which although not immediately rehabilitated, has with the potential to naturalise over time. See Note 3.	No remnant native vegetation will be cleared (site is in a grazing paddock); soil profiles will be disrupted by excavation. Completed works will result in a permanent waterbody that will likely be affected by stock. The existing nearby dam shows signs of such impacts – can be mitigated by fencing. See Note 3.

PRESCRIBED SOLUTION	SITE 90C_210 (CH 210.8)	SITE 90C_240C (CH 240.3)	SITE 90C_241 (CH 240.9)	SITE 90C_245 (CH 245.3)
Water storage dams are located off stream or not in major watercourses.	Compliant.	Compliant.	Compliant.	Compliant.
Wildlife Corridors				
The activity is separated from wildlife corridors by an appropriate buffer (e.g. 200 metres) and will not result in actual or potential adverse effects onto the integrity or functioning of the corridor.	No riparian vegetation wildlife corridor will be impacted (proposed water storage is >100 m away).	No riparian vegetation wildlife corridor will be impacted (proposed water storage is >100 m away).	No riparian vegetation wildlife corridor will be impacted (proposed water storage is >30 m away).	No riparian vegetation wildlife corridor will be impacted (proposed water storage is >80 m away).

Source: Study team compilation based on assessment against RPI Act Guideline 05/14 (Table 1).

Notes:

1. 'Major watercourse' is not defined in the guideline or the RPI Act / Regulations or the *Water Act 2000* (Qld). Advice received from DILGP (J Ross pers. comm. 3 June 2015) is that this is taken to be a third greater order stream. A 'watercourse' is defined in the RPI Act as being that defined in the *Water Act 2000* (Qld). 'Major watercourse' is not defined in the guideline or the RPI Act / Regulations or the *Water Act 2000* (Qld). Advice received from DILGP (J Ross pers. comm. 3 June 2015) is that this is taken to be a third or greater order stream.
2. The EMP (Construction) to be developed by RoadTek based on **Part C** will include construction safeguards relevant to this requirement as well as standard best practice.
3. The works will result in a permanent water body at each site. TMR will fence the area and the management of the WSS will then pass to the owner of the property on which it was constructed. Therefore the works will result in disturbance of land which will not be rehabilitated immediately after the works are complete. Although active rehabilitation of the sites will not be undertaken, over time they will naturalise and provide an important water source for local native species.

The above table shows that Sites 90C_241 and 90C_245 are technically non-compliant as they are located within '100 m of a watercourse'. However, advice from DILGP suggests they are generally concerned only with 'major watercourses' defined as being stream order 3 or above. Based on this advice, only site 90C-245 would be non-compliant with this requirement. Regarding this site, there is a significant topographical feature (a mound) between the recommended WSS and riparian vegetation associated with the watercourse, therefore if standard mitigation such as sediment control is used, the proposed construction of the WSS should not impact on the watercourse or associated vegetation, or its potential as a wildlife movement corridor.

As noted in **Section 2.5.3**, the above storages are to remain under the management of the property owner and be used for cattle watering and other agricultural uses. TMR will install a fence of the desired standard around the storage to exclude cattle and the property owner will be responsible for on-going maintenance and management of weeds etc. This will result in disturbance of land which will not be rehabilitated immediately after the works are complete and this is technically non-compliant. However, although active rehabilitation of the sites will not be undertaken, over time they will naturalise and provide an important water source for local native species.

The proposed construction of each storage will technically cause local disruption to soil profiles during earthworks and excavations and are therefore non-compliant with this section of the proposed solution. However, in terms of protecting the landscape-level values of whole river systems, the size of the storages and the potential for significant impact is extremely low. As noted in **Section 6.4.4c)**, the storages are part of a project that will ultimately lead to improvements in natural resource values across Cape York Peninsula. The following discussion is also relevant in this regard.

6.5.4 Guideline – Demonstration of Compliance Part (b) of the Prescribed Solution

a) Regional Plan Issue

Having complied with Part (a) of the Prescribed Solution, there is no need to consider Part (b). However, it is of interest to examine Part (b)(iv) that relates to Regional Plan Issues, namely:

(iv) if the activity is to be carried out in a SEA identified in a regional plan—the activity will contribute to the regional outcomes, and be consistent with the regional policies, stated in the regional plan.

As demonstrated below, the storages meet this requirement.

b) Relevant Extracts

Chapter 6 - Infrastructure of the CYP Regional Plan (notes that, for *Transport infrastructure and networks*:

> The transport infrastructure and network base is a barrier to regional economic development and a key contributor to increased social isolation in the region.
>
> The **priority outcome** sought for the region's transport networks is a program management approach to:
> - improving the reliability and condition of transport networks for freight and people movement throughout the region
> - multi-user infrastructure upgrades to support economic development in the region. (p24)

Further, the plan notes that:

> The PDR and other access roads in the region are subject to seasonal flooding and surface saturation, with road access from the south cut for months at a time. Improvements to the PDR and community access roads are critical for more efficient, affordable and safe freight and personal transport and for supporting economic growth aspirations.

> Existing projects being undertaken by the Department of Transport and Main Roads that will provide additional direction on prioritising improvements/upgrade works in the Cape York region include:
>
> - Far North Queensland Regional Action Plan
> - Cape York and Torres Strait Transport Infrastructure Plan
> - Peninsula Development Road Investment Plan. (p24)

The proposed storages are a key component of the Cape York Region Package.

Further, in ***Chapter 7—State interests—planning guidance*** of the Plan under *Hazards and Safety*, the Plan notes:

> The region is subject to a tropical monsoonal climate that is characterised by a long, warm to hot dry season, and a shorter hot, humid and intensive wet season each year.
>
> This annual monsoon season is a major constraining factor on the region as it impacts on travel and many economic and social activities with delivery of food and mail supplies regularly disrupted to virtually all areas. It isolates many properties and communities for approximately four to five months due to flooded roads. Air travel and freight can also be curtailed due to inundated airstrips and intensive thunderstorm activity. (p30)

c) Summary

It is clear that the proposed works are aligned with key aspects of the Cape York Regional Plan.

7 INFORMATION FOR APPROVAL IN NATURE REFUGE

7.1 INTRODUCTION

The Yarraden Lease (Lot 10 SP113659) has been declared a Nature Refuge under section 46 of the NC Act. The relevant conservation agreement is intended to protect and enhance the values that are described in Schedule 2 (see **Appendix F** for extracts from the conservation agreement).

As noted in **Section 4.3.1** above, the following water storage sites are included in the Yarraden Nature Refuge:

- 90C_210
- 90C_213
- 90C_222.

The process developed by TMR for the Picaninny Plains Nature Refuge north of Coen (i.e. a similar situation) is as follows:

- TMR demonstrate that the proposed storages do not result in a significant impact on the values for which the refuge was listed.
- TMR obtains approval/agreement from land holder (normally undertaken with the Department of Environment and Heritage Protection (EHP) present).
- TMR send signed agreement (TMR/land holder) to EHP and obtain written confirmation that the works can proceed.

This same process has been followed for the Yarraden Nature Refuge. This chapter addresses the implications for the storages in terms of:

- values listed in the conservation agreement
- relevant values at the site of the storages
- impact on values and proposed mitigation
- landholder agreements

7.2 CONSERVATION AGREEMENT

In summary, the values listed in the conservation agreement (see **Appendix F**) are:

- Various regional ecosystems (3.12.36, 3.3.66, 3.3.26, 3.5.11, 3.11.7, 3.11.11, 3.11.13, 3.11.9, and 3.12.14).
- Habitat for the following rare and threatened species:
  - The endangered *Cajanus mareebensis*, *Teucrium ajugaceum*, *Erythrotriorchis radiatus* (red goshawk) and a 'Confidential Record' of a species from the Accipitridae family.
  - A 'Confidential Record' of a 'vulnerable' species from the Cycadaceae family.
  - The rare *Brachychiton grandiflorus*, *Tadorna radjah* (Radjah shelduck) and *Probosciger aterrimus* (palm cockatoo).
- Suitable habitat for the following rare and threatened species -
  - The endangered *Erythrura gouldiae*. (Gouldian finch), *Psephotus chrysopterygius* (Golden-shouldered parrot) and *Hipposideros semoni* (Semon's leaf-nosed bat).

- The vulnerable *Carmona retusa, Eclectus roratus macgmivrayi* (Eclectus parrot), *Turnix olivii* (Buff-breasted button quail), *Hipposideros cervinus* (Fawn leafnosed bat) and *Casuarius casuarius johnsonii* (northern population) (Southern cassowary- northern population).
- The rare *Dianella incollata, Pandanus gemmifer, Ephippiorhynchus asiaticus* (Black-necked stork), *Aerodramus terraereginae* (Australian swiftlet), *Spilocuscus maculatus* (Common spotted cuscus) and *Hipposideros diadema reginae* (Diadem leaf-nosed bat).

- Catchment protection for the Holroyd River and Coleman River Catchments and the Holroyd, Lukin, Kendle and Stewart Rivers.
- Catchment protection for numerous creeks and pools.

An assessment of these values at the individual site level is summarised in **Table 7-2**.

7.3 CONSULTATION WITH DEHP

7.3.1 Overview

The following table summarises consultation between TMR and the Department of Environment and Heritage Protection regarding the construction and operation of storages in the Yarraden Nature Refuge. This has consisted of an initial face to face meeting and an exchange of emails.

Table 7-1 Summary of Consultation

DATE	TMR REPRESENTATIVE	EHP REPRESENTATIVE	DETAILS
22 May 2015 (meeting in Cairns)	Lou Kamenos (TMR)	Keith Smith	Overview of project (details, timing). Nature of follow-up consultation.
25 May 2015 (email to EHP)	David Rivett (Environment North)	Keith Smith	Locations and nature of storages on Yarraden Nature Refuge. Proposed survey work. Reporting. Proposed process regarding consultation / landholder agreement.
25 May 2015 (email from EHP)	David Rivett (Environment North)	Keith Smith	Conservation values. Threats / management needs. Landholder agreement needs.
27 May 2015 (email from EHP)	David Rivett (Environment North)	Keith Smith	Details of negotiations between EHP and landholder.

Source: Study team compilation.

7.3.2 Details

Based on the above consultation, it is apparent that EHP's concerns can be summarised as follows (K Smith pers. comm. 25 May 2015):

- Siting. EHP will defer to TMR's negotiations with the manager of Yarraden (Jay Willmann) and the owner (D'Arcy Byrnes) in regard to the location of works and land management implications. EHP is prepared to become personally involved if the landholders or TMR require but this is not seen as essential.
- EHP is not aware of any specific conservation values that are likely to be impacted immediately adjacent to the PDR through Yarraden.
- Concerns on the immediate and longer-term impacts of the PDR upgrade relate to:
  - impacts on natural drainage patterns and subsequent erosion
  - the introduction and spread of weed species not already present on the properties
  - the impact of constructed permanent water sources on cattle management and feral animal distribution and behaviour
  - the impact by travellers who use quarry sites, borrow pits and water storage areas as a rest stop (including overnight camping) – in particular introduction of weeds and unauthorised pig hunting (further spreading weeds with bikes and quads).
- For Piccaninny Plains Nature Refuge, TMR entered into a negotiated agreement with the landholder (AWC) to deal with these likely impacts. Strategic fencing, locked gates and weed monitoring and control were elements of that agreement.
- Location details of any EVNT species recorded are to be provided to the State for inclusion in the WildNet program.
- Detailed locations for the constructed water storage areas are required (hard-copy maps or GIS shape files).

7.3.3 Landholder Negotiations

EHP has also undertaken discussions with the landholder (K Smith pers. comm. 27 May 2015) and advises that the Department is satisfied that the negotiated outcomes are satisfactory and that TMR should continue to deal directly with the landholder.

7.3.4 TMR Outputs

In line with the above EHP requirements, TMR will document an appropriate landholder agreement. This will be provided separately (i.e. not as part of this report).

7.4 VALUES PRESENT

The following is an assessment of the values of the relevant sites against these attributes (see also **Part B**). These values are used in the assessment of impacts prepared in support of approval to construct the storages in the Yarraden Nature Refuge (**Section 7.5**).

Table 7-2 Values of the Yarraden Nature Refuge

VALUES	APPLICABILITY TO PROPOSED STORAGE
Regional ecosystems 3.3.66, 3.5.11, 3.11.7, 3.11.9, 3.11.11, 3.11.13, and 3.12.14.	Only REs 3.11.11 and 3.11.9 occur within the survey areas. Both are Least Concern regional ecosystems that occur extensively across Cape York. The amount of vegetation cleared for each WSS will be typically less than one hectare and this proposed clearing will not significantly impact on the values of these ecosystems in the Cape York area.
Known habitat for rare and threatened species, namely *Brachychiton grandiflorus, Cajanus mareebensis, Teucrium ajugaceum, Erythrotriorchis radiatus* (Red goshawk), *Tadorna radjah* (Radjah shelduck) and *Probosciger aterrimus* (Palm cockatoo) and 'confidential records' of a *Accipitridae* family species and a *Cycadaceae* family species.	Of these, *Cajanus mareebensis, Erythrotriorchis radiatus*, a *Cycadaceae* family species, *Brachychiton grandiflorus* and *Probosciger aterrimus* (Palm cockatoo) have previously been recorded within the general study area (i.e. the PDR south of Coen). *Cajanus mareebensis* was recorded at the western fringe of 90C_210 survey area at the Silver Plains turnoff about 10-30 m off the PDR and on a narrow strip of Kimba soil immediately adjacent to the PDR about 223 km north of Laura (about 23km south of Coen). Whist pre-construction surveys specifically targeted these threatened species, no other sightings or signs (tracks and scats) of these species were recorded.
Suitable habitat for rare and threatened species, namely: *Carmona retusa, Dianella incollata, Pandanus gemmifer, Aerodramus terraereginae* (Australian swiftlet), *Casuarius casuarius johnsonii* (Southern cassowary – northern population), *Eclectus roratus macgillivrayi* (Eclectus parrot), *Ephippiorhynchus asiaticus* (Black-necked stork),*Erythrura gouldiae* (Gouldian finch), *Hipposideros cervinus* (Fawn leaf-nosed bat), *Hipposideros diadema reginae* (Diadem leaf-nosed bat), *Hipposideros semoni* (Semon's leaf-nosed bat), *Psephotus chrysopterygius* (Golden-shouldered parrot), *Turnix olivii* (Buff-breasted button quail, and *Spilocuscus maculatus* (Common spotted cuscus).	Of these, *Carmona retusa, Eclectus roratus macgillivrayi* (Eclectus parrot), *Hipposideros cervinus* (Fawn leaf-nosed bat), *Hipposideros diadema reginae* (Diadem leaf-nosed bat) and *Hipposideros semoni* (Semon's leaf-nosed bat), *Psephotus chrysopterygius* (Golden-shouldered parrot), *Turnix olivii* (Buff-breasted button quail), have previously been recorded within the study area. Whist pre-construction surveys specifically targeted these rare and threatened species, no other sightings or signs (tracks and scats) of these species were recorded.
Catchment protection for the Holroyd River and Coleman River Catchments and the Holroyd, Lukin, Kendle and Stewart Rivers.	Part of the catchments for the Holroyd and Kendle Rivers are within the study area. The planned water storage at the Sliver plains turnoff (90C_210) aims to collect surface water at the very headwaters of the Kendle River at the top of the range (which eventually drains into the Holroyd River), whereas sites 90C_213 and 90C_222 aim to collect surface runoff at the very headwaters of the Holroyd catchment. Once filled from surface water flows, they will overflow and not further impede surface water flows.
Catchment protection for numerous creeks and pools.	As above. No creeks are mapped as occurring within the footprint of the WSS. Refer to **Table 3-7**.

Source: Study team compilation based on **Appendix F**.

7.5 IMPACT ON VALUES AND MITIGATION

7.5.1 Impacts and Mitigation Needs

the following table provides an assessment of likely impacts and required mitigation. The impact categories are derived from the conservation agreement (as relevant to the specific sites) as well as this indicated by EHP (K Smith pers. comm. 25 May 2015 and noted in **Section 0**).

Table 7-3 Summary of Impacts and Mitigation

IMPACT	COMMENT	MITIGATION
Regional ecosystems. Only REs 3.11.11 and 3.11.9 occur within the survey areas. Both are Least Concern regional ecosystems that occur extensively across Cape York Peninsula.	The amount of vegetation cleared for each WSS will be typically less than one hectare and this proposed clearing will not significantly impact on the values of these ecosystems in the Cape York area.	Mitigation measures such as avoidance of known protected flora species, checking trees to be felled for nests and hollows, relocation of any adult animals found by an authorised person and the consideration of bird nests during construction will be recommended for during construction works.
Known habitat for rare and threatened species.	As above. Sites have been refined to avoid important habitats and features.	As above.
Suitable habitat for rare and threatened species.	As above. Sites have been refined to avoid important habitats and features.	As above.
Catchment protection for the Holroyd River and Coleman River Catchments and the Holroyd, Lukin, Kendle and Stewart Rivers.	The small scale of the proposed WSS is such that they will not have a significant impact on these rivers.	Standard environmental management required (i.e. ESCP, weed management, post-construction fencing).
Impacts on natural drainage patterns and subsequent erosion.	Sites have been refined to avoid important drainage features.	Siting of storage to avoid eroded areas. Management of soil and water during construction under EMP (Construction) (see **Part C**).
The introduction and spread of weed species not already present on the properties.	Weeds could be spread during construction unless carefully managed.	Management of weeds during construction under EMP (Construction) (see **Part C**). Fencing of storages to exclude cattle, most feral animals, and people.
The impact of constructed permanent water sources on cattle management and feral animal distribution and behaviour.	Cattle or feral animals could cause damage around watercourses unless excluded.	Fencing of storages to exclude cattle, most feral animals, and people.

(Continued over)

IMPACT	COMMENT	MITIGATION
The impact by travellers who use quarry sites, borrow pits and water storage areas as a rest stop (including overnight camping) – in particular introduction of weeds and unauthorised pig hunting (further spreading weeds with bikes and quads).	Travellers could cause damage around watercourses unless excluded.	Fencing of storages to exclude cattle, most feral animals, and people. Signage and surveillance will also be required.

Source: Study team compilation.

7.5.2 Mitigation

Mitigation as recommended takes three forms:

- Detailed siting of storages within survey areas (complete – see **Part B**) and provision of fencing to prevent access by cattle, most feral animals, and the public.
- Construction management via EMP (Construction) (see **Part C**).
- Operational management by landholder as currently required by the Conservation Agreement (Schedule 3):
  - Item 2. Natural resource protection:
    - Ecosystem management and protection (e.g. regional ecosystems, vegetation communities
    - Wildlife and habitat protection
    - Water, Watercourses and Wetland protection
    - Soil stability and protection.
  - Item 3. Land protection and threat abatement:
    - Pest Animal management
    - Pest Plant management
    - Disease management.

Those matters that are under the control of TMR are deal with in **Part B** and **Part C** of this report.

7.6 LANDHOLDER NEGOTIATIONS AND AGREEMENT

7.6.1 Negotiations

TMR / RoadTek has held several discussions with the manager of Yarraden (Jay Willmann) and in particular during the October 2014 and April 2015 reconnaissance surveys. These discussions included:

- suggested locations for storages
- management (especially cattle access and weed control)
- fencing and access details.

By email dated 26 May to EHP (K Smith pers. comm. 27 May 2015), Jay Willmann advised:

- He has been in negotiations with PDR for some time for the up and coming dams to be put in and as he builds dams for a living, he is very capable of siting dams for this project.
- The long term benefits from these dams are only positive as they will result in a sealed road to Weipa which cuts down, erosion and dust pollution among many other things.
- Properties owners also will halve their costs in maintenance, time travelled and stock management.
- In regards to weed management, Mr Willmann is one of the leaders in Cape York for controlling weeds on his property and help many other stations with their weed control. Regarding travellers coming in, that is already a problem but does not out-weigh the benefits of the dams and sealed road.
- Mr Willmann has already talked to PDR about fencing and each site will be fenced at their cost.

As noted in **Section 7.3.3**, EHP is satisfied that these discussions are appropriate and may proceed without EHP involvement.

7.6.2 Agreement

A final written agreement will be signed by TMR and the landholder and a copy provided to EHP as soon as possible. This task is still underway and the document will be provided separately (i.e. not as part of this report).

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APPENDIX A
DATABASE SEARCH RESULTS

Assessment Site Code	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
Section	C	C	C	C	C	C
Latitude	-14.21563	-14.19839	-14.13838	-13.98954	-13.98694	-13.95492
Longitude	143.28700	143.27921	143.22976	143.190026	143.187265	143.19636
Chainage	90C_210.8	90C_213.7	90C_222.9	90C_240.3	90C_240.9	90C_245.3
Side of Road	RHS	LHS	LHS	LHS	RHS	LHS
Property Name / Tenure	Yarraden / Lands Lease	Yarraden / Lands Lease	Yarraden / Lands Lease	Lochinvar / Lands Lease	Lochinvar / Lands Lease	Public Land / Reserve (under Lochinvar management)
Lot/Plan	Lot: 10 / Plan SP113659	Lot: 10 / Plan SP113659	Lot: 10 / Plan: SP113659	Lot: 9 / Plan: SP211742	Lot: 9 / Plan: SP211742	Lot: 18 / Plan: SP142881
Protected Area / Nature Refuge	Yarraden Nature Refuge	Yarraden Nature Refuge	Yarraden Nature Refuge	None (KULLA (McIlwraith Range) National Park (CYPAL) less than 2km E)	None (KULLA (McIlwraith Range) National Park (CYPAL) less than 2km E)	None (KULLA (McIlwraith Range) National Park (CYPAL) less than 1km S)
High Risk Protected Plant Survey Trigger Area	No	No	No	No (at very edge of: *Carmona retusa*)	Yes (*Carmona retusa*)	Yes (*Dendrobium bigibbum*)
Regional Ecosystem (strict on point)	3.5.8a / 3.5.10	3.5.8c / 3.11.8 / 3.11.15a	3.11.11x1c / 3.11.11 / 3.11.9	3.11.15a / 3.11.11x3 / 3.11.11 / 3.3.49b	3.11.15a / 3.11.11x3 / 3.11.11 / 3.3.49b	non-remnant
Regional Ecosystem (surrounding vegetation)	3.5.8a / 3.5.10 70/30 - L/L	3.5.8c / 3.11.8 / 3.11.15a 70/20/10 - L/L/L	3.11.11x1c / 3.11.11 / 3.11.9 70/20/10 - L/L/L	3.11.15a / 3.11.11x3 / 3.11.11 / 3.3.49b 50/20/20/10 - L/L/L/L	3.11.15a / 3.11.11x3 / 3.11.11 / 3.3.49b 50/20/20/10 - L/L/L/L	3.12.17a / 3.12.19b / 3.12.14c / 3.3.49b 50/20/20/10 - L/L/L/L
Geology	Coen Metamorphic Group	Coen Metamorphic Group	Coen Metamorphic Group	Coen Metamorphic Group	Coen Metamorphic Group	Coen Metamorphic Group
Soil Type	Gail	Kimba	Kimba	Chlory	Chlory	Drop

Assessment Site Code	90C_210	90C_213	90C_222	90C_240C	90C_241	90C_245
MSES	Yes - Protected Area (Yarraden Nature Refuge)	Yes - Protected Area (Yarraden Nature Refuge)	Yes - Protected Area (Yarraden Nature Refuge)	None	None	Yes - Species - *Rhinolophus philippinensis / robertsi* E-EPBC, E-NCA, Essential habitat
Floodplain	No	No	No	No	No	Yes
Cape York Strategic Environmental Areas	No	No (SEA is across PDR)	No	Yes	Yes	Yes
Waterway Barrier Works Risk Of Impact	No	Low	Low	Low	No	High (~40m to NE)
Cape York RNCV	None	None	at very edge of: cyp_fa_06	ar_r_fa_01	ar_r_fa_01	ar_r_fa_01
State corridors	State	State	State	State	State	State
Important Bird Area	No	No	No	No (Iron & McIlwraith Ranges IBA <7km NE)	No (Iron & McIlwraith Ranges IBA <7km NE)	No (Iron & McIlwraith Ranges IBA <5km E)
EVNT flora records (ALA) within 1km	No	No	No	No	No	No

Assessment Site Code	*90C_210*	90C_213 (WP13)	*90C_222*	*90C_240C*	*90C_241 (WP 16)*	*90C_245 (WP 20)*
EVNT fauna records (ALA) within 5km	*Probosciger aterrimus* NT-NCA	No	*Hipposideros cervinus* V-NCA	*Hipposideros cervinus* V-NCA	*Dasyurus hallucatus* E-EPBC	*Dasyurus hallucatus* E-EPBC
	No	No	No	*Psephotus chrysopterygius* E-EPBC, E-NCA	*Hipposideros cervinus* V-NCA	*Hipposideros semoni* E-EPBC, E-NCA
	No	No	No	*Turnix olivii* E-EPBC, V-NCA	*Hipposideros semoni* E-EPBC, E-NCA	*Psephotus chrysopterygius* E-EPBC, E-NCA
	No	No	No	No	*Psephotus chrysopterygius* E-EPBC, E-NCA	*Turnix olivii* E-EPBC, V-NCA
	No	No	No	No	*Turnix olivii* E-EPBC, V-NCA	No

Cape York RNCV Code	**Description**
ar_r_fa_01	McIlwraith and Iron ranges: High endemism and richness of frog species.
cyp_fa_04	Major locations identifying significant habitat (breeding and feeding) for the threatened golden-shouldered parrot (*Psephotus chrysopterygius*). Covers a large proportion of the Morehead River Important Bird Area (Dutson et al. 2009). Values of the IBA include supporting high proportion of golden-shouldered parrot population and possibly a significant population of the buff-breasted buttonquail (*Turnix olivii*). Also important populations of the black-throated finch (*Poephila cincta*) and bush stone-curlew (*Burhinus grallarius*).
cyp_fa_06	Significant fish habitat areas identified by Abrahams et al. (1995) and Herbert et al. (1995). Rivers containing rare and uncommon fish taxa and fish communities include: f) Holroyd, Edward and Coleman rivers—area of transition between fish fauna assemblages of CYP and Gulf of Carpentaria.

APPENDIX B
FLORA SPECIES LIST

90C_210 – Recorded Plant Species

Trees and Shrubs	Weeds
Acacia aulacocarpa	*Alternanthera denticulata*
Acacia calyculata	*Mesosphaerum suaveolens*
Acacia platycarpa	*Sida cordifolia*
Acacia rothii	*Spermacoce latifolia*
Acacia simsii	***Sporobolus pyramidalis*** **(Class 2- Land Protection (Pest and Stock Route Management) Act 2002.**
Adenanthera abrosperma	*Stylosanthes scabra*
Alphitonia pomaderroides	*Themeda quadrivalvis*
Atalaya australiana	
Atalaya variifolia	**Grasses**
Brachychiton garrawayae	
Brachychiton vitifolius	*Aristida holathera*
Canarium australianum	*Aristida utilis*
Corymbia nesophila	*Bothriochloa bladhii*
Corymbia stockeri	*Dichanthium sericeum*
Dolichandrone heterophylla	*Ectrosia leporina*
Erythrophleum chlorostachys	*Eragrostis fallax*
Eucalyptus leptophleba	*Eragrostis schultzii*
Eucalyptus megasepala	*Eriachne glauca*
Eucalyptus staigeriana	*Eriachne pallescens*
Eucalyptus tetrodonta	*Eriachne squarrosa*
Ficus opposita	*Eriachne stipacea*
Grevillea glauca	*Heteropogon contortus*
Maytenus cunninghamii	*Heteropogon triticeus*
Melaleuca stenostachya	*Imperata cylindrica*
Melaleuca viminalis	*Mnesithea rottboellioides*
Melaleuca viridiflora	*Panicum decompositum*
Parinari nonda	*Pseudopogonatherum contortum*
Persoonia falcata	*Sarga angustum*
Petalostigma banksii	*Sarga plumosum*
Petalostigma pubescens	*Schizachyrium fragile*
Planchonella pohlmaniana	*Scleria levis*
Planchonia careya	*Setaria surgens*
Sterculia quadrifida	*Thaumastochloa pubescens*
Syzygium suborbiculare	*Xanthorrhoea johnsonii*

Forbs	
Ampelocissus acetosa	*Vigna lanceolata*
Breynia oblongifolia	*Xerochrysum bracteatum*
Buchnera gracilis	*Xyris complanata*
Cajanus mareebensis **(Endangered – EPBC 1999 & NCA 1992)**	*Zornia stirlingii*
Cajanus scarabaeoides	
Cartonema spicatum	
Cayratia trifolia	
Crotalaria brevis	
Crotalaria medicaginea	
Cyanthillium cinereum	
Dendrophthoe glabrescens	
Desmodium tenax	
Dianella caerulea	
Dioscorea transversa	
Dipteracanthus bracteatus	
Distichostemon malvaceus	
Evolvulus alsinoides	
Flemingia parviflora	
Galactia muelleri	
Galactia sp.	
Glycine tomentosa	
Grevillea dryandri	
Hibbertia candicans	
Ipomoea diversifolia	
Lindsaea ensifolia	
Microstachys chamaelea	
Phyllanthus carpentariae	
Phyllanthus virgatus	
Pleurocarpaea denticulata	
Rhynchospora pterochaeta	
Smilax blumei	
Sonchus oleraceus	
Spermacoce brachystema	
Spermacoce sp.	
Stemona australiana	
Stylidium clarksonii	
Tacca leontopetaloides	
Tephrosia filipes	
Teucrium ajugaceum	
Thecanthes cornucopiae	
Thysanotus chinensis	
Tricoryne anceps	
Uraria lagopodioides	

90C_213 – Recorded Plant Species

Trees and Shrubs	Weeds
Acacia calyculata	*Chamaecrista rotundifolia*
Acacia leptocarpa	*Mesosphaerum suaveolens*
Acacia rothii	*Passiflora foetida*
Acacia simsii	*Sida cordifolia*
Adenanthera abrosperma	*Spermacoce latifolia*
Alphitonia pomaderroides	*Stylosanthes scabra*
Antidesma ghaesembilla	*Themeda quadrivalvis*
Atalaya variifolia	*Urena lobata*
Brachychiton diversifolius	
Brachychiton vitifolius	**Grasses**
Canarium australianum	
Clerodendron floribundum	*Aristida holathera*
Coelospermum reticulatum	*Aristida utilis*
Corymbia clarksoniana	*Capillipedium spicigerum*
Corymbia papuana	*Cymbopogon refractus*
Corymbia stockeri	*Cyperus polystachyos*
Dolichandrone heterophylla	*Dichanthium sericeum*
Drypetes deplanchei	*Ectrosia leporina*
Erythrina vespertilio	*Ectrosia nervilemma*
Erythrophleum chlorostachys	*Ectrosia scabrida*
Eucalyptus chlorophylla	*Eragrostis fallax*
Eucalyptus cullenii	*Eriachne burkittii*
Eucalyptus tetrodonta	*Eriachne glauca*
Exocarpos latifolius	*Eriachne pallescens*
Ficus opposita	*Eriachne triseta*
Flueggea virosa	*Heteropogon contortus*
Gastrolobium grandiflorum	*Heteropogon triticeus*
Grevillea dryandri	*Lomandra longifolia*
Grevillea glauca	*Mnesithea rottboellioides*
Grevillea parallela	*Panicum decompositum*
Melaleuca nervosa	*Sarga angustum*
Melaleuca stenostachya	*Schizachyrium fragile*
Melaleuca viridiflora	*Schoenus sparteus*
Melaleuca viminalis	*Scleria brownii*
Pandanus spiralis	*Scleria levis*
Persoonia falcata	*Scleria sp.*
Petalostigma banksii	*Sehima nervosum*
Planchonella pohlmaniana	*Setaria surgens*
Planchonia careya	*Thaumastochloa major*
Coelospermum reticulatum	*Themeda australis*
Santalum lanceolatum	

Wrightia saligna	**Orchids**
Xylomelum scottianum	
	Cepobaculum canaliculatum
Forbs	
Ampelocissus acetosa	
Buchnera gracilis	
Cassytha filiformis	
Cayratia trifolia	
Commelina ensifolia	
Crotalaria brevis	
Dioscorea transversa	
Eriocaulon sp.	
Evolvulus alsinoides	
Flemingia parviflora	
Galactia sp.	
Goodenia sp.	
Hibbertia candicans	
Indigofera pratensis	
Lindsaea ensifolia	
Microstachys chamaelea	
Phyllanthus carpentariae	
Phyllanthus virgatus	
Phyllodium hackeri	
Pleurocarpaea denticulata	
Polygala rhinanthoides	
Rhynchosia minima	
Rhynchospora pterochaeta	
Smilax blumei	
Spermacoce brachystema	
Spermacoce sp.	
Stemona australiana	
Stylidium clarksonii	
Tacca leontopetaloides	
Tephrosia filipes	
Uraria lagopodioides	
Vigna lanceolata	
Wahlenbergia tumidifructa	
Xerochrysum bracteatum	
Xyris complanata	

90C_222 – Recorded Plant Species

Trees and Shrubs	Weeds
Acacia aulacocarpa	*Bidens bipinnata*
Acacia crassicarpa	*Hyparrhenia rufa*
Acacia humifusa	*Sida cordifolia*
Acacia rothii	*Stylosanthes scabra*
Adenanthera abrosperma	*Themeda quadrivalvis*
Alphitonia pomaderroides	
Atalaya variifolia	**Grasses**
Brachychiton diversifolius	
Brachychiton garrawayae	*Aristida holathera*
Brachychiton vitifolius	*Aristida utilis*
Breynia oblongifolia	*Capillipedium spicigerum*
Canarium australianum	*Cymbopogon refractus*
Coelospermum reticulatum	*Dichanthium sericeum*
Corymbia stockeri	*Ectrosia leporina*
Croton arnhemicus	*Ectrosia nervilemma*
Dendrolobium arbuscula	*Eragrostis fallax*
Denhamia oleaster	*Eragrostis schultzii*
Drypetes deplanchei	*Eriachne burkittii*
Erythrophleum chlorostachys	*Eriachne glauca*
Eucalyptus brassiana	*Eriachne pallescens*
Eucalyptus tetrodonta	*Eriachne squarrosa*
Euroschinus falcatus	*Eriachne stipacea*
Exocarpos latifolius	*Heteropogon contortus*
Gardenia scabrella	*Heteropogon triticeus*
Grevillea dryandri	*Ischaemum fragile*
Grevillea glauca	*Lomandra longifolia*
Grevillea parallela	*Melinis repens*
Grevillea pteridifolia	*Mnesithea rottboellioides*
Jagera pseudorhus	*Panicum decompositum*
Leucopogon ruscifolius	*Sarga angustum*
Lithomyrtus obtusa	*Sarga plumosum*
Livistona muelleri	*Schizachyrium fragile*
Melaleuca stenostachya	*Schoenus sparteus*
Melaleuca viridiflora	*Sehima nervosum*
Pandanus cookii	*Setaria surgens*
Parinari nonda	*Thaumastochloa major*
Persoonia falcata	
Petalostigma banksii	
Petalostigma pubescens	
Planchonella pohlmaniana	
Planchonia careya	

Santalum lanceolatum	
Scolopia braunii	
Sterculia quadrifida	
Syzygium suborbiculare	
Terminalia platyptera	
Wrightia saligna	
Xylomelum scottianum	
Forbs	**Orchids**
Abrus precatorius	*Cepobaculum canaliculatum*
Alyxia spicata	*Cymbidium canaliculatum*
Buchnera gracilis	
***Cajanus mareebensis* (Endangered – EPBC 1999 & NCA 1992)**	
Cassytha filiformis	
Cayratia trifolia	
Commelina ensifolia	
Dapsilanthus spathaceus	
Desmodium tenax	
Dianella caerulea	
Dipteracanthus bracteatus	
Drosera burmanni	
Eustrephus latifolius	
Flemingia parviflora	
Glinus oppositifolius	
Goodenia debilis	
Goodenia pumilio	
Grewia retusifolia	
Hibiscus meraukensis	
Indigofera pratensis	
Ipomoea hederifolia	
Isotoma gulliveri	
Lindsaea ensifolia	
Microstachys chamaelea	
Petraeovitex multiflora	
Phyllanthus carpentariae	
Phyllanthus virgatus	
Pleurocarpaea denticulata	
Polymeria ambigua	
Pterocaulon sphacelatum	
Rhynchospora pterochaeta	
Smilax blumei	
Stemona australiana	
Stylidium armeria	

Tephrosia filipes	
Thecanthes sanguinea	
Tylophora erecta	
Vigna lanceolata	
Wahlenbergia tumidifructa	
Xyris complanata	

90C_240C – Recorded Plant Species

Trees and Shrubs	Weeds
Acacia aulacocarpa	*Mesosphaerum suaveolens*
Acacia auriculiformis	*Sida cordifolia*
Acacia brassii	*Sonchus oleraceus*
Acacia crassicarpa	*Spermacoce latifolia*
Acacia holosericea	***Sporobolus pyramidalis*** **(Class 2- Land Protection (Pest and Stock Route Management) Act 2002.**
Acacia leptocarpa	*Stylosanthes scabra*
Adenanthera abrosperma	
Alphitonia pomaderroides	**Grasses**
Antidesma ghaesembilla	
Atalaya australiana	*Alloteropsis semialata*
Atalaya variifolia	*Aristida schultzii*
Brachychiton diversifolius	*Aristida utilis*
Brachychiton garrawayae	*Cymbopogon refractus*
Brachychiton vitifolius	*Cyperus aquatilis*
Cleistanthus xerophilus	*Cyperus polystachyos*
Clerodendron floribundum	*Ectrosia agrostoides*
Corymbia confertiflora	*Ectrosia leporina*
Corymbia nesophila	*Ectrosia nervilemma*
Corymbia stockeri	*Ectrosia scabrida*
Denhamia oleaster	*Eragrostis schultzii*
Dolichandrone heterophylla	*Eriachne glauca*
Eucalyptus leptophleba	*Eriachne pallescens*
Eucalyptus megasepala	*Evolvulus alsinoides*
Eucalyptus tetrodonta	*Imperata cylindrica*
Exocarpos latifolius	*Panicum decompositum*
Ficus opposita	*Panicum trichoides*
Gardenia tessellaris	*Perotis clarksonii*
Grevillea dryandri	*Sarga angustum*
Grevillea glauca	*Schizachyrium fragile*
Lamprolobium fruticosum	*Scleria pygmaea*
Melaleuca stenostachya	*Sehima nervosum*
Melaleuca viridiflora	*Thaumastochloa major*
Melaleuca viminalis	
Pandanus cookii	
Parinari nonda	**Orchids**
Petalostigma banksii	
Petalostigma pubescens	*Cepobaculum canaliculatum*
Planchonia careya	*Cymbidium canaliculatum*
Santalum lanceolatum	
Sersalisia sericea	

Siphonodon pendulus	
Syzygium suborbiculare	
Terminalia oblongata	
Xylomelum scottianum	
Forbs	
Buchnera gracilis	
Cajanus mareebensis **(Endangered – EPBC 1999 & NCA 1992)**	
Cajanus scarabaeoides	
Canarium australianum	
Cassytha filiformis	
Cayratia trifolia	
Crotalaria medicaginea	
Decaisnina brittenii	
Fimbristylis acicularis	
Flemingia parviflora	
Galactia muelleri	
Galactia sp.	
Grewia retusifolia	
Heteropogon contortus	
Heteropogon triticeus	
Hibiscus meraukensis	
Lindsaea ensifolia	
Phyllanthus carpentariae	
Phyllanthus virgatus	
Polycarpaea sp.	
Polymeria ambigua	
Pterocaulon sphacelatum	
Rhynchospora pterochaeta	
Spermacoce brachystema	
Spermacoce sp.	
Stemona australiana	
Uraria lagopodioides	
Vigna lanceolata	
Zornia stirlingii	

90C_241 – Recorded Plant Species

Trees and Shrubs	Weeds
Acacia auriculiformis	*Aeschynomene americana*
Acacia crassicarpa	*Alternanthera ficoidea*
Acacia holosericea	*Bidens bipinnata*
Acacia polystachya	*Chamaecrista rotundifolia*
Albizia procera	*Melinis repens*
Alphitonia pomaderroides	*Mesosphaerum suaveolens*
Antidesma ghaesembilla	*Passiflora foetida*
Atalaya australiana	*Passiflora suberosa*
Atalaya variifolia	***Senna obtusifolia*** **(Class 2- Land Protection (Pest and Stock Route Management) Act 2002.**
Brachychiton diversifolius	*Sida cordifolia*
Brachychiton vitifolius	*Sida rhombifolia*
Buchanania arborescens	*Sonchus oleraceus*
Choriceras tricorne	*Spermacoce latifolia*
Cleistanthus xerophilus	*Stachytarpheta jamaicensis*
Clerodendrum floribundum	*Synedrella nodiflora*
Corymbia clarksoniana	*Themeda quadrivalvis*
Corymbia dallachiana	*Urena lobata*
Corymbia papuana	
Corymbia stockeri	**Grasses**
Dolichandrone heterophylla	
Drypetes deplanchei	*Alloteropsis semialata*
Elaeocarpus arnhemicus	*Cymbopogon refractus*
Erythrophleum chlorostachys	*Cyperus aquaticus*
Erythroxylum ellipticum	*Eragrostis schultzii*
Eucalyptus leptophleba	*Eriachne armitii*
Eucalyptus megasepala	*Heteropogon contortus*
Exocarpos latifolius	*Heteropogon triticeus*
Ficus opposita	*Imperata cylindrica*
Flueggea virosa	*Lomandra longifolia*
Glycosmis trifoliata	*Mnesithea rottboellioides*
Grevillea coriacea	*Panicum decompositum*
Grevillea parallela	*Panicum seminudum*
Hakea persiehana	*Panicum trichoides*
Indigofera pratensis	*Pseudopogonatherum contortum*
Lamprolobium fruticosum	*Sarga plumosum*
Larsenaikia ochreata	*Sehima nervosum*
Mallotus philippensis	*Setaria surgens*
Melaleuca viridiflora	
Pandanus cookii	
Petalostigma banksii	

Planchonia careya	
Santalum lanceolatum	**Orchids**
Siphonodon pendulus	
Terminalia oblongata	*Cymbidium canaliculatum*
Terminalia platyptera	
Trema tomentosa	
Vachellia ditricha	
Vitex helogiton	
Forbs	
Ampelocissus acetosa	
Argyreia nervosa	
Cajanus scarabaeoides	
Cajanus mareebensis **(Endangered – EPBC 1999 & NCA 1992)**	
Cassytha filiformis	
Cayratia trifolia	
Commelina ensifolia	
Crotalaria brevis	
Crotalaria calycina	
Dipteracanthus bracteatus	
Evolvulus alsinoides	
Flagellaria indica	
Flemingia parviflora	
Galactia sp.	
Grewia mesomischa	
Grewia retusifolia	
Hibbertia scandens	
Hibiscus meraukensis	
Ipomoea hederifolia	
Ludwigia octovalvis	
Lygodium flexuosum	
Phacellothrix cladochaeta	
Phyllodium hackeri	
Piliostigma malabaricum	
Polymeria ambigua	
Pseuderanthemum variable	
Pterocaulon sphacelatum	
Smilax blumei	
Spermacoce brachystema	
Spermacoce sp.	
Stemona australiana	
Vigna lanceolata	
Wahlenbergia tumidifructa	

Xenostegia tridentata	
Xerochrysum bracteatum	
Ziziphus oenopolia	

90C_245 – Recorded Plant Species

Trees and Shrubs	Weeds
Brachychiton garrawayae	*Alternanthera denticulata*
Buchanania arborescens	*Chamaecrista rotundifolia*
Corymbia clarksoniana	*Cynodon dactylon*
Corymbia confertiflora	*Ipomoea hederifolia*
Corymbia dallachiana	*Mesosphaerum suaveolens*
Melaleuca viridiflora	***Senna obtusifolia*** **(Class 2- Land Protection (Pest and Stock Route Management) Act 2002.**
Planchonia careya	*Sida cordifolia*
Terminalia platyptera	*Sida rhombifolia*
Vachellia ditricha	*Spermacoce latifolia*
	Sporobolus pyramidalis **(Class 2- Land Protection (Pest and Stock Route Management) Act 2002.**
	Themeda quadrivalvis
	Urena lobata
Forbs	**Grasses**
Ampelocissus acetosa	*Aristida holathera*
Ludwigia octovalvis	*Dapsilanthus spathaceus*
Ziziphus oenopolia	*Ectrosia leporina*
	Eragrostis schultzii
	Petraeovitex multiflora
	Thaumastochloa major

APPENDIX C
DECLARED WEED FACT SHEETS

COMMON NAME:	SICKLE POD
BOTANICAL NAME:	*Senna obtusifolia*
DESCRIPTION:	Annual to short lived perennial woody shrub to 2m
LEAVES:	Compound leaves divided into two or three pairs of round ended leaflets
FRUIT:	Sickle shaped seed pods to ~12cm which are long, slender and rounded in cross section
FLOWERS:	Small (1cm diameter) and yellow with five petals and usually found in pairs in leaf axils
DECLARATION:	A class 2 Declared Plant under the *Lands Protection (Pests and Stock Route Management) (Q.L.D) Act 2002* and a Far North Queensland Regional Organisation of Councils (FNQROC) Category 3
MANAGEMENT:	Apply approved herbicide to infestation and monitor and prevent seed dispersal by thorough vehicle wash down



COMMON NAME:	GIANT RAT'S TAIL GRASS
BOTANICAL NAME:	*Sporobolus pyramidalis*
DESCRIPTION:	Exotic, tussock forming, thin leaved grass to 1.7m
LEAVES:	Linear, thin and long, grass leaves
FRUIT:	Small and condensed together on the flower spike to form a seed head with a rat's tail like display but open out into pyramidal shape infructescence
FLOWERS:	Insignificant individual flowers, but inflorescence is conspicuous and held erect above the foliage of the plant appearing similar to an erect rat's tail
DECLARATION	A Class 2 Declared Plant under the Lands Protection (*Pests and Stock Route Management*) [Qld] Act 2002, Far North Queensland Regional Organisation of Councils- Category 3
MANAGEMENT:	Apply approved herbicide to infestation and monitor. Ensure thorough washdown of vehicles and machinery after departing known infestations



APPENDIX D
ONLINE SEARCH RESULTS

Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

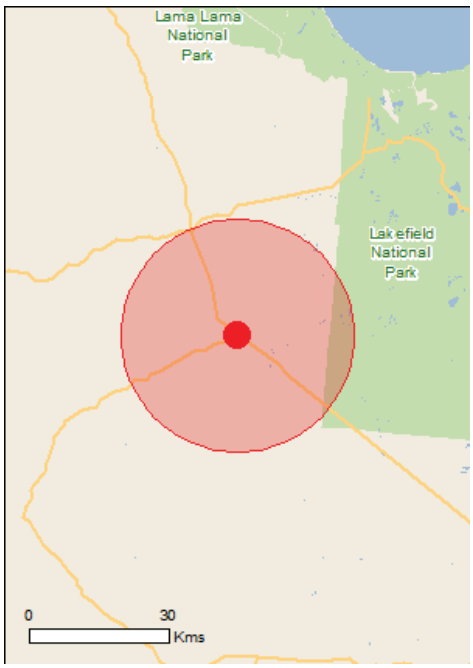
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/01/15 12:10:53

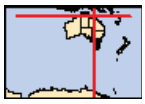
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 25.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	18
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

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A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	2
State and Territory Reserves:	3
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Cape York Peninsula	QLD	Nominated place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area
Psephotus chrysopterygius Golden-shouldered Parrot [720]	Endangered	Species or species habitat known to occur within area
Turnix olivii Buff-breasted Button-quail [59293]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat may occur within area
Hipposideros semoni Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Endangered	Species or species habitat may occur within area
Pteropus conspicillatus Spectacled Flying-fox [185]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Rhinolophus philippinensis (large form)		
Greater Large-eared Horseshoe Bat [66890]	Endangered	Species or species habitat likely to occur within area
Xeromys myoides		
Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Plants		
Cajanus mareebensis		
[8635]	Endangered	Species or species habitat known to occur within area
Cepobaculum carronii		
an orchid [78700]	Vulnerable	Species or species habitat known to occur within area
Ceratobium antennatum		
Antelope Orchid [78702]	Endangered	Species or species habitat may occur within area
Dendrobium bigibbum		
Cooktown Orchid [10306]	Vulnerable	Species or species habitat likely to occur within area
Dendrobium johannis		
Chocolate Tea Tree Orchid [13585]	Vulnerable	Species or species habitat may occur within area
Vappodes phalaenopsis		
Cooktown Orchid [78894]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Sharks		
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Grus antigone Sarus Crane [904]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
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Spectacled Monarch [610]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Reptiles		
Crocodylus johnstoni		
Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Lakefield National Park	QLD	Registered
Historic		
Musgrave Telegraph Station (former)	QLD	Indicative Place

State and Territory Reserves [Resource Information]

Name	State
Alwal	QLD
Artemis Antbed	QLD
Rinyirru (Lakefield)	QLD

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina		
Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus		
Gamba Grass [66895]		Species or species habitat likely to occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis		
Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Marina Plains - Lakefield Aggregation	QLD
Violet Vale	QLD

Coordinates

-14.97668 143.59479

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Department of the Environment
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Canberra ACT 2601 Australia
+61 2 6274 1111

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: -14.9767
Longitude: 143.5948
Distance: 25
Email: sarahholt@biotropica.com.au
Date submitted: Wednesday 07 Jan 2015 11:15:52
Date extracted: Wednesday 07 Jan 2015 11:20:34

The number of records retrieved = 17

Disclaimer

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Accipitridae	*Erythrotriorchis radiatus*	red goshawk		E	V	2
animals	birds	Estrildidae	*Erythrura gouldiae*	Gouldian finch		E	E	1
animals	birds	Psittacidae	*Psephotus chrysopterygius*	golden-shouldered parrot		E	E	465
animals	birds	Turnicidae	*Turnix olivii*	buff-breasted button-quail		V	E	1
animals	mammals	Macropodidae	*Petrogale coenensis*	Cape York rock-wallaby		NT		3/2
animals	mammals	Megadermatidae	*Macroderma gigas*	ghost bat		V		2
plants	higher dicots	Cucurbitaceae	*Cucumis costatus*			NT		1/1
plants	higher dicots	Fabaceae	*Cajanus mareebensis*			E	E	10/10
plants	higher dicots	Myrtaceae	*Homoranthus tropicus*			NT		5/5
plants	higher dicots	Simaroubaceae	*Samadera sp. (Kennedy River J.R.Clarkson 5645)*			V		2/2
plants	higher dicots	Sterculiaceae	*Brachychiton grandiflorus*			NT		1/1
plants	higher dicots	Stylidiaceae	*Stylidium trichopodum*			NT		2/2
plants	higher dicots	Thymelaeaceae	*Jedda multicaulis*			V		5/5
plants	monocots	Alismataceae	*Astonia australiensis*			E		1/1
plants	monocots	Orchidaceae	*Dendrobium johannis*	brown antelope orchid		V	V	3
plants	monocots	Poaceae	*Lepturus xerophilus*			NT		1/1
plants	monocots	Stemonaceae	*Stemona angusta*			V		10/10

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Australian Government
Department of the Environment

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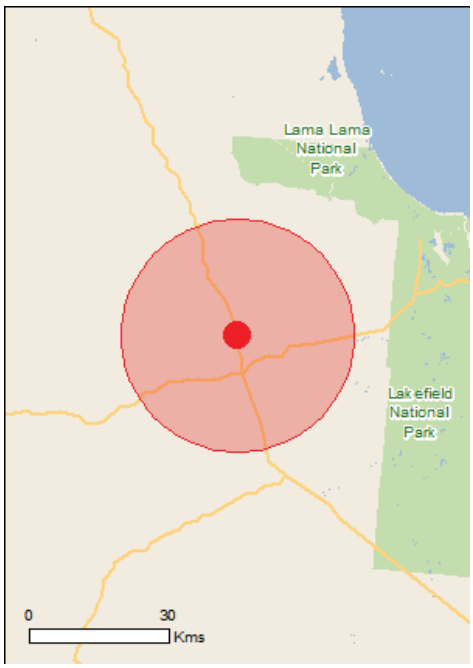
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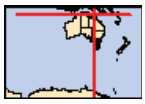
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Coordinates
Buffer: 25.0Km



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Key Ecological Features (Marine)	None

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Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat likely to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Reptiles		
Crocodylus johnstoni		
Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Glen Garland	QLD	Indicative Place
Historic		
Musgrave Telegraph Station (former)	QLD	Indicative Place

State and Territory Reserves [Resource Information]

Name	State
Artemis Antbed	QLD
Lilyvale	QLD
Yarraden	QLD

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina		
Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Plants		
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Marina Plains - Lakefield Aggregation	QLD
Violet Vale	QLD

Coordinates

-14.71166 143.49648

Caveat

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Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

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Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
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The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: -14.7117
Longitude: 143.4965
Distance: 25
Email: sarahholt@biotropica.com.au
Date submitted: Wednesday 07 Jan 2015 11:16:30
Date extracted: Wednesday 07 Jan 2015 11:20:40

The number of records retrieved = 14

Disclaimer

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Accipitridae	*Erythrotriorchis radiatus*	red goshawk		E	V	14
animals	birds	Cacatuidae	*Probosciger aterrimus*	palm cockatoo		NT		1
animals	birds	Meliphagidae	*Melithreptus gularis*	black-chinned honeyeater		NT		6
animals	birds	Psittacidae	*Psephotus chrysopterygius*	golden-shouldered parrot		E	E	24
animals	birds	Strigidae	*Ninox rufa meesi*	rufous owl (Cape York subspecies)		NT		1
animals	birds	Turnicidae	*Turnix olivii*	buff-breasted button-quail		V	E	1
animals	mammals	Macropodidae	*Petrogale coenensis*	Cape York rock-wallaby		NT		6/5
plants	higher dicots	Fabaceae	*Cajanus mareebensis*			E	E	16/16
plants	higher dicots	Simaroubaceae	*Samadera sp. (Kennedy River J.R.Clarkson 5645)*			V		1/1
plants	higher dicots	Sterculiaceae	*Brachychiton grandiflorus*			NT		3/3
plants	higher dicots	Stylidiaceae	*Stylidium longissimum*			V		1/1
plants	higher dicots	Stylidiaceae	*Stylidium trichopodum*			NT		2/2
plants	monocots	Orchidaceae	*Dendrobium johannis*	brown antelope orchid		V	V	3
plants	monocots	Orchidaceae	*Habenaria rumphii*			NT		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

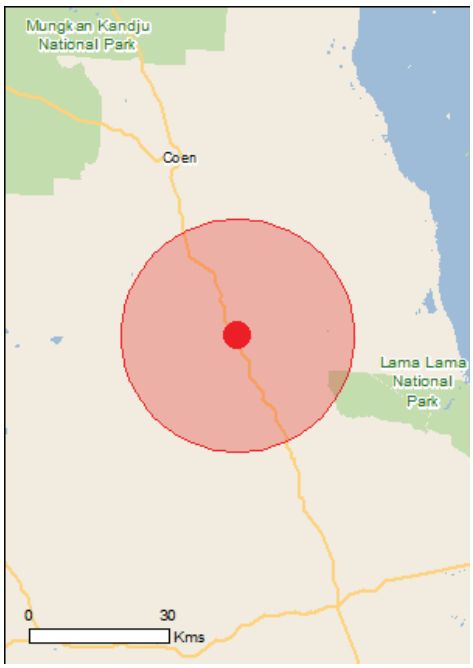
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/01/15 12:11:53

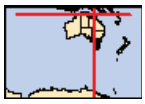
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 25.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	21
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	1
State and Territory Reserves:	9
Regional Forest Agreements:	None
Invasive Species:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Cape York Peninsula	QLD	Nominated place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area
Psephotus chrysopterygius Golden-shouldered Parrot [720]	Endangered	Species or species habitat may occur within area
Turnix olivii Buff-breasted Button-quail [59293]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat may occur within area
Hipposideros semoni Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Endangered	Species or species habitat may occur within area
Pteropus conspicillatus Spectacled Flying-fox [185]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Rhinolophus philippinensis (large form)		
Greater Large-eared Horseshoe Bat [66890]	Endangered	Species or species habitat known to occur within area
Xeromys myoides		
Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Plants		
Cajanus mareebensis		
[8635]	Endangered	Species or species habitat known to occur within area
Cepobaculum carronii		
an orchid [78700]	Vulnerable	Species or species habitat likely to occur within area
Ceratobium antennatum		
Antelope Orchid [78702]	Endangered	Species or species habitat likely to occur within area
Dendrobium bigibbum		
Cooktown Orchid [10306]	Vulnerable	Species or species habitat likely to occur within area
Dendrobium johannis		
Chocolate Tea Tree Orchid [13585]	Vulnerable	Species or species habitat likely to occur within area
Durabaculum nindii		
an orchid [78704]	Endangered	Species or species habitat likely to occur within area
Phalaenopsis rosenstromii		
Native Moth Orchid [15984]	Endangered	Species or species habitat may occur within area
Rhinerrhizopsis matutina		
[82846]	Vulnerable	Species or species habitat likely to occur within area
Streblus pendulinus		
Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat may occur within area
Reptiles		
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Sharks		
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Grus antigone Sarus Crane [904]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
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Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
McIlwraith Range	QLD	Indicative Place

State and Territory Reserves [Resource Information]

Name	State
Astrea	QLD
Balclutha (Lava Hill)	QLD
Balclutha Creek	QLD
Crystalvale	QLD
KULLA (McIlwraith Range)	QLD
Lama Lama	QLD
Running Creek	QLD
Silver Plains	QLD

Name	State
Yarraden	QLD

Invasive Species [Resource Information]

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Name	Status	Type of Presence
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Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
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Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus		
Gamba Grass [66895]		Species or species habitat likely to occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Coordinates

-14.27566 143.31128

Caveat

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-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: -14.2757
Longitude: 143.3113
Distance: 25
Email: sarahholt@biotropica.com.au
Date submitted: Wednesday 07 Jan 2015 11:16:59
Date extracted: Wednesday 07 Jan 2015 11:20:37

The number of records retrieved = 6

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animals	birds	Cacatuidae	*Probosciger aterrimus*	palm cockatoo		NT		3
animals	mammals	Hipposideridae	*Hipposideros diadema reginae*	diadem leaf-nosed bat		NT		1/1
plants	cycads	Cycadaceae	*Cycas tuckeri*			V		11/11
plants	higher dicots	Sterculiaceae	*Brachychiton grandiflorus*			NT		1/1
plants	monocots	Orchidaceae	*Dendrobium bigibbum*			V	V	3/3

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I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

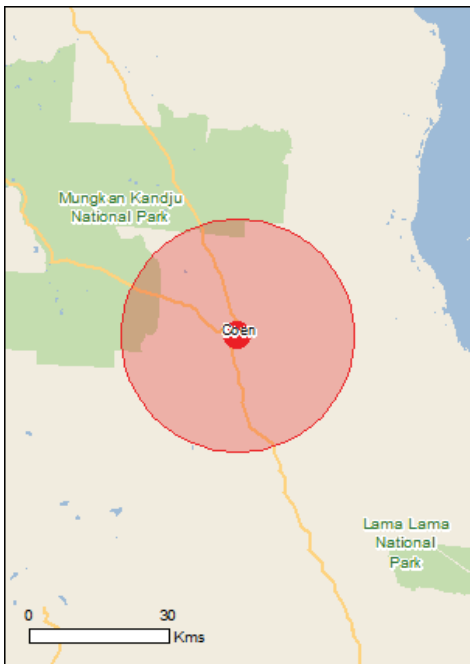
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/01/15 12:13:23

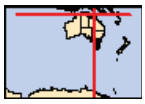
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 25.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	33
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	5
State and Territory Reserves:	6
Regional Forest Agreements:	None
Invasive Species:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
Cape York Peninsula	QLD	Nominated place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Casuarius casuarius johnsonii Southern Cassowary (Australian), Southern Cassowary [25986]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area
Psephotus chrysopterygius Golden-shouldered Parrot [720]	Endangered	Species or species habitat may occur within area
Turnix olivii Buff-breasted Button-quail [59293]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
Hipposideros semoni Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Pteropus conspicillatus Spectacled Flying-fox [185]	Vulnerable	Species or species habitat known to occur within area
Rhinolophus philippinensis (large form) Greater Large-eared Horseshoe Bat [66890]	Endangered	Species or species habitat known to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheathtail Bat [66889]	Critically Endangered	Species or species habitat known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Plants		
Acriopsis emarginata Pale Chandelier Orchid [83928]	Vulnerable	Species or species habitat likely to occur within area
Cajanus mareebensis [8635]	Endangered	Species or species habitat likely to occur within area
Cepobaculum carronii an orchid [78700]	Vulnerable	Species or species habitat known to occur within area
Ceratobium antennatum Antelope Orchid [78702]	Endangered	Species or species habitat known to occur within area
Ctenopterella blechnoides [83505]	Vulnerable	Species or species habitat likely to occur within area
Dendrobium bigibbum Cooktown Orchid [10306]	Vulnerable	Species or species habitat known to occur within area
Dendrobium johannis Chocolate Tea Tree Orchid [13585]	Vulnerable	Species or species habitat known to occur within area
Dipodium pictum [2723]	Endangered	Species or species habitat likely to occur within area
Durabaculum nindii an orchid [78704]	Endangered	Species or species habitat likely to occur within area
Myrmecodia beccarii Ant Plant [11852]	Vulnerable	Species or species habitat may occur within area
Phalaenopsis rosenstromii Native Moth Orchid [15984]	Endangered	Species or species habitat may occur within area
Phlegmariurus carinatus Keeled Tassel-fern [86549]	Endangered	Species or species habitat likely to occur within area
Phlegmariurus dalhousieanus BlueTassel-fern [86550]	Endangered	Species or species habitat likely to occur within area
Phlegmariurus squarrosus Rock Tassel-fern, Water Tassel-fern [86556]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Rhinerrhizopsis matutina [82846]	Vulnerable	Species or species habitat likely to occur within area
Sarcochilus hirticalcar [11388]	Vulnerable	Species or species habitat likely to occur within area
Streblus pendulinus Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Vanda hindsii Cape York Vanda [4494]	Vulnerable	Species or species habitat likely to occur within area
Zeuxine polygonoides Velvet Jewel Orchid [46794]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat likely to occur within area
Sharks		
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha frater Black-winged Monarch [607]		Species or species habitat likely to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Grus antigone		
Sarus Crane [904]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Monarcha frater Black-winged Monarch [607]		Species or species habitat likely to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
McIlwraith Range	QLD	Indicative Place
Rokeby - Croll Creek - McIlwraith Range	QLD	Indicative Place
Rokeby / Croll Creek National Park	QLD	Indicative Place
North East Cape York	QLD	Registered
Historic		
Coen Carrier Station	QLD	Indicative Place

State and Territory Reserves [Resource Information]

Name	State
KULLA (McIlwraith Range)	QLD
KULLA (McIlwraith Range)	QLD
Mount Croll	QLD
Oyala Thumotang	QLD
Silver Plains	QLD
Yarraden	QLD

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area

Coordinates

-13.95495 143.19597

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: -13.9549
Longitude: 143.1960
Distance: 25
Email: sarahholt@biotropica.com.au
Date submitted: Wednesday 07 Jan 2015 11:17:42
Date extracted: Wednesday 07 Jan 2015 11:20:03

The number of records retrieved = 62

Disclaimer

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	*Litoria longirostris*	long snouted treefrog		NT		43/31
animals	amphibians	Microhylidae	*Cophixalus crepitans*	northern nurseryfrog		V		15/6
animals	amphibians	Microhylidae	*Cophixalus peninsularis*	Cape York nurseryfrog		V		2/2
animals	birds	Accipitridae	*Erythrotriorchis radiatus*	red goshawk		E	V	3
animals	birds	Cacatuidae	*Probosciger aterrimus*	palm cockatoo		NT		9
animals	birds	Casuariidae	*Casuarius casuarius johnsonii (northern population)*	southern cassowary (northern population)		V	E	7
animals	birds	Estrildidae	*Erythrura gouldiae*	Gouldian finch		E	E	1
animals	birds	Psittacidae	*Psephotus chrysopterygius*	golden-shouldered parrot		E	E	12/5
animals	birds	Psittacidae	*Eclectus roratus macgillivrayi*	eclectus parrot		V		7
animals	birds	Strigidae	*Ninox rufa meesi*	rufous owl (Cape York subspecies)		NT		1
animals	birds	Turnicidae	*Turnix olivii*	buff-breasted button-quail		V	E	8/7
animals	mammals	Emballonuridae	*Taphozous australis*	coastal sheathtail bat		NT		1/1
animals	mammals	Hipposideridae	*Hipposideros diadema reginae*	diadem leaf-nosed bat		NT		22/12
animals	mammals	Hipposideridae	*Hipposideros semoni*	Semon`s leaf-nosed bat		E	E	11/7
animals	mammals	Hipposideridae	*Hipposideros cervinus*	fawn leaf-nosed bat		V		38/33
animals	mammals	Macropodidae	*Petrogale coenensis*	Cape York rock-wallaby		NT		7/5
animals	mammals	Megadermatidae	*Macroderma gigas*	ghost bat		V		1
animals	mammals	Rhinolophidae	*Rhinolophus philippinensis*	greater large-eared horseshoe bat		E	E	7/3
animals	mammals	Vespertilionidae	*Murina florium*	tube-nosed insectivorous bat		V		1/1
animals	reptiles	Boidae	*Morelia viridis*	green python		NT		19
animals	reptiles	Carphodactylidae	*Orraya occultus*			V		7/5
animals	reptiles	Scincidae	*Egernia rugosa*	yakka skink		V	V	1/1
plants	club mosses	Lycopodiaceae	*Phlegmariurus phlegmarioides*			V		2/2
plants	club mosses	Lycopodiaceae	*Phlegmariurus carinatus*			E	E	5/5
plants	cycads	Cycadaceae	*Cycas tuckeri*			V		11/11
plants	ferns	Hymenophyllaceae	*Hymenophyllum eboracense*			V		4/4
plants	higher dicots	Acanthaceae	*Lepidagathis royenii*			NT		2/2
plants	higher dicots	Apocynaceae	*Hoya macgillivrayi*	red hoya		NT		1/1
plants	higher dicots	Araliaceae	*Schefflera bractescens*			NT		2/2
plants	higher dicots	Asteraceae	*Glossocardia orthochaeta*			E		1/1
plants	higher dicots	Boraginaceae	*Carmona retusa*			V		3/3
plants	higher dicots	Euphorbiaceae	*Croton brachypus*			NT		1/1
plants	higher dicots	Loranthaceae	*Cecarria obtusifolia*			NT		2/2
plants	higher dicots	Mimosaceae	*Senegalia albizioides*			NT		3/3
plants	higher dicots	Myrtaceae	*Acmena mackinnoniana*	Rocky River satinash		NT		1/1
plants	higher dicots	Myrtaceae	*Syzygium macilwraithianum*			NT		5/5
plants	higher dicots	Rubiaceae	*Hydnophytum ferrugineum*			V		1/1
plants	higher dicots	Rubiaceae	*Lasianthus hirsutus*			NT		7/7
plants	higher dicots	Sapotaceae	*Chrysophyllum roxburghii*	star apple		NT		1/1
plants	higher dicots	Solanaceae	*Solanum angustum*			E		1/1
plants	higher dicots	Sterculiaceae	*Firmiana papuana*	lacewood		V		1/1
plants	higher dicots	Sterculiaceae	*Brachychiton grandiflorus*			NT		7/7
plants	monocots	Cyperaceae	*Paramapania parvibractea*			NT		1/1
plants	monocots	Orchidaceae	*Schoenorchis sarcophylla*			NT		2/2
plants	monocots	Orchidaceae	*Sarcochilus hirticalcar*	harlequin orchid		V	V	2/2

Queensland Government Wildlife Online - Extract Date 07/01/2015 at 11:20:03

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Orchidaceae	*Dendrobium malbrownii*			V		9/9
plants	monocots	Orchidaceae	*Dendrobium antennatum*	antelope orchid		E	E	2/2
plants	monocots	Orchidaceae	*Robiquetia wassellii*			NT		2/2
plants	monocots	Orchidaceae	*Dockrillia wassellii*			NT		3/3
plants	monocots	Orchidaceae	*Crepidium fimbriatum*			V		1/1
plants	monocots	Orchidaceae	*Acriopsis emarginata*	pale chandelier orchid		V	V	1/1
plants	monocots	Orchidaceae	*Dendrobium carronii*			V	V	1/1
plants	monocots	Orchidaceae	*Dendrobium bigibbum*			V	V	2/2
plants	monocots	Orchidaceae	*Thelasis carinata*			NT		4/4
plants	monocots	Orchidaceae	*Eria irukandjiana*			NT		1/1
plants	monocots	Orchidaceae	*Dipodium pictum*	brittle climbing orchid		E	E	2/2
plants	monocots	Orchidaceae	*Cadetia wariana*			V		1/1
plants	monocots	Orchidaceae	*Vanda hindsii*	Cape York vanda		V	V	2/2
plants	monocots	Orchidaceae	*Trichoglottis australiensis*			V		1/1
plants	monocots	Orchidaceae	*Aphyllorchis queenslandica*			NT		2/2
plants	monocots	Pandanaceae	*Freycinetia percostata*			V		1/1
plants	monocots	Pandanaceae	*Pandanus zea*			NT		4/4

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

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This number is output as 999 if it equals or exceeds this value.

APPENDIX E
CULTURAL HERITAGE REPORT

APPENDIX E PART A

SECTION A REPORT (NOVEMBER 2014)

Cultural Heritage Survey
Proposed Water Points
Laura to Coen, Peninsula Development Road



Report to Environment North

Alice Buhrich
Nov 2014

Executive Summary

A cultural heritage assessment of seven water points was conducted on the Peninsula Development Road between Laura and Kennedy River in November 2014.

Six significant Aboriginal sites, all scar trees, were located within three of the survey areas, at Chainage 2.9, 11.3 and 41.3 (kms north of Laura) (Table 1 below). Five of these are sugar bag scars, four on living trees in good condition (S2-S5). Buffers of fifty metres are recommended for these four sites. SC1 and SC6 are scars on dead trees. SC1 is not a sugar bag scar, and a 20 metre buffer is recommended. SC6 is a dead tree in very poor condition (see photo on front cover) and no specific buffer is recommended. It is recommended to retain SC6 only if possible.

Location (Chainage)	**Recommendation**
2.9	20m buffer around SC1 (-15.54418, 144.425075).
11.3	Construct water point in south east corner of study area. This will maintain a 50 m buffer around SC2-SC5. Facilitate Joseph Lee Cheu to inspect the buffer around the 3 scarred trees before construction begins.
15	No cultural heritage impediments to the construction of water point within survey area.
22	No cultural heritage impediments to the construction of water point within survey area.
23.8	No cultural heritage impediments to the construction of water point within survey area.
41.3	Retain a 50 metre buffer around SC5 (-15.381967, 144.122061). Retain SC6 if possible.
45.2	No cultural heritage impediments to the construction of water point within survey area.
General	Consider Joseph Lee Cheu's request that the ironwood that is destroyed during construction be made available to Ang-Gnarra Aboriginal Corporation. This would require the ironwood to be stacked separately to the other trees and left for Ang-Gnarra to collect when they have a saw mill in operation.
	If any further cultural heritage is located during construction works: 1. Stop work in the area immediately. 2. Contact Joseph Lee Cheu (0448 585 033) for an inspection of the site and to advise on cultural heritage significance. 3. Contact archaeologist (0488 035 778) for advice on appropriate management options.

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Acknowledgements

The assistance of Lars Kazmeier, of Biotropica Australia, in preparing the maps is gratefully acknowledged. James Hill provided advice on potential scar trees in the survey areas. Annette Oertle was a valuable archaeological field. Buddy Ahmat, Transport and Main Roads, provided helpful advice on relevant Traditional Owners for the area.

1. Introduction

This report documents the cultural heritage considerations of proposed work to re-sheet and reseal the Peninsula Development Road between Laura and Coen. It is expected that work will be commenced before the end of 2014.

The study area is divided into 3 zones from Laura to Coen – Zones A, B and C. Fieldwork and consultation for Zone A was conducted between Oct-Nov 2014, and is discussed in this report.

Cape York Peninsula is rich in Aboriginal heritage and history. Many sites remain unrecorded, with the majority of sites On the Cultural Heritage Database recorded as a result of surveys for development and research projects.

The *Aboriginal Heritage Cultural Act 2003* (the Act) protects all significant Aboriginal sites in Queensland. Under the Act all land users have a Duty of Care to minimise harm to Aboriginal cultural heritage places. This document describes some of the steps taken to minimise impacts to cultural heritage in the planning phase. These include

- Consultation with relevant Aboriginal parties
- Obtaining information on previously recorded cultural heritage places from the DATSIMA Cultural Heritage database
- Conducting field assessment
- Considering management options for Aboriginal places that may be affected by the proposed development.

Sections 2-4 present the aims of the study, proposed project activities and location of the project. Section 5 provides a brief history of the general area with the aim of identifying the types of cultural heritage places that may be encountered. A summary of relevant legislation is presented in Section 6. Sections 7 and 8 describe the methods and results, and Section 9 makes recommendations for this project to minimise impacts to significant Aboriginal heritage.

This report does not include information on hydrography, geology, flora or fauna, as the appropriate experts have completed separate environmental studies.

2. Aims of the Study

This study aims to manage potential impacts to Aboriginal cultural heritage from construction of proposed water points on the Peninsula Development Road between Laura and Coen.

This report describes the steps taken to ensure the provisions of the Duty of Care regarding Aboriginal cultural heritage under the *Aboriginal Cultural Heritage Act 2004* are met. The steps include

- Background research
- Consultation with appropriate Aboriginal Parties and representatives
- Field inspections

- Recommendations for management of known and potential Aboriginal cultural places.

3. Proposed Project Activities

Water will be needed for the re-sheeting and/or resealing of the PDR, and it is proposed that water points will be constructed at regular intervals along the PDR. For the purposes of this project, which is for the Laura to Coen section, the PDR is divided into 3 zones. Zone A is the first section north of Laura, extending 42 kms north of the (north) Laura River crossing.

Seven sites are proposed in Zone A. Each will have a water storage facility, which will require excavation of approximately 100m x 100m. Ancillary development includes access tracks and storage of excavated material. Figure 1 shows the location of each of these proposed sites and previously recorded cultural heritage form the DATSIMA database.

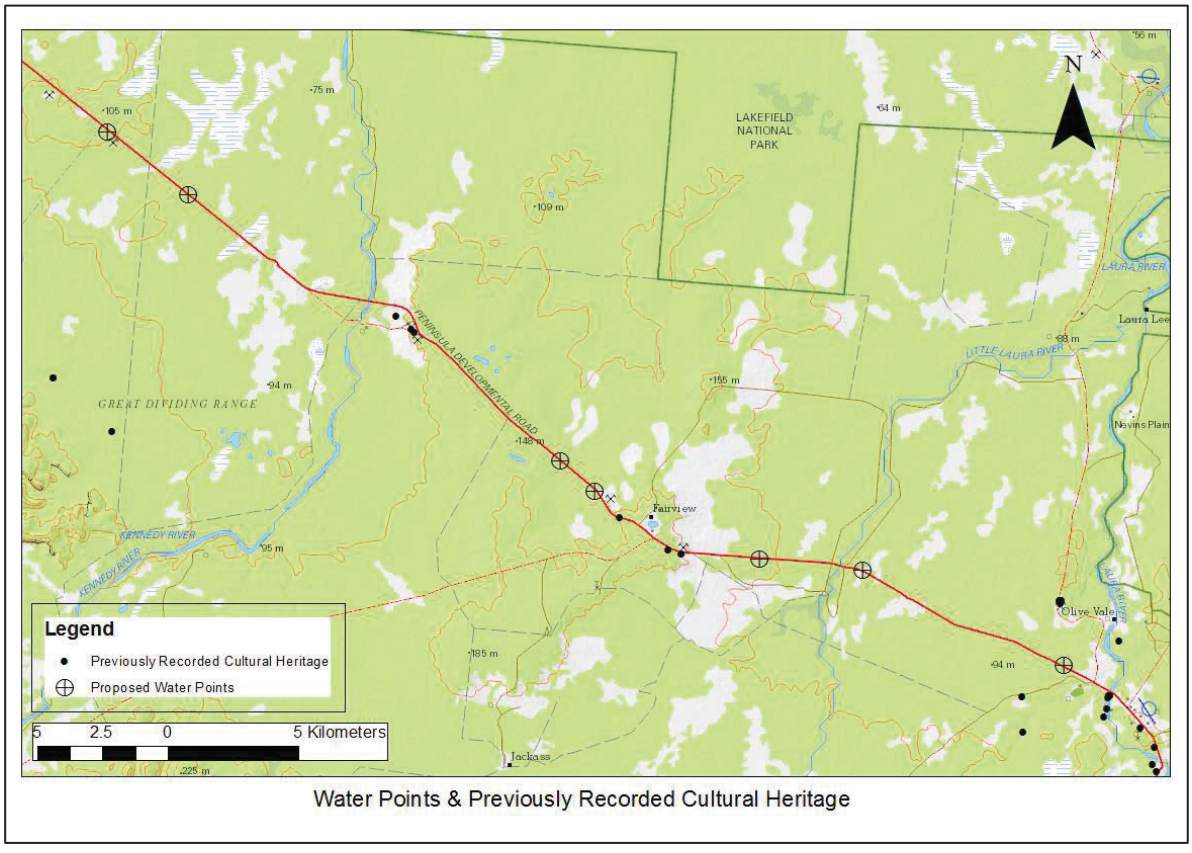


Figure 1. Location of proposed water points and previously recorded cultural heritage.

4. History of the Area & Previously Recorded Cultural Heritage

Occupation of the Laura sandstone area has been dated to around 40,000 years and today Aboriginal people have a deep connection to their land. Heritage sites may be physically visible or known through oral history. Major phases in the

Aboriginal history of Cape York Peninsula are identified below, with a description of the types of sites that could be expected in the study area.

4.1 The 'Old People'

Charcoal and ochre have been found in deep archaeological excavations in sandstone shelters, at Mushroom Rock on Welcome Station, and Sandy Creek on Olive Vale Station (Morwood 1995). These are at least 35,000 years old, and some of the oldest evidence of occupation in Australia. Occupation deposits typically accumulate in rock shelters, and that is why these shelters make ideal excavation locations.

Archaeological investigations reveal a dramatic increase in the number and types of archaeological sites found across Australia during the Mid-Holocene (5,000 years ago). Increases in charcoal and discard rate of cultural artefacts occur in archaeological deposits dating from this time. It has been suggested that the mid-Holocene was a time of social change, with more people living in larger groups and utilising a greater range of resources. In Cape York Peninsula, it is thought that the tightly bound clan estates associated with specific language groups developed during the mid-Late Holocene (David 2002). Today there are four language/clan groups with affiliation to the study area from Laura to Coen – Possum People, Olkola, Thaypan and Ayapathu.

Potential sites from pre-occupation include (but not limited to) scar trees, artefact scatters and story places. Scar trees, usually where people have accessed sugar bags of native bees in Cooktown ironwoods (see Discussion).

Fifty one Aboriginal sites are recorded on the DATSIMA database within 10 kms of the PDR in Zone A. These sites are dominated by paintings, engravings and scar trees. A burial site, grinding grooves and artefact scatters are also recorded. Paintings, engravings and grinding grooves are restricted to sandstone outcrops, plateaus and creek beds, primarily in the area around the Laura and Mossman Rivers and Olive Vale homestead at the southern end of Zone A. Six scar trees are recorded directly adjacent to the PDR in Zone A. Three are near the Fairview homestead and three are approximately 2 kms south of the Kennedy River (Figure 1). There are no recorded sites inside the proposed development areas. The high density of recorded cultural heritage sites around the Laura and Mossman Rivers is because people permanent water systems were important areas of occupation, and also because the Laura sandstone region has been a focus for research and recording projects.

4.2 European exploration

Edmund Kennedy led the first team of European explorers, with Aboriginal guide Jackey Jackey, through the area in 1848. In 1864 the Jardine brothers led their herd of cattle from Rockhampton to the newly created government outpost at Somerset Cape York. This was the start of the pastoral industry in Cape York Peninsula. Venture Mulligan discovered gold at the Palmer River in 1876, sparking an influx of over 20,000 people to the new goldfield.

There is unlikely to be any physical remnants of the early exploration phase, although massacre sites or other points of contact may be known in oral history.

4.3 Mining

Palmer River was the first mineral field in southeast Cape York Peninsula, discovery of gold here led to a massive influx of European and Chinese miners. The port of Cooktown sprung up virtually overnight. The main access road between Cooktown and the Palmer River crossed the PDR on the northern side of the Laura River near what is now the Laura Racetrack. The opening of the Cooktown – Laura railway in 1889 established Laura as a regional outpost. The railway closed in 1961.

Later, gold fields opened in Wenlock and Ebagoolah. The importance of mining to the history of the area is demonstrated through the inclusion of a number of historic mine sites on the Queensland Heritage Register.

Potential sites from this era include massacre sites, burials (usually of lone miners who died while travelling), tracks/roads, market gardens, evidence of the railway and items such as gold pans, cook pots, nails etc.

4.4 Pastoralism

Cattle has been the primary industry in south east Cape York Peninsula for over 100 years. Aboriginal men and women worked on pastoral stations for rations or wages from the 1870's. Their bush skills were highly regarded, particularly in tracking and horsemanship. For some Aboriginal people, working on pastoral properties provided opportunities to stay or visit their traditional clan estates. Many Aboriginal people in the area today have a strong link to the pastoral history and places related to this phase are a significant aspect of the regions Aboriginal history.

Potential sites relating to the pastoral industry include stockman's camps, scar trees (with metal axes) and cattle yards.

4.5 The Aboriginal Protection Act

The Aboriginal Protection Act was in force from 1897 to 1967. It allowed for the forced removal of lighter coloured children to missions and reserves. People living under the Act had every aspect of their lives controlled by the Aboriginal Protector – this Act severely restricted Aboriginal people ability to travel freely and access their traditional estates.

Although there are unlikely to be any sites related to this Act in the study area, it is a significant aspect of the Aboriginal history of Cape York Peninsula. Forced removals under the Act demonstrate why people today no longer live 'on country', why some Aboriginal people do not speak an Aboriginal language and why some traditional owners may have never visited their own clan estates.

5. Relevant Legislation

The (Queensland) *Aboriginal Cultural Heritage Act 2003* (the Act) provides protection for significant Aboriginal heritage places from development activities.

Significant Aboriginal heritage is defined as an object or area that is archaeologically or historically significant evidence of Aboriginal occupation of an area, or a place of particular significance to Aboriginal people. Significant Aboriginal places can be identified physically or by oral history, and do not need to contain physical markings. Aboriginal people are considered holders of cultural heritage information, and therefore responsible for assessing significance of a place.

All land users are bound to the provisions of the Act, through a duty of care to protect significant Aboriginal places from being harmed by a change in land use.

The consultant was commissioned to meet the requirements of the duty of care by

- Consulting the relevant Aboriginal Party about potential to harm non-tangible cultural heritage during the project
- Seeking information from the state managed Cultural Heritage database about previous cultural heritage recorded in the area
- Conducting a survey of the area, with the relevant Aboriginal Party, to identify any cultural heritage sites that may be impacted
- Developing management strategies with the Aboriginal Party to manage impacts to cultural heritage.

The Australian Burra Charter (Australia ICOMOS 2013) outlines best practise for management of heritage places. With regard to Aboriginal heritage, these principles are

- Avoid impacts to the place if possible
- Involve relevant Aboriginal people
- Understand the significance of place
- Make decisions based on significance.

Burra Charter principles are incorporated into the management recommendations provided in this report.

6. Methods

Methods for identifying cultural heritage in the study areas consists of talking to relevant people who may know of sites in the area, searching the existing records held by DATSIMA and conducting a ground survey of the sites. Management recommendations are made after identifying the sites and the site context and understanding the Aboriginal and scientific value of the site. Discussions were had on site between archaeologist and traditional owner about appropriate strategies for protecting the significant heritage places identified.

6.1 Consultation

There are no registered native title claims, or Cultural Heritage Bodies, for the study area. Advice was provided by Buddy Ahmat, Senior Heritage Officer, Transport and Main Roads (TMR) on potential contacts in the area from Laura to Coen. The consultation approach taken is to be inclusive, rather than exclusive. I contacted as many people on the list provided by Buddy Ahmat possible, to determine their level of interest in the study area. A table showing people

consulted for Section A of the PDR is presented in Appendix A. Fred Coleman, Shane Ross and Joseph Lee Cheu advised that Possum (Gulang) People are the appropriate clan group for Zone A, represented by Joseph Lee Cheu.

Joseph Lee Cheu accompanied archaeologists on site inspections of Zone A and advised on the identification of specific sites and their cultural significance. Joseph Lee Cheu was highly knowledgeable about the survey area. He has a strong cultural affiliation with the study area through his father Ceasar Lee Cheu, a Possum man as well as with the broad area through his mother, who identified as Gugu Warra. Joseph Lee Cheu has worked on both Olive Vale and Fairlight Stations as a stockman for many years.

Initial contact was made by telephone, over the course of 2 weeks prior to the field trip, followed up with a visit to their homes on Monday 11 November. A full list of individuals consulted is provided in Appendix A.

6.2 Fieldwork – Zone A

The heritage team consisted of archaeologists Alice Buhrich and Annette Oertle and traditional owner Joseph Lee Cheu. The 7 water point sites in Zone A were surveyed on Tues 11 November.

First the outer boundary of the survey area was inspected following a GPS track. The team walked approximately 10 - 20m apart. Second, the boundary of the proposed dam sites was walked, again with the three survey participants between 10 and 20 metres. Third, any parts of the survey area missed in the first stages of survey were inspected. Areas of high potential for cultural heritage were targeted for close inspection. These include areas with high ground visibility (ie. low grass cover) and mature Cooktown ironwoods (see Discussion).

6.3 Constraints – Zone A

Ground visibility was low in all sites. Grass cover was extensive which meant it was unlikely that any archaeological material on the ground would have been seen. However, it is unlikely that camps existed on the survey areas, considering the distance to permanent water, and therefore stone tools are unlikely.

7. Results

Six scar trees were located in Zone A. A 50 metre buffer is recommended around four of the trees. A 20 metre buffer is recommended around SC1. This is smaller buffer than SC2-5 because it is on a dead tree and it is not a sugar bag scar. One tree (SC6) is dead and decaying and unlikely to survive in the long term. There are no concerns with the destruction of SC6 If it was required, however, it's location outside of the proposed construction zone means it is unlikely to be disturbed by the project.

Maps of proposed development sites at Chainage 2.9, 11.3 and 41.3, showing location of identified cultural heritage sites, are presented in Appendix B. Sites were recorded using a Garmin 62sc GPS in using decimal degrees and projected using GDA94.

7.1 Chainage 2.9

This is the closest site to permanent water, and is surrounded by a number of recorded cultural sites such as scar trees, paintings, engravings, grinding grooves, campsites and a burial. Scar trees are the only site type recorded away from the Laura River or sandstone outcrops. Because of its close proximity to water, Joseph Lee Cheu considered this area to have high potential for scar trees.



Figure 2. Cultural scar on SC 2

However, despite checking a number of mature ironwoods, no sugar bag trees were located at this site. One scar tree was recorded, it was a dead ironwood with two marks made by removing the outer bark (Figure 2). It is possible that these were the start of sugar bag that was never finished. One scar faces northeast, the other southwest. A 20 metre buffer is recommended.

At least 6 cut ironwoods with stumps around 1.2 metres were observed at this site (Figure 3). These were cut for railway sleepers on the Laura to Cooktown railway, in 1880. Ironwoods were particularly sought after because of their strength and durability. Joseph Lee Cheu has observed many of these adjacent to the old coach road, which crosses the PDR near the Laura racecourse. Although an interesting aspect of the areas European history, they have no specific significance to Aboriginal people and are not protected by any legislation, and so were not recorded in any detail for this report.



Figure 3. Joseph lee Cheu with Ironwood cut for Laura Railway sleeper.

7.2 Chainage 11.3

Three Cooktown ironwoods with sugar bag scars were found in the survey area at Chainage 11.3. Each of the scar trees are on sandy soils on the northern side of a natural watercourse. Relocation of the water point to the south eastern corner of the study area (as shown in Figure 10) would retain an appropriate buffer around these trees.

SC2 is just outside the northwest boundary of the survey area. It is a mature ironwood with 3 marks, two of which are sugar bag (Figure 4).



Figure 4. Sugar bag scars on SC 2.

SC3 is within the northeast corner of the survey area. It is a single sugar bag scar, which faces north (Figure 5).



Figure 5. SC3.

SC4 has 3 sugar bag scars. Two of the scars face west, the lowest of which is in very poor condition. The third scar faces SSE (Figure 6a & 6b, below).

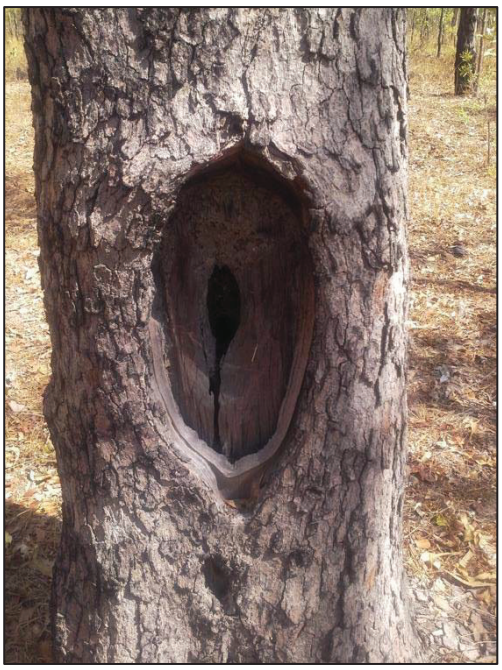


Figure 6a. West facing scar of SC4.



Figure 6b. Southsoutheast facing scar of SC4.

7.3 Chainage 15

This survey area had low ground visibility and no Cooktown ironwoods were present on the site. It is considered to have little potential for cultural heritage and no sites were identified in the survey.

7.4 Chainage 22

This survey area had low ground visibility, but considering its location so far from a permanent water source there is little likely for any cultural heritage to be present, no sites were identified in the survey.

7.5 Chainage 23.8

This survey area had low ground visibility and was considered to have little potential for cultural heritage sites because of the distance to permanent water. No sites were located during survey.

7.6 Chainage 41.3

Joseph Lee Cheu advised that this site has a higher potential for cultural heritage sites because of its proximity to Black Snake Creek, which retains pockets of water until the late dry season. Two sugar bag trees were located.

Botanist James Hill identified SC5 as being a potential scar tree. It is near the north west survey boundary line. The sugar bag scar has two branches of another tree growing out of its base (Figure 7). A 50 metre buffer is recommended.



Figure 7. Sugarbag scar of SC5 is within the opening visible here.

SC6 is a dead and decaying ironwood tree in very poor condition (Figure 8). It is in the northeast corner of the survey area. It is outside of the proposed water point construction zone, and therefore unlikely to be affected by the work. However, there are no cultural heritage constraints to the destruction of this tree, if it was necessary, because of its poor state of health.



Figure 8. Joseph Lee Cheu points out sugar bag scar on dead ironwood (SC6).

7.7 Chainage 45.2

This site had low visibility due to the extensive grass cover. No cultural heritage sites were located in the survey and there are no cultural heritage constraints to the water point construction.

8. Discussion: Sugar Bag scars on Cooktown Ironwoods

This survey resulted in the location of six culturally modified trees, five of which are sugar bag scars and all of which are on Cooktown ironwood (*Erythropleum chlorostachys*). In addition, a further 6 scar trees are recorded in Cultural Heritage database between Laura and Coen on the PDR. Scar trees are the dominant site type on the PDR, being recorded at Laura, Coen, Weipa and elsewhere in Cape York Peninsula. In the Weipa Peninsula area, over 900 culturally modified have been recorded (Morrison et al 2010).

Cooktown ironwoods last a long time – trees with diameter at breast height (DBH) of over 35cm are estimated to be older than 300 years (Cook et al 2005). Other species trees that were used to access sugar bag were probably destroyed in the process of obtaining the honey (see Morrison et al 2010).

Cooktown ironwoods are highly visible, especially when compared to other cultural material that may be at ground level. When the grass is high, visibility of the ground surface can be virtually zero, while ironwoods are distinctive and easy to identify.

Sugar bag scars on Cooktown ironwoods are common wherever mature trees are found. In the author's experience, anywhere you find mature ironwoods you will find sugar bag scars. This does not mean that these are a common site type in Queensland, as they are limited to the distribution of Cooktown ironwoods, which is north of approximately Chillagoe and Georgetown.

Sugar bag scars contain significant information on the occupation of the landscape at the time of contact. They are physical evidence of 'the Old People' and therefore significant to Aboriginal people. They have some scientific importance, for example, the distribution of stone axe and steel axe marks could provide information on movement of people at the time of contact. Virtually all the scars around the Weipa Mission are steel axe, indicating bush honey continued to be an important resource after people moved to the mission and were using steel implements. On Talaroo Station, at Georgetown, all the sugar bags were made with stone axe, reflecting the loss of access to resources on the station by Ewamian people soon after contact. In Laura there is a combination of steel and stone axe cuts, and further research could determine how these are distributed.

9. Recommendations

A total of six culturally modified trees were located within the survey areas of Zone A. None of these are within the proposed development footprints of the water points (Table 1).

One tree within the survey area of Chainage 2.9 contains a culturally modified tree – it is the only recorded tree that does not contain a sugar bag scar. A 20 metre buffer is recommended.

The survey area at Chainage 11.3 contains three sugar bag trees in good condition, and a 50 metre buffer is recommended around each of these. The water point should be constructed in the southeast corner of the survey area in order to maintain these buffers and retain the cultural landscape values of the area surrounding the trees. Joseph Lee Cheu should be given the opportunity to inspect the buffer around these 3 scarred trees before construction begins.

Two trees were located within the survey area of Chainage 41.3 – SC5 is a sugar bag scar in good condition, and a 50 metre buffer should be maintained around this tree. SC6 is a sugar bag scar on a dead tree in very poor condition. It is outside the development footprint, and unlikely to be affected by the work, but no specific buffer is recommended.

Name	Location	Description	Direction scar faces	Lat	Lon	Proposed Buffer
SC1	Ch 2.9	2 marks cut into dead ironwood	NE, SW	-15.544181	144.425075	20m
SC2	Ch 11.3	Mature ironwood with 3 scars, one of which is possibly natural	SE, E	-15.510105	144.353183	50m
SC3	Ch 11.3	Mature ironwood, single sugar bag scar	N	-15.510896	144.35478	50m
SC4	Ch 11.3	Mature ironwwod, three scars to lowest in very poor condition	W, SSE	-15.511669	144.35366	50m
SC5	Ch 41.3	Small tree growing out of a sugar bag scar	NW	-15.381967	144.122061	50m
SC6	Ch 41.3	Three scars on dead ironwood, tree unlikely to last long		-15.382675	144.124571	Avoid if possible

Table 1. Summary of cultural heritage sites located and recommended buffers

Joseph Lee Cheu made a request on behalf of the Ang Gnarra Aboriginal Corporation that they be given rights to the Cooktown ironwoods that will be destroyed during construction of the water points. The Corporation wishes to mill the timber as part of its development of a mobile saw mill operation. This would require the ironwood to be stacked separately to other tree species during construction. Ang Gnarra would have to negotiate access to the site with the relevant land owners. This request should be considered.

If any further cultural heritage is located during construction works the following steps should be taken:

1. Stop work in the area immediately.
2. Contact Joseph Lee Cheu (0448 585 033) for an inspection of the site and to advise on cultural heritage significance.
3. Contact archaeologist (0488 035 778) for advice.

References

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Morrison, M., McNaughton, D., & Shiner, J. (2010). Mission based Indigenous production at the Weipa Mission Presbyterian Mission, Western Cape York Peninsula (1932-66). *International Journal of Historical Archaeology*, *14*, 86–111.

Morwood, M. and D. Hobbs. (1995). *Quinkan Prehistory*. Tempus Vol 3, University of Qld, St Lucia.

Appendices

Appendix A: Table of Consultation for Zone A

Name	Represents	Method	Date	Outcome
Buddy Ahmat	TMR	Phone	3.10.14	Buddy will provide list of contacts
		Email	9.10.14	List of contacts provided
		Phone	27.10.14	Buddy will advise on payment amounts & process TBC
		Email	30.10.14	Paperwork and process for TO payments provided
Allwyn Lyall	Western Yalanji	Meeting	16.10.14	While meeting on another matter, AL indicated northern boundary of WY interests ends at Laura
Micheal Ross	Olcola	Phone	23.10.14	Out of range
Fred Coleman	Olkola/Thaypan?	Phone	27.10.14	Suggests Joseph Lee Chu would be appropriate for Area A
		Phone	10.11.14	Not interested in a visit to discuss the project
Shane Ross	Olkola	Phone	27.10.14	Can help contact Michael Ross
		Visit	11.11.14	Discuss project
Tanya Friday		Phone	28.10.14	Can get message to Michael Ross
Joseph Le Cheu	Possum	Phone	27.10.14	Can attend fieldwork 11 Nov
		Phone	6.11.14	Confirm payment method
		Phone	9.11.14	Confirm availability
		Visit	10.11.14	Organise fieldwork for next day, overview of project
Thomas George	Olcola/Thaypan	Phone – number no longer in use	5.11.14	Informed by Joseph Lee Cheu & Sue Marsh he is not well.

Appendix B. Maps of Chainage 2.9, Chainage 11.3 and 41.3

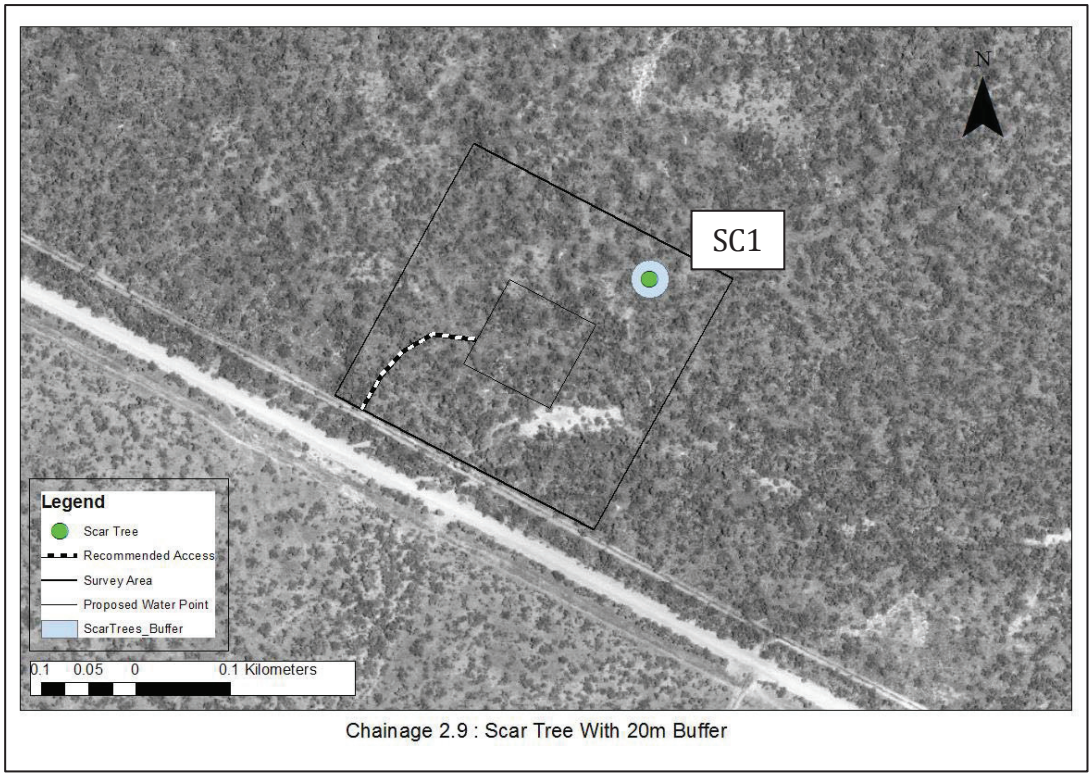


Figure 9. Chainage 2.9 showing SC1with 20m buffer, in relation to the proposed water point and access track proposed by Biotropica.

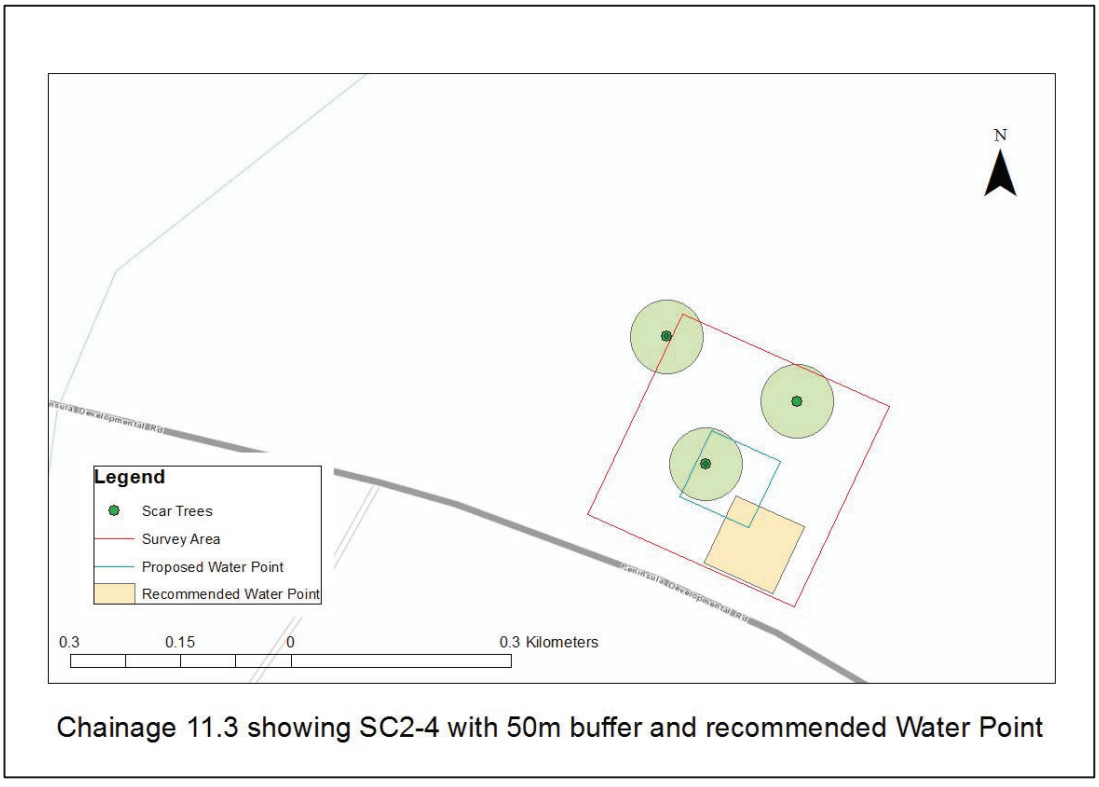


Figure 10. Chainage 11.3 showing location of scar trees with 50m buffer, in relation to the proposed water point and Biotropica recommendation to move it to the southeast corner of the survey area.

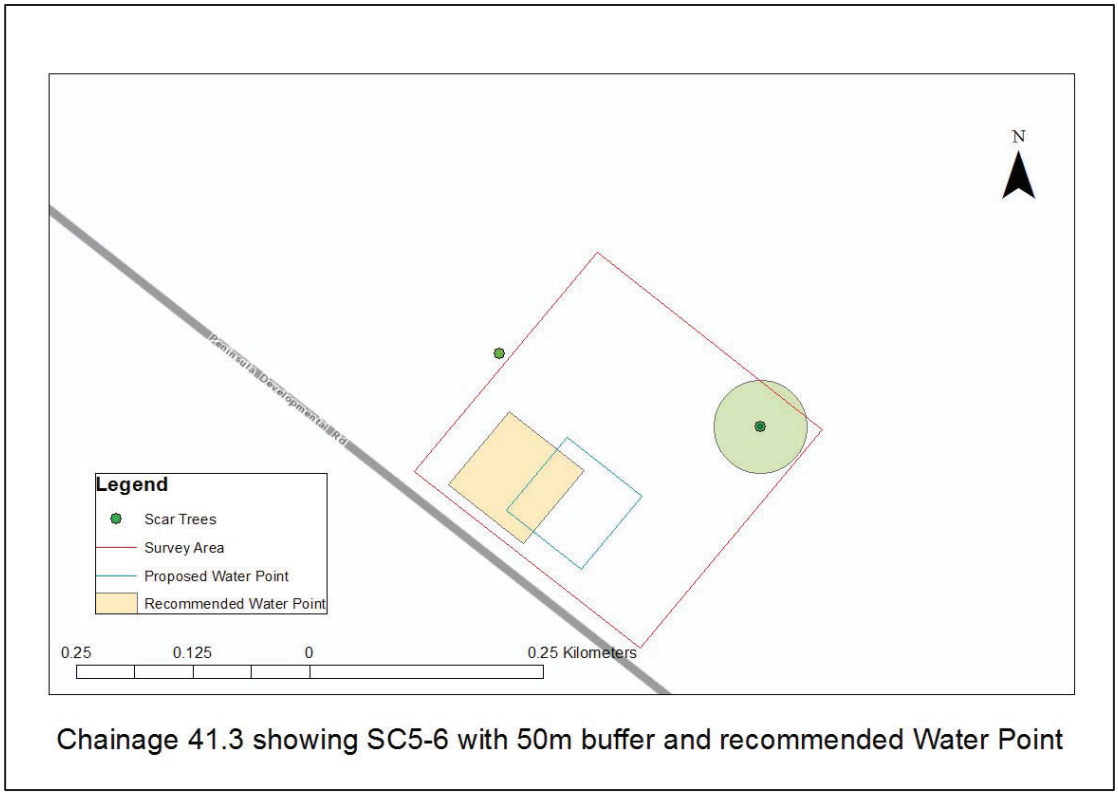


Figure 11. Chainage 41.3 showing location of Scar trees with 50m buffer around SC5, in relation to the proposed water point and Biotropica's recommendation to move it to the northwest corner.

APPENDIX E PART B

SECTION B& C ADDENDUM (JUNE 2015)

Addendum

Cultural Heritage Survey Proposed Water Points Laura to Coen, Peninsula Development Road

Alice Buhrich, 17 June 2015

Overview

This Addendum supplements report 'Cultural Heritage Survey Proposed Water Points Laura to Coen, Peninsula Development Road' provided to Environment North in November 2014. The Addendum is desktop assessment of a proposal to construct water storage facilities (water points) adjacent to the Peninsula Development Road between Laura and Coen, Cape York Peninsula, for use in maintaining and re-sheeting the Peninsula Development Road. The proposed water points are allocated into 3 geographic areas – Zone A (Laura to Kennedy River), Zone B (Musgrave) and Zone C (Coen). The initial report provided background information for the three zones and results of an archaeological survey of Zone A. The Addendum provides a desktop assessment of Zones B and C.

The Addendum contains

- Descriptions on the specific activities proposed at Zones B and C,
- Results of DATSIP database searches within 10kms of Zones B and C,
- Information on the role of Cape York Land Council in managing Aboriginal cultural heritage under the *Aboriginal Cultural Heritage Act 2003*
- Recommendations for managing impacts to Aboriginal cultural heritage and the (former) Musgrave Telegraph Station, a Queensland Heritage Registered place.

Proposed Activities at Zones B and C

Construction of water points will involve excavation of approximately 100 x 100m pits and ancillary development including access tracks and storage of excavated material. The excavated pits will provide water storage facilities for use during the road maintenance and re-sheeting. Site clearances incorporate a larger area, approximately 300 x 300m. This process provides flexibility to place the excavated pits within the larger area where they will have the least impacts to cultural and natural heritage. Seven water points are proposed in Zone B and six in Zone C. The sites have been chosen to have minimal effect on erosion and natural drainage systems.

Zone B extends 26 kms south and 7.7kms north of Musgrave Telegraph Station (Fig 1). Four water points are proposed south of the roadhouse, and three to the north. Six water point sites are proposed at Zone C, all within 38kms south of Coen (Fig 2).

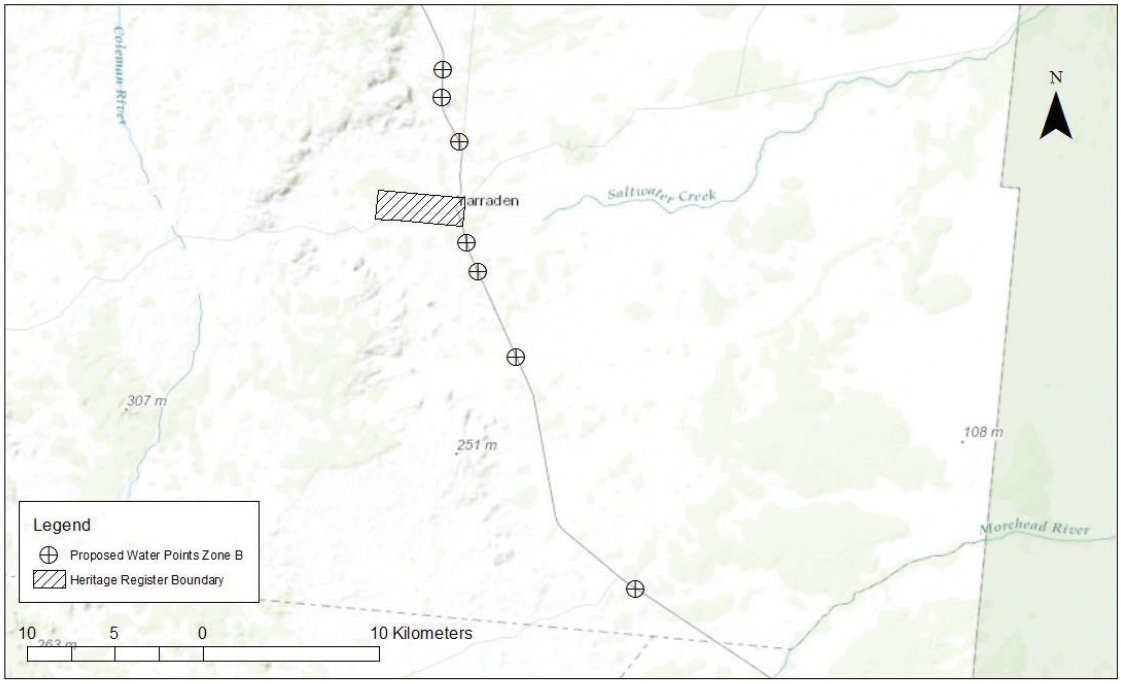


Fig 1. Proposed water points in Zone B and the heritage registered boundary of (former) Musgrave Telegraph Station.

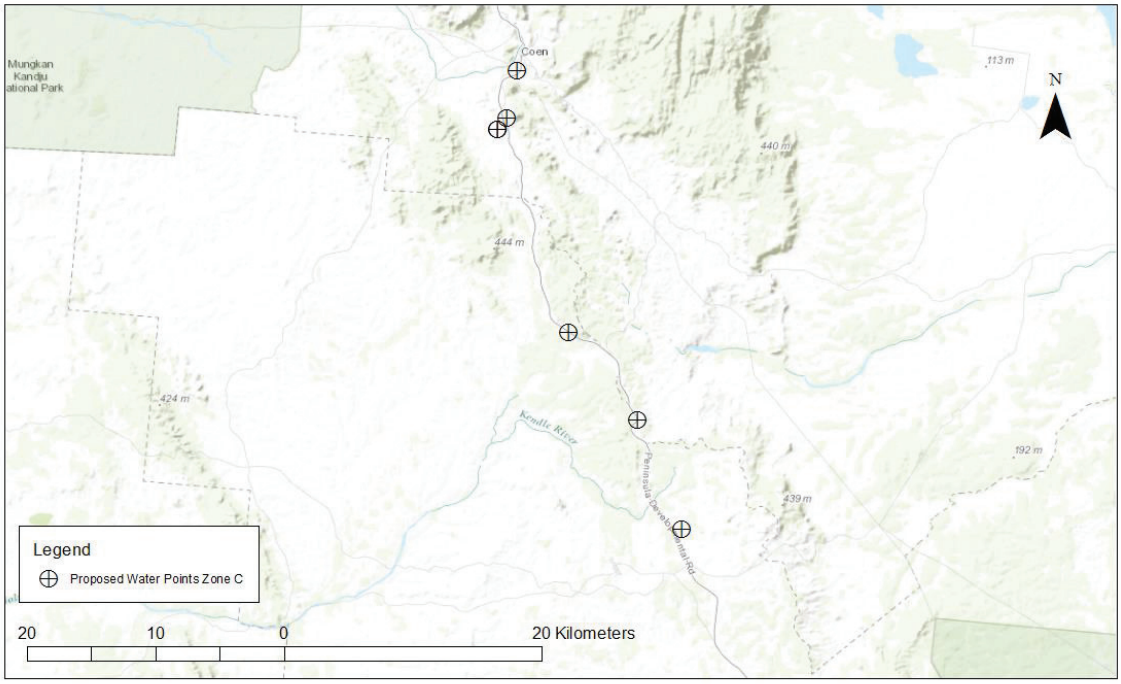


Fig 2. Proposed water points in Zone C.

Identified cultural heritage

A search of the DATSIP database identified no recorded Aboriginal cultural heritage places within 10kms of the proposed water points at Zones B or C. However, an absence of sites on the database does not mean there are no sites of significance in the proposed development areas. Most sites on the Cultural Heritage database were identified in formal cultural heritage surveys prior to 2003 when site locations were required to be provided under permitting conditions. Changes to Queensland heritage legislation in 2003 means there is no longer any requirement to provide cultural heritage site data to the government. The absence of identified Aboriginal places on the state database is probably due to the either a lack of formal cultural heritage surveys being completed in the study area, or a reluctance to provide site information to the Cultural Heritage Branch.

Aboriginal cultural heritage sites are regularly identified on the Peninsula Development Road when cultural heritage surveys are completed. Culturally modified trees, where Aboriginal people have cut holes into the trunks of living trees to obtain sugar bag (see s8 in main report), are often recorded as a result of surveys on the Peninsula Development Road. They are usually on Cooktown ironwoods (*Erythropleum chlorostachys*). As an example, six culturally modified trees were found during surveys of Zone A in November 2014, and one culturally modified tree was located on a survey of the Peninsula Development Road 50 kms north of Coen in 2010 (Buhrich 2010). Although culturally modified trees are the most visible site expected to be encountered, there could be other types of Aboriginal sites, such as story places, contact sites, resource area or stone artefact scatters.

The Musgrave Telegraph Station was constructed in 1887 to service the overland telegraph. Like other sites taken up by white settlers, Musgrave was an important area for Aboriginal people, which contained tangible and non-tangible heritage values. The design of the building illustrates the difficult relations between the telegraph employees and local Aboriginal people (Queensland Heritage Listing #600431). The building wraps around a central space where the water tank was stored to prevent it from being damaged by attack. Gun-post enclosures were constructed on the two corners of the building. It is likely that the Musgrave area has Aboriginal sites of significance, from both contact and pre-contact periods. Consultation with relevant people could identify significant Aboriginal sites, including contact sites, which are not visible in ground surveys.

The (former) Musgrave Telegraph Station is the last remaining building of the 1887 telegraph line and listed on the Queensland Heritage Register for its non-indigenous values. The heritage listed boundary is identified in Fig 1.

Processes Managing Potential Impacts to Cultural Heritage

Indigenous

In Feb 2015, the Native Title Tribunal accepted the Cape York United Number 1 Claim for registration on behalf of the Cape York Land Council (CYLC). The registration of the Cape York United Number 1 Claim has significant implications for the process for managing cultural heritage on the Peninsula Development Road. As Native Title Party, the Cape York Land Council has become the Aboriginal Party for the area with defined roles under the *Aboriginal Cultural Heritage Act 2003* (ACHA). Previously, in the absence of a native title claim or Aboriginal Cultural Heritage Body, the Aboriginal Party was a person who had particular knowledge on the cultural heritage of the area, and whose family was recognized as having responsibility for the area.

The Aboriginal Party has a specific role for management of cultural heritage, identified in the Duty of Care Guidelines. The Aboriginal Party

- Have a key role in assessing potential of an activity to harm Aboriginal cultural heritage.
- Should be consulted prior to any activities likely to harm Aboriginal cultural heritage.

- Should be notified if any cultural heritage material is located during development activities.
- Are responsible for making agreements with land users if there is proposal to harm Aboriginal cultural heritage.
- Are responsible for assessing the significance of Aboriginal cultural heritage.

Where agreement cannot be reached with the Aboriginal Party the land user continues to have a duty of care to protect Aboriginal cultural heritage from harm. If Aboriginal cultural heritage is harmed from any development activities the extent to which the land user met the duty of care, including outcomes of consultation with the Aboriginal Party, would be an important consideration.

Non-indigenous

The former Musgrave Telegraph Station (now the Musgrave homestead) is a state heritage listed place under the Queensland Heritage Act 1992 (Place ID: 600431). While there are no development activities within the heritage listed area, one water point is within 1km of the heritage boundary (Fig 1). Transport and Main Roads should be aware of the potential to impact the heritage place through work adjacent to the heritage listed place. The natural vegetation surrounding the (former) Musgrave Telegraph Station contributes to the setting of the place, and the proposed work should not impact views of the building from the PDR.

The Cook Shire Planning Scheme requires that Development on land adjacent to Cultural Features "must be designed, executed and operated to: be compatible with the cultural heritage significance of the listed site and not detrimentally impact on its values or its setting; and not obscure the appearance or prominence of the place when viewed from adjacent public or semi-public streets or open spaces, nor intrude into the place" (Cook Shire Council 2007, Cultural Features Code S4.3.1.2). Although the construction of the water points does not require Development Application approvals, and therefore not subject to the Cultural Features Code, it is recommended that the proposed work respects the intention of the Code by retaining the natural bushland setting of the (former) Musgrave Telegraph Station and view of the building from the PDR.

Recommendations

Cultural heritage surveys should be conducted on the development footprints of the proposed water points.

The new role of the Cape York Land Council in cultural heritage management of Aboriginal heritage within the Cape York United One Claim area requires new consultation processes. A process is needed for identifying relevant custodians 'on the ground' through the Cape York Land Council and for assessing significance of any cultural heritage places located in the proposed development areas.

Consideration should be given to retaining the bushland setting of the (former) Musgrave Roadhouse, and views to the building from the Peninsula Development Road.

References

Buhrich, A. 2010. Cultural Heritage Assessment Coen to Archer River Roadhouse, Peninsula Development Road. Report to Environment North.

Cook Shire Council 2007. Planning Scheme for Cook Shire Adopted 1 June 2007. http://www.cook.qld.gov.au/town-planning Accessed on 15 June 2015.

APPENDIX F

EXTRACTS FROM YARRADEN NATURE REFUGE CONSERVATION AGREEMENT

SCHEDULE 2

Significant Natural Resources for the Agreed Area

This Agreement is intended to protect and enhance the following significant Natural Resources for the Agreed Area:

(i) The following regional ecosystem is described as 'Of Concern' and has nil representation in the protected area estate –

- Evergreen to complex evergreen mesophyll to notophyll vine forest and thicket on mountain ranges of Torres Strait Islands, described as regional ecosystem 3.12.36.

(ii) The following regional ecosystem is described as 'Of Concern' and has high representation in the protected area estate –

- Permanent lakes and lagoons, frequently with fringing woodlands or sedgelands, described as regional ecosystem 3.3.66.

(iii) The following regional ecosystem is described as 'Least concern' and has nil representation in the protected area estate –

- *Corymbia nesophila* ± *Eucalyptus tetrodonta* woodland on sandstone footslopes and fans, described as regional ecosystem 3.3.26.

(iv) The following regional ecosystems described as 'Least concern' that have low representation in the protected area estate –

- *Eucalyptus tetrodonta* and *Corymbia nesophila* woodland on lower slopes of plains and rises, described as regional ecosystem 3.5.11;
- *Eucalyptus cullenii* and *Corymbia clarksoniana* woodland on low metamorphic hills and rises, described as regional ecosystem 3.11.7;
- *Corymbia stockeri* ± *Eucalyptus tetrodonta* woodland on hills and erosional surfaces, described as regional ecosystem 3.11.11; and
- *Corymbia nesophila* ± *E. brassiana* woodland on metamorphic hills and ranges, described as regional ecosystem 3.11.13.

(v) The following regional ecosystems described as 'Least concern' that have medium representation in the protected area estate –

- *Eucalyptus cullenii* and *Corymbia stockeri subsp. peninsularis* woodland on metamorphic hills, described as regional ecosystem 3.11.9; and
- *Eucalyptus tetrodonta* ± *Corymbia hylandii subsp. peninsularis* woodland on rises and ridges, described as regional ecosystem 3.12.14.

(vi) Known habitat for the following rare and threatened species -

- The endangered *Cajanus mareebensis, Teucrium ajugaceum, Erythrotriorchis radiatus* (red goshawk) and a 'Confidential Record' of a species from the Accipitridae family.
- A 'Confidential Record' of a 'vulnerable' species from the Cycadaceae family.
- The rare *Brachychiton grandiflorus, Tadorna radjah* (radjah shelduck) and *Probosciger aterrimus* (palm cockatoo).

(vii) Suitable habitat for the following rare and threatened species -

- The endangered *Erythrura gouldiae* (Gouldian finch), *Psephotus chrysopterygius* (golden-shouldered parrot) and *Hipposideros semoni* (Semon's leaf-nosed bat).
- The vulnerable *Carmona retusa, Eclectus roratus macgillivrayi* (eclectus parrot), *Turnix olivii* (buff-breasted button quail), *Hipposideros cervinus* (fawn leaf-nosed bat) and *Casuarius casuarius johnsonii* (northern population) (southern cassowary – northern population).
- The rare *Dianella incollata, Pandanus gemmifer, Ephippiorhynchus asiaticus* (black-necked stork), *Aerodramus terraereginae* (Australian swiftlet), *Spilocuscus maculatus* (common spotted cuscus) and *Hipposideros diadema reginae* (diadem leaf-nosed bat).

(viii) Catchment protection for the Holroyd River and Coleman River Catchments and the Holroyd, Lukin, Kendle and Stewart Rivers.

(ix) Catchment protection for numerous creeks and pools.

SCHEDULE 3

Agreed Management Conditions

Item 1. General

Protection of the Natural Resources of the Agreed Area by:

a) Not permitting or applying for subdivision of the Agreed Area except where consent in writing is given in this Agreement or by the Minister.

b) Not erecting Infrastructure except where consent in writing for non-residential buildings necessary for the proper and effective management of the Agreed Area is given in this Agreement or by the Minister.

c) Existing and future rights related to mineral and petroleum exploration and extraction are not altered by this Agreement.

d) Any lawfully approved mining or petroleum-related activity on the Agreed Area will be planned and conducted in accordance with relevant statutory requirements, including environmental, conservation and cultural heritage requirements relevant to the Agreed Area.

e) Existing rights of the Queensland Government to access and permit the sale of forest products (e.g. timber) on the Agreed Area are not altered by this Agreement.

f) The policy intent of the Queensland Government at the time of this Agreement is to provide certainty to the forest industry, to protect environmental values and to ensure ecologically sustainable management of forests. This will include a transition out of commercial native hardwood timber harvesting in favour of plantations.

g) The Queensland Government has established the Statewide Forests Process to achieve these objectives for all State owned land.

h) Further commercial timber harvesting on the Agreed Area may occur, but only where necessary to provide supply to the timber industry under the Statewide Forests Process.

i) Harvesting of timber on State owned lands is planned and conducted with regard to regional and local conservation values and in accordance with relevant standards.

Item 2. Natural resource protection

Ecosystem management and protection (e.g. regional ecosystems, vegetation communities)

Protection of the viability and resilience of ecosystems on the Agreed Area by:

a) Conducting land uses and land management activities on the Agreed Area in such a way that ecological integrity and diversity of ecosystems are protected.

Wildlife and habitat protection

Protection of populations of native plants and animals, including their habitat, from Threatening Processes by:

b) Protecting native plants and animals by not deliberately damaging, marking, moving or removing any native plant or animal, unless otherwise approved in this Agreement.

c) Protecting native animal habitats by not intentionally damaging, destroying, marking, moving, digging up or otherwise interfering with active nests (i.e.

canopy, sub-canopy and ground nests), burrows, roosts, caves or other structures used by native animals.

d) Conducting and managing land uses and land management activities in a manner that minimises interruption to breeding cycles and food sources.

e) Not intentionally killing or taking native animals unless licensed to do so under relevant legislation.

f) Not employing any native Fauna Deterrent unless otherwise approved in this Agreement or where otherwise lawful to do so.

g) Preventing Unnatural Encouragement of wildlife, unless otherwise approved in this Agreement.

Water, Watercourses and Wetland protection

Protection of Wetland and Water Values on the Agreed Area by:

h) Minimising unnatural contamination, sedimentation or degradation resulting from land uses and land management activities conducted on the Agreed Area.

i) Providing for natural water flows and processes, unless specified otherwise or where established prior to this Agreement.

j) Protecting Wetland and riparian vegetation to prevent or minimise Scour and/or Instability.

Soil stability and protection

Protection of soil productivity and integrity on the Agreed Area by:

k) Preventing or minimising soil erosion, compaction or any deterioration of the soil's physical, biological or chemical properties resulting from land uses and land management activities conducted on the Agreed Area.

l) Protecting soil from mechanical disturbance in Sensitive Areas, unless approved otherwise in this Agreement.

m) Protecting areas of obvious past, present or potential Instability by restricting land uses and land management activities in such areas, with the exception of site rehabilitation activities.

Protection of Significant Geological Features and Landforms

Protection of Significant Geological Features and Landforms on the Agreed Area by:

n) Conducting land uses and land management activities on the Agreed Area in such a way to prevent loss, minimise damage to, or deterioration of, Significant Geological Features and Landforms on the Agreed Area.

Item 3. Land protection and threat abatement

Pest Animal management

Protection of Natural Resources on the Agreed Area from Pest Animals by:

a) Taking reasonable steps to minimise the introduction of Pest Animals and control existing populations of Pest Animals on the Agreed Area.

b) Managing Pest Animals by way of a lawful control Program by the Lessee or his Agent.

c) Ensuring Control Programs are timed and managed to prevent the capture, injury or death of non-target native animals.

Pest Plant management

Protection of Natural Resources on the Agreed Area from Pest Plants by:

d) Taking reasonable steps to minimise the introduction, establishment and spread of Pest Plants and control of existing infestations of Pest Plants on the Agreed Area.

e) Ensuring Control Programs are timed and managed to prevent the illness, injury or death of native plants and animals.

f) Informing the DERM about any new occurrences of Declared Pest Plants.

g) Taking reasonable steps to control or eradicate any new occurrences of Declared Pest Plants.

Disease management

Protection of Natural Resources on the Agreed Area from Disease by:

h) Taking reasonable steps to minimise the introduction, establishment and spread of Disease where feasible.

i) Reporting any unusual plant or animal death, damage or Disease activity that may threaten Natural Resources on the Agreed Area to the DERM.

j) Quarantining all machinery and equipment from Disease infected areas until cleaned/disinfected.

Item 4. Land use and management

Fire management

Implementation of fire management strategies to protect Natural Resources on the Agreed Area by:

a) Developing and implementing appropriate fire management strategies (typically prevention, preparedness and suppression).

Native vegetation removal/management (i.e. timber, plant)

Harvest/removal of native vegetation (typically timber, thinning, whole plants, plant parts, seed) on the Agreed Area will maintain or enhance Natural Resources by:

b) Protecting native vegetation by not deliberately destroying, removing or damaging native vegetation on the Agreed Area, unless otherwise approved in this Agreement.

Built Infrastructure management (e.g. roads, tracks, fences, watering points)

Protection of Natural Resources on the Agreed Area from any adverse impacts associated with new or existing built Infrastructure by:

c) Constructing Infrastructure only where required and where allowed under this agreement or approved by the DERM.

d) Designing roads and tracks appropriate to site condition and function.

e) Ensuring new Infrastructure, where allowed under this Agreement, is planned, sited, constructed and maintained to achieve the desired function and minimise impacts on Natural Resources on the Agreed Area.

f) Decommissioning Infrastructure in consultation with the DERM and using reasonable endeavours to restore the site to a safe stable and rehabilitated state.

g) Minimising the total area of disturbance when building Infrastructure.

Waste and Hazardous Material management

Management of Waste and Hazardous Materials to protect Natural Resources on the Agreed Area by:

h) Conducting land uses and management activities in such a way as to minimise the risk of land and water pollution, visual or other degradation from Wastes on the Agreed Area.

i) Securing, storing, using and disposing of Hazardous Substances in accordance with label instructions.

j) Not burying/disposing of any non-degradable Waste on the Agreed Area, unless otherwise approved in this Agreement or approved by the DERM.

Item 5. Tenure and zoning

Agriculture Zones *(refer to zone D on PA plan)*

Land Uses and land management activities conducted in the Agriculture Zone, as described in the Protected Area Plan, will not adversely impact on Natural Resources on the Agreed Area by:

a) Balancing production and the conservation of natural values through implementation of industry best practice management of agricultural pursuits on the Agreed Area.

Domestic Zones *(refer to zone A on PA plan)*

Land Uses and land management activities conducted in the Domestic Zone, as described in the Protected Area Plan, will not adversely impact on Natural Resources on the Agreed Area by:

b) Constructing and maintaining Infrastructure in the 'Domestic Zone' in accordance with Item 4. Built Infrastructure management.

Relocatable Domestic Zones *(refer to zone A (R) on PA plan)*

Land Uses and land management activities conducted in the Relocatable Domestic Zone, as described in the Protected Area Plan, will not adversely impact on Natural Resources on the Agreed Area by:

c) Obtaining written approval from the DERM in relation to the final location of the 'Domestic Zone'.

d) Not allowing the 'Relocatable Domestic Zone' to exceed 55 hectare/s.

e) Ensuring the resultant 'Domestic Zone' is managed in accordance with Item 5. Domestic Zones.

Infrastructure Zones *(refer to zone B on PA plan)*

Land Uses and land management activities conducted in the Infrastructure Zone, as described in the Protected Area Plan, will not adversely impact on Natural Resources on the Agreed Area by:

f) Constructing and maintaining Infrastructure in the 'Infrastructure Zone' in accordance with Item 4. Built Infrastructure Management.

Relocatable Infrastructure Zones (refer to zone B (R) on PA plan)
Land Uses and land management activities conducted in the Relocatable Infrastructure Zone, as described in the Protected Area Plan, will not adversely impact on Natural Resources on the Agreed Area by:

g) Obtaining written approval from the DERM with regard to the final location within the 'Infrastructure Zone'.

h) Not allowing the 'Relocatable Infrastructure Zone' to exceed 55 hectares.

Easements

Land Uses and land management activities conducted in the Easement, as described in the Protected Area Plan, will not adversely impact on Natural Resources on the Agreed Area by:

i) With respect to that area of the Agreed Area covered by the Easement 602805675 (K356475V) on: lot 10 on plan SP113659 -

- Ensuring activities are conducted, as necessary, to comply with the rights or obligations conferred by the Easement and relevant legislation; and
- If the provisions of this Agreement and the rights and obligations of the Easement conflict, the Easement rights and obligations will prevail.

Item 6. Continual improvement

Monitoring
Monitoring will be conducted on the Agreed Area to assess whether the outcomes of this Agreement have been met by:

a) Developing and implementing a Monitoring Plan for the Agreed Area, in consultation and by agreement with the DERM, within 12 months of signing this Agreement. The Monitoring Plan may be reviewed from time to time.

b) Retaining the results of any monitoring required under this Agreement for a period of at least five years and, on request, making them available to the DERM.

c) On request, making available to the DERM the results of any monitoring or research conducted on the Agreed Area that is over and above that required under this Agreement, (excluding any commercial in confidence material held under agreement with a third party).

d) The DERM may provide advice to ensure monitoring conducted by the Lessee assesses condition, trend and impacts, with the view to continual improvement and corrective action where required.

Restoration/revegetation

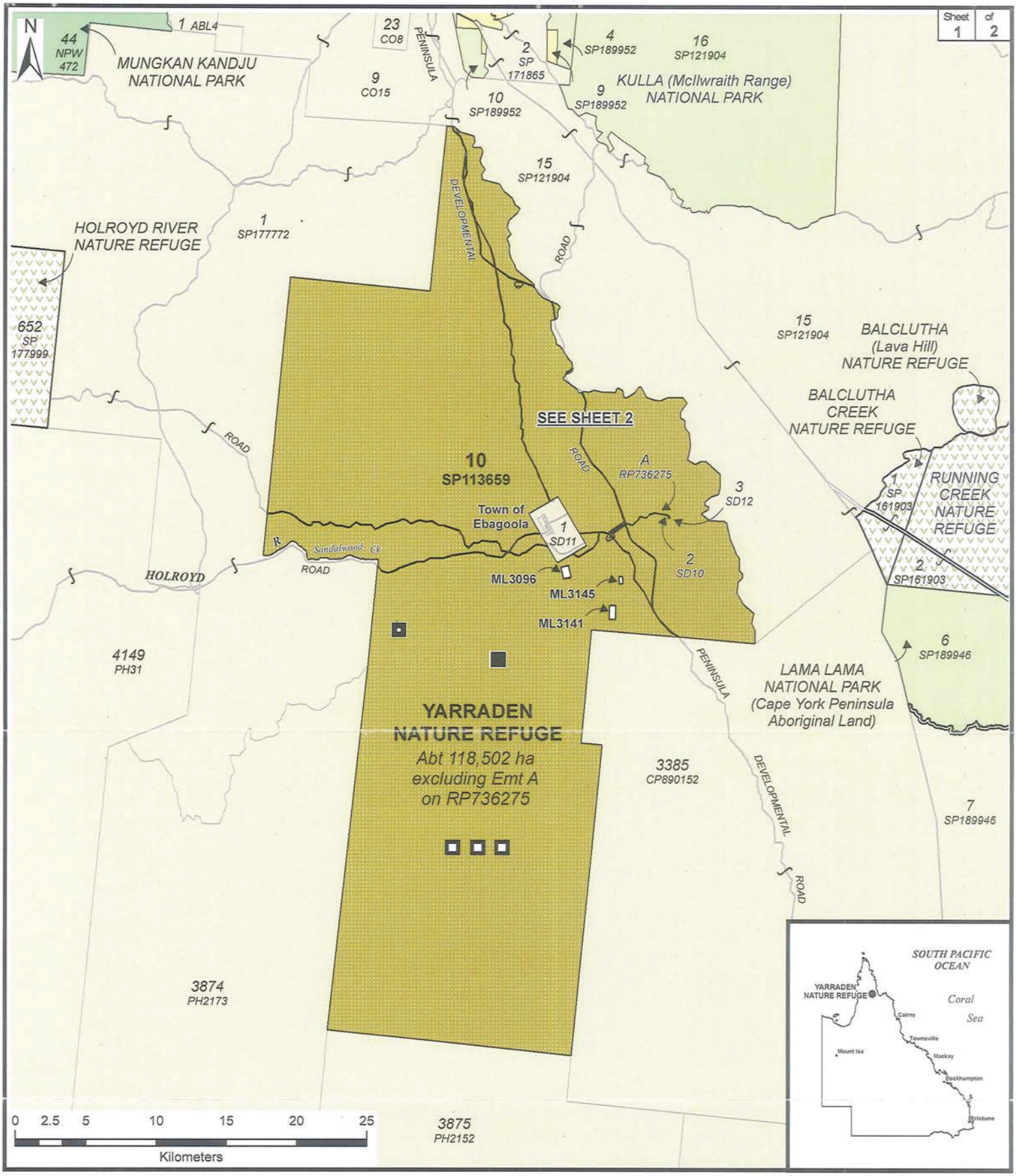
Any restoration/revegetation works conducted on the property will enhance Natural Resources on the Agreed Area by:

e) Using local provenance seed stock, preferably sourced from the Agreed Area, when planting or direct seeding.

f) Conducting restoration work in consultation with the DERM.

SCHEDULE 4

Protected Area Plan
PA526
(attached)



Queensland Government

GDA

DATUM GDA94

ZONE MGA 54

PLAN OF YARRADEN NATURE REFUGE

Yarraden Nature Refuge | Exclusion Area | Zone A Abt 0.693 ha | Zone B Abt 40.6 ha | Zone D Abt 17.7 ha

Zone A_R (Abt 50.5 ha) | Zone B_R (Abt 52.17 ha) | Zone B_R (3) Each Abt 50 ha (max)

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Produced to delineate the boundaries of the Nature Refuge under the provisions of the Nature Conservation Act 1992 and the Survey and Mapping Infrastructure Act 2010.

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The property boundaries shown on this plan are APPROXIMATE ONLY. They are NOT an accurate representation of the legal boundaries.

Based upon an extraction from the Digital Cadastral Data Base on: 25/08/2010

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COUNTY: SIDMOUTH, COEN, KALKAH **REGION:** CAPE YORK/SAVANNA

LOCALITY: YARRADEN **ELECTORATE:** COOK

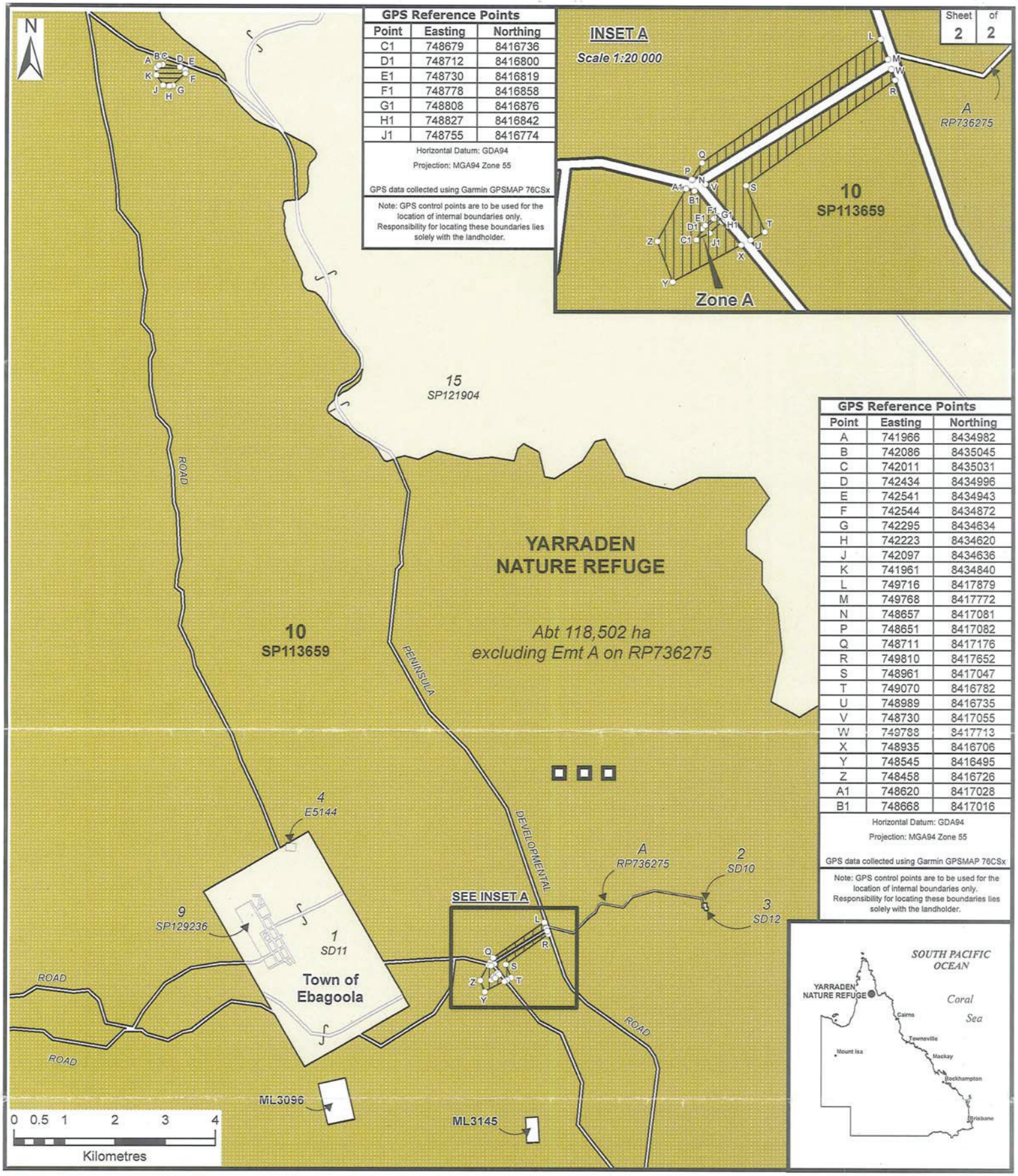
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File Ref: BNE40711-1 | Map Ref: 7569-31221 | Date: 26/08/2010

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AP19092



PLAN OF YARRADEN NATURE REFUGE

Queensland Government

GDA DATUM GDA94 ZONE MGA 54

Yarraden Nature Refuge | Exclusion Area | Zone A Abt 0.693 ha | Zone B Abt 40.6 ha | Zone D Abt 17.7 ha

Zone A_R (Abt 50.5 ha) | Zone B_R (Abt 52.17 ha) | Zone B_R (3) Each Abt 50 ha (max)

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PARISH: EBAGOOLA, KENLIS, KINTORE, LECONSFIELD, LILFORD, PROBY LOCAL AUTH: COOK SHIRE

COUNTY: SIDMOUTH, COEN, KALKAH REGION: CAPE YORK/SAVANNA

LOCALITY: YARRADEN ELECTORATE: COOK

Scale: 1:70000

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