TMR

Park Road to Cleveland Rail Upgrade Planning Project
Stage 1 Duplication - Technical Assessment Report

July 2017

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Appendices

1. Acronyms & Abbreviations

Acronym	Definition
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AS	Arrangement Signalling
ATS	Auto Transformer System
BaT	Bus and Train Project
BCC	Brisbane City Council
BSA	Brisbane Suburban Area
BTS	Booster Transformer System
CETS	Civil Engineering and Track Standards
Ch.	Chainage
CRR	Cross River Rail
DA	Development Approval
DBYD	Dial Before You Dig
DCDB	Digital Cadastral Database
DEE	Department of Environment and Energy's
DEM	Digital Elevation Model
DILGP	Department of Infrastructure, Local Government and Planning
DNRM	Department of Natural Resources and Mines
DSITI	Department of Science, Information Technology and Innovation's
EAMS	Enterprise Asset Management System
ECO	Electric Control Operator
EHP	Department of Environment and Heritage Protection
EPBC	Environment Protection Biodiversity Conservation
EPM	Environmental Process Manual
ESR	Environmental Scoping Report
ETCS	European Train Control System Level 2
LIDAR	Light Imaging, Detection, And Ranging

MSES	Matters of State Environmental Significance Mapping
OHLE	Overhead Line Equipment
PAF	Project Assurance Framework
PUP	Public Utility Plant
QR	Queensland Rail
RCC	Redland City Council
RCS	Remote Control Signalling
RL	Reduced Level
RMAR	Rail Maintenance Access Road
SASR	Strategic Assessment of Service Requirements
SCADA	Supervisory Control And Data Acquisition
SEQ	South East Queensland
SEQCI	South East Queensland Capacity Improvement
SiD	Safety in Design
SPP	State Planning Policy
SPRP	State Planning Regulatory Provisions
TMR	Transport and Main Roads
WPCW	Water Pollution Control Works

2. Introduction

2.1 Scope of Technical Assessment

GHD have been commissioned by TMR to undertake a rail planning study to investigate upgrades along the Cleveland Line that forms the Eastern corridor between Park Road and Cleveland. The project is split into two parts: • Stage 1 investigation of track duplication concepts between Manly and Cleveland; and • Stage 2 investigation of stabling opportunities along the line between Park Road and Cleveland.

The objective of Stage 1 (Manly to Cleveland Duplication) is to determine what rail infrastructure is required and the likely corridor requirements. This entails the following tasks:

1. Undertaking desktop technical investigations and assessments of the rail corridor to establish the feasibility of the duplication.
2. Developing rail infrastructure concepts for a dual track and supporting infrastructure.
3. Identifying costings, whole of corridor land and infrastructure requirements, construction timeframes and staging ability.

This report documents the Stage 1 Task 1 work undertaken for the rail corridor to identify the key constraints, determine the likely impacts and feasibility of the duplication. The remaining Tasks for Stage 1 and the Stage 2 – Stabling opportunities scope will be documented in subsequent reports. Figure 1 below shows the rail corridor duplication extents.

Figure 1 Manly to Cleveland rail corridor

2.2 Background

The Cleveland Rail Line is a rail corridor located between Park Road junction and Cleveland station, and is approximately 37 km in length. The line primarily supports commuter movements to Brisbane's Central Business District, the Eastern Suburbs and Redland City, and accommodates freight movements to the Port of Brisbane.

The single track section between Manly and Cleveland limits the effective capacity of the entire Cleveland Line. In particular, the current configuration does not allow for an improvement on 15-minute frequencies between Manly and Cleveland in either direction.

The Cleveland line is predicted to reach capacity by 2021. The current constraints to capacity in this section include:

- Conflict between peak and contra peak movements along the single-track section between Manly and Cleveland
- The use of Manly as a terminal station

- Lack of stabling facilities
- Lack of turnback facilities
- Network-wide timetabling impacts of single track

The *South East Queensland Capacity Improvement Project* (extract of section 6 from PB report 2178011B-RAI-REPO-002 Rev B) recommended duplication of the Cleveland line between Manly and Cleveland.

It is anticipated that the duplication will be implemented in stages to extend up to full duplication.

This project is at the first phase of the Queensland State government's PAF, SASR process decision.

2.3 Purpose of this report

This report aims to define the corridor characteristics, issues and design parameters that the duplication concept must respond to, forming the basis of design for the concept development.

This report also facilitates a greater understanding of the key project risks, issues and opportunities to inform the PAF decisions process.

The level of assessment was qualitative in nature commensurate with the level required to inform the SASR phase of PAF that will be undertaken by TMR following the projects conclusion. If that gateway is approved, the next PAF phase, Preliminary Evaluation, will require more detailed quantitative assessment as part of a future study, outside of this project.

2.4 Report scope

The scope of this technical assessment was to undertake a desktop only study of the Cleveland Line rail corridor from Manly to Cleveland in order to assess the feasibility of the duplication and inform the development of the concept design. Information used in this assessment was either provided by TMR or publically available. A list of the information used here is described in Section 2.6.

The study undertaken covered the following aspects

- Public utilities
- Roads and local access
- Rail and station infrastructure
- Rail Systems
- Environmental
- Land use
- Cultural heritage
- Geotechnical
- Bridge structures
- Hydrology / Flood
- Constructability and staging

No stakeholder engagement has been undertaken as part of the study and project requirements are subject to stakeholder consultation potentially affecting outcomes of this report.

Existing flood risk data (refer Section 4.5) from third parties was used and the accuracy of this data has not been independently verified or validated. It has been assumed that this data is fit

for purpose, and that it reflects the current best understanding of flood risk along the study area. The accuracy of this assessment is directly underpinned by (and therefore limited to) the accuracy of these data sources.

2.5 Assumptions

The following assumptions have been made during the course of the technical assessment. These are subject to further consultation with stakeholders and concept design development.

- Rail corridor upgrade infrastructure will be designed for a 6-car train consist (150m) with provision for 7-car train consist (175m)
- Dual tracks require one RMAR
- Type 1 RMAR will be provided where feasible and adjacent land use permits
- Preference is to leave existing rail infrastructure unaffected to maintain Cleveland line operations during construction

2.6 Base information

On 11 May 2017 GHD requested the following information from TMR:

- On track video of the Cleveland Line
- LIDAR survey along the corridor
- Aerial photography along the corridor in GIS and JPEG formats
- Land adjacent to the rail corridor ownership information– notably government owned sites and properties
- DCDB / Cadastre information
- TMR / QR operational requirements. Including any identified preferred infrastructure at stations, Cleveland Station terminus and any additional turn backs and cross overs
- QR standards
- QR existing utilities / signalling information
- QR existing bridge and culvert information, schedules and drawings
- Identification of any major table drains or drainage infrastructure
- Any QR flood information along the corridor
- QR Cleveland Line line diagram
- Any additional TMR requirements or standards i.e. Public Transport Infrastructure Manual
- Any additional scope items to project brief

A further information request was sent on 18 May 2017 for the following;

- Cleveland Line Working Plan and Section drawings or alignment model or survey
- Arrangement Signalling (AS) plans

The following information was received from TMR or QR and used to form the basis for this study.

- Aerial photography (TMR)
- DCDB information (TMR)
- Cleveland Line Working Plan and sections
- QR Arrangement Signalling plans
- EAMS (QR assets management system) output for structures along the route
- QR Standard drawings
- QR Civil Engineering Track Standards
- QR Station Design Guide version 5.0

Information that was not available and that has been supplemented instead with publicly available information or sourced from GHD library sources. Information from the GHD library is uncontrolled and may be outdated or superseded. As such GHD cannot guarantee the accuracy or completeness not validate the appropriateness of this information. This information has been used with appropriate caution and assumptions and caveats have been applied and any identified risks highlighted. This information is listed below:

- QR monumental alignment and survey was not available. GHD developed a 'best fit' approximated alignment using aerial photography for line (horizontal) and LIDAR survey for the levels (vertical).

3. Project details and context

3.1 Existing corridor & rail infrastructure

The Cleveland line between Manly and Cleveland consists of:

- Single electrified track from Manly to Cleveland
- Stations at Manly, Lota, Thorneside, Birkdale, Wellington Point, Ormiston and Cleveland
- Passing Loops at Lota, Thorneside and Wellington Point
- Two holding roads at Manly Station

The track is crossed by the following road over rail bridges:

- Ernest Street, Manly
- Main Road, Wellington Point
- Fernbourne Road, Wellington Point
- Bainbridge Street West, Ormiston
- Gordon Street, Ormiston

QR bridges over roads are located at the following locations:

- Hindes Street, Manly West
- Thorneside Road, Thorneside
- Charles Street, Birkdale
- Birkdale Road, Birkdale
- Sturgeon Street, Ormiston
- Bagden Road, Wellington Point

The current rail corridor has an intermittent rail maintenance access road (RMAR) along the length of the route.

There are four main water courses that cross beneath the rail corridor; these are:

- Lota Creek
- Tingalpa Creek
- Tarradarrapin Creek
- Hilliards Creek

There are several other water crossings beneath the rail corridor: either tributaries that flow into the main Creeks or other overland flows that are not gazetted. These are generally culverted or coincide with existing rail over road bridges.

3.2 Previous studies

The following previous planning studies are relevant to this project:

- South East Queensland Capacity Improvement Study
- Cleveland Centre Master Plan and Implementation Plan
- South East Queensland Strategic Stabling Investigation reports

- South East Queensland Stabling Feasibility Study – Thorneside and Hemmant design Feasibility reports
- South East Queensland Rail Stabling Program – Thorneside feasibility reports

Where information contained within these previous studies has been used, relied upon, quoted or forms the basis of assessment they are explicitly referenced in the relevant section of this report.

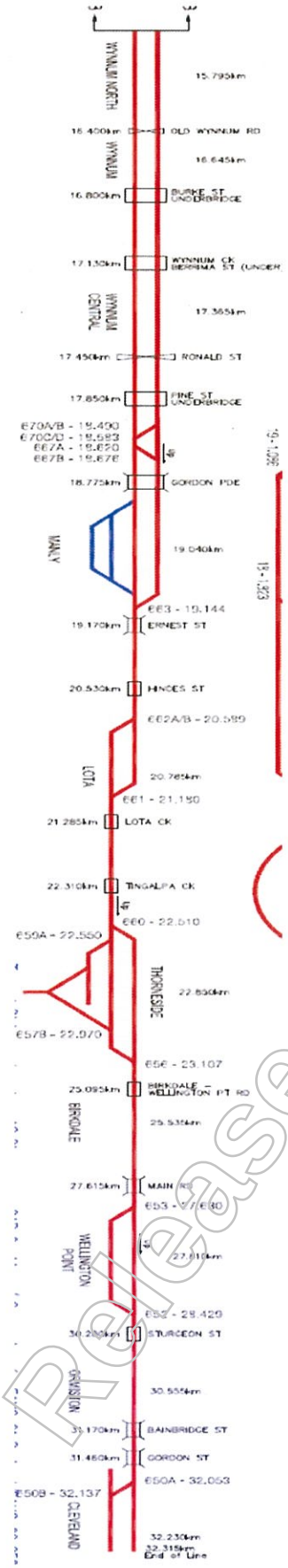
3.3 Related projects

This study has been undertaken independently from the current CRR and ETCS level 2 projects as both are confidential in nature. Therefore, GHD is not able to consider current or ongoing studies by the respective project teams that include the development of SEQ network rail operations including demand forecasting, service patterns modifications and potential infrastructure upgrades. It should be noted that the rewards might affect stabling requirements and infrastructure required along the Cleveland corridor.

When these studies have been completed and results are made available further assessment of what effect these projects will have on the Cleveland Line duplication and stabling requirements will be required. It is recommended that the TMR project team consult with the relevant TMR representative for each project to establish what the effects may be. This is recorded in the Project risk register.

No other projects have been identified that may affect the duplication or stabling requirements.

4. Technical assessment



4.1 General

The Cleveland Line between Manly and Cleveland was reviewed to identify existing infrastructure, constraints and issues along the corridor. The corridor was then assessed by each discipline to determine what the implications of the duplication were and whether the duplication was feasible. This included identifying the impacts, risks and opportunities in addition to the rail infrastructure required to duplicate the Cleveland Line. The following sections describe each discipline assessment of the corridor and likely impacts and feasibility of the duplication.

For ease of reference the QR chainage convention has been approximated from the Cleveland Line line diagram and used as the basis for the project corridor chainage. A Key plan showing the corridor extents, key features and chainage is contained in Appendix A. Typical cross-sections used to assess duplication requirements and potential corridor widening implications are also contained in Appendix A.

A site visit was undertaken on 31st May 2017 to observe structures, notably road-over-rail bridges. Stations that require upgrades and at tie-in points. The site visit also included a corridor train journey to observe general corridor characteristics, clearances and adjacent land uses. This has been used to assess likely impacts, assess physical constraint, prioritise land use types and inform on potential mitigation treatments.

There are generally two options to duplicate the track. • First option is to widening the formation level and earthworks to one side leaving the existing rail track and infrastructure unaffected. The new duplicated track and supporting infrastructure is then installed while the existing track remains in operation. • The second option is to slew the existing track and supporting infrastructure to one side and widen the embankment as required, before installing the duplicated track. This option impacts the existing infrastructure and therefore requires railway processions, extending the construction time frames and adding complexity to the project. Widening structures to accommodate the duplicated track have various options and are subject to location specific constraints. These options have been investigated in Section 4.3.3 with associated constraints, potential impacts and risks identified along the corridor.

4.2 Safety in design

An initial hazard identification exercise has been undertaken commensurate with the strategic level of this assessment. The SiD hazard log documenting all hazards and risks identified to date is contained in Appendix E. During the concept-design development the hazard log will be maintained and updated as required. A risk assessment will need to be undertaken and any control measures identified will be applied to the concept design as appropriate. Where a current control measure cannot be identified or implemented for a given risk these will be transferred to the next design stage for management and control. These will be communicated on the Hazard log as part of the concept design report.

4.3 Rail civil infrastructure

4.3.1 General

The rail corridor was reviewed for existing rail civil infrastructure and an assessment undertaken to establish the requirements for duplicating the existing track and likely impacts.

4.3.2 RMAR

Generally a single type 1 RMAR has been provided at formation level based on QR standard drawings and requirements for the rail lines in the Brisbane Metropolitan system. Where corridor widths are constrained the provision of a continuous RMAR will need to be assessed based on the impacts to neighbouring property against the maintenance requirements for that section of track. Where critical rail infrastructure is located, continuous maintenance access must be provided. Section 4.3.3 below further discusses railway clearance requirements and potential impacts along the corridor.

4.3.3 Rail corridor clearance requirements

Track

The existing track consists of a single narrow gauge (1067 mm) railway between Manly and Cleveland with the exception of passing loops (dual track) at Lota, Thorneside and Wellington Point stations providing access to a second platform face and a passing function for the Up and Down movements.

To enable duplication the existing formation will require widening to provide 6 m track centres, which is the desirable minimum that allows for maintenance on an adjacent track while maintaining operations.

Earthworks and Formation

The majority of the route is on embankment with the exception of where road over rail bridges are located and the alignment goes into cut. For further description on geotechnical characteristics along the corridor refer to Section 4.6. For this early stage of assessment the embankment and cutting slopes of 2H:1V have been adopted as a conservative approach, as shown in QR standard formation drawings, before the precise nature of ground conditions are understood. There is the opportunity to steepen cut and embankments slopes subject to ground investigation along the corridor to confirm geotechnical conditions. This will reduce likely land requirements and extent of retaining structures. A typical embankment widening is shown below in Figure 2.

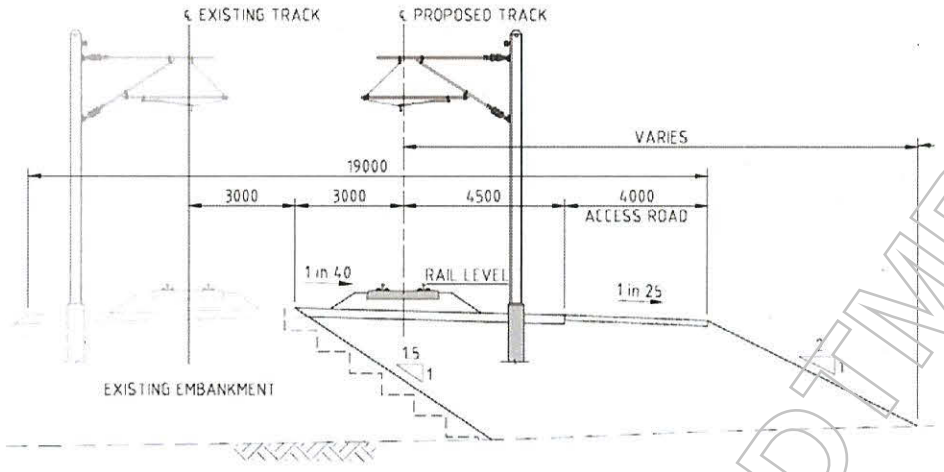


Figure 2 Typical embankment widening cross-section

The rail formation and earthwork cross section must provide for longitudinal drainage. As a minimum the standard size cess drain must be provided along both sides of the rail formation. No additional table drains have been identified but may be required to convey larger over land flows to transverse drainage structure (culverts).

The QR standard track formation drawings (02717 to 02723) set out QR's desirable minimum clearances for a typical rail corridor with no project or site-specific considerations. These prescribe a 6 m clearance from toe of embankment or top of shallow cut (not requiring catch banks) to boundary fence line, and a 10 m clearance from top of a deep cut or toe an embankment on an up slope (requiring catch banks) to boundary fence line.

Corridor Assessment

Given this section of the rail corridor runs through urban to suburban areas with significant land use value flanking large portions of the corridor, mitigation treatments or relaxations to the standard cross-sections should be considered to reduce the corridor width providing maintenance and drainage functions can be satisfied.

Figure 3 shows the initial assessment of duplication requirements along a section of the rail corridor running through the suburban area just south of Manly Station. The corridor extents shown are based on providing desirable clearances using standard earthworks profiles. This initial assessment was undertaken to identify areas where land impact could be significant (extents and land use value) and where treatments to narrow the corridor should be considered.

Not Relevant

Figure 3 Indicative duplication corridor extents south of Manly Station

It should be noted that the existing corridor clearance from earthworks to boundary fence on the western side of the rail corridor is reduced to 3 m in some areas. Any relaxations that are proposed during the concept design development will include appropriate and robust justification based on a range of factors including maintenance access, safety, operations, land use and drainage. Relaxations will be consulted with TMR and QR who will need to confirm they are accepted before being adopted in future design stages.

In large sections of the corridor the existing embankments are wider than the desirable minimum required for a single track. This would suggest that some provision has been made for the future duplication of the line. This reduces the width of embankment widening required and therefore reduces the extent of corridor widening and land impact. The extent of corridor widening required will be determined during the concept design and this will identify potential land and property impacts.

In order to minimise impacts to existing rail infrastructure and operations during construction the duplication would be generally applied to the west of the corridor, leaving the existing track in-situ, unaffected by the duplication. During concept design, where localised narrowing of the existing corridor or land use constraints reduce the available corridor width, will explore slewing of existing infrastructure to help mitigate land impacts. However, slewing the track has significant disadvantages as it requires track closures, will affect existing rail infrastructure; may require embankment and formation widening on both sides of the track and requires additional infrastructure expenditure on slewed OHLE and gantries. A typical cross section of how duplication can be applied by slewing the existing track is shown in Figure 4.

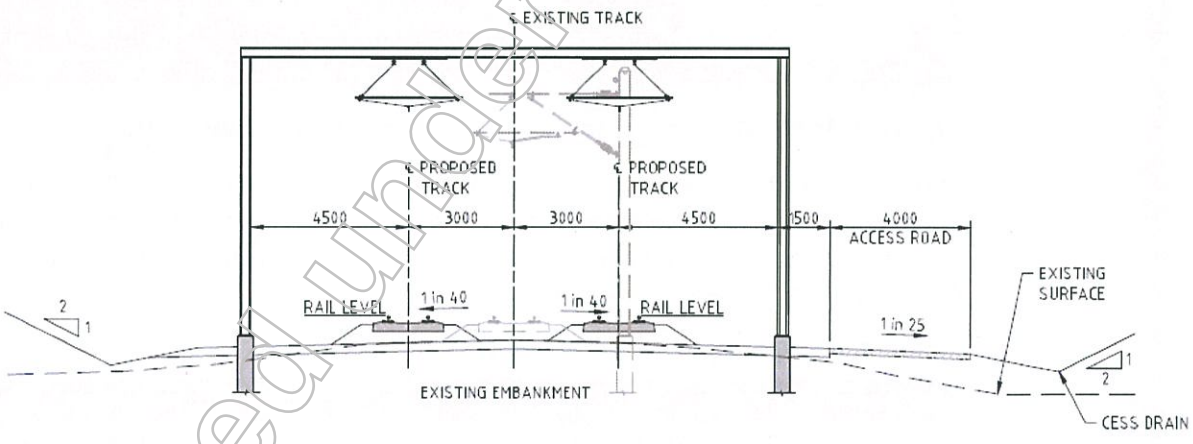


Figure 4 Duplication with slewing of existing track

Where the corridor is significantly constrained, including high value land use adjacent to the corridor, alternative options may have to be considered to mitigate land and property impacts of the duplication, including use of retaining walls or reduction in the railway corridor cross section. There is a balance to be met between minimising impacts of the duplication along the corridor while providing for safe, efficient and desirable railway operations and maintenance functions. At this early planning stage of the project development life cycle it is advisable to use the desirable minimum railway corridor clearances and cross sections in the first instance to provide a desirable and robust corridor envelope. Where sections of the corridor are significantly constrained opportunities to reduce the cross-section will be identified. The future Preliminary Evaluation stage of the PAF process will further investigate opportunities to balance competing requirements of rail infrastructure functions, impacts and corridor constraints.

Project typical cross sections, contained in Appendix A, provide for all functions and clearances prescribed in the QR standard track formation drawings. These have been used to inform the

rail corridor assessment of duplication requirements and corridor widening implications. These will be updated during concept design to reflect any opportunities to limit impacts to adjacent land uses that are identified.

Figure 5 below shows the indicative duplication corridor extents through Wellington Point based on providing desirable clearances using the standard earthworks profile. In this area near the Wellington Point Wetlands the land impact is less significant (extents and land use value) and therefore use of earthworks with acquisition rather than a retaining structure may be considered preferable.

Figure 5 Indicative corridor extents through Wellington Point

Table 1 below identifies locations along the corridor with constrained widths along with potential treatments that will be developed during concept design. The hierarchy of these treatments and how they are applied along the corridor will be agreed with TMR and assessed/workshopped jointly during the concept design phase.

Table 1 Constrained corridor widths

Ch. (m)	Constraint	Potential Treatments
19,160 – 19,850	Properties	Slewing with retaining wall
19,850 – 20,050	Bushland	Land Resumption
20,050 – 20,300	Properties	Retaining Wall
20,945 – 20,995	Shed/Industrial Building	Retaining Wall
20,995 – 22,180	Bushland	Land Resumption
22,400 – 22,650	Bushland	Land Resumption
22,990 – 23,145	Bushland	Land Resumption
23,200 – 24,830	Bushland, near road	Retaining Wall
24,880 – 24,990	Bushland, near road	Retaining Wall
25,450 – 25,750	Bushland	Land Resumption
25,800 – 26,100	Properties	Retaining Wall
26,100 – 27,300	Bushland	Land Resumption
27,300 – 27,600	Properties	Retaining Wall
27,640 – 28,150	Properties	Retaining Wall
28,150 – 30,250	Bushland	Land Resumption

Ch. (m)	Constraint	Potential Treatments
30,300 – 31,100	Road	Retaining Wall
31,150 – 31,480	Industrial	Retaining Wall
31,480 – 32,015	Industrial	Retaining Wall

4.3.4 Stations

All the stations along the corridor have island platforms and dual track (passing loop) with the exception of Ormiston and Birkdale stations. All stations currently provide for 6-car train consists (150 m long). Stations with dual track and two platform faces do not require any works as part of the duplication. However, there is the opportunity of upgrading the existing stations along the corridor by providing better cross-corridor connections, removing curved platforms and providing fully compliant equitable access.

Ormiston and Birkdale stations both require upgrading as part of the duplication. These upgrades will include the addition of a platform, pedestrian footbridge and lift access, and dual track. A typical cross section of a station upgrade with a new side platform and footbridge with lift access is shown below in Figure 6.

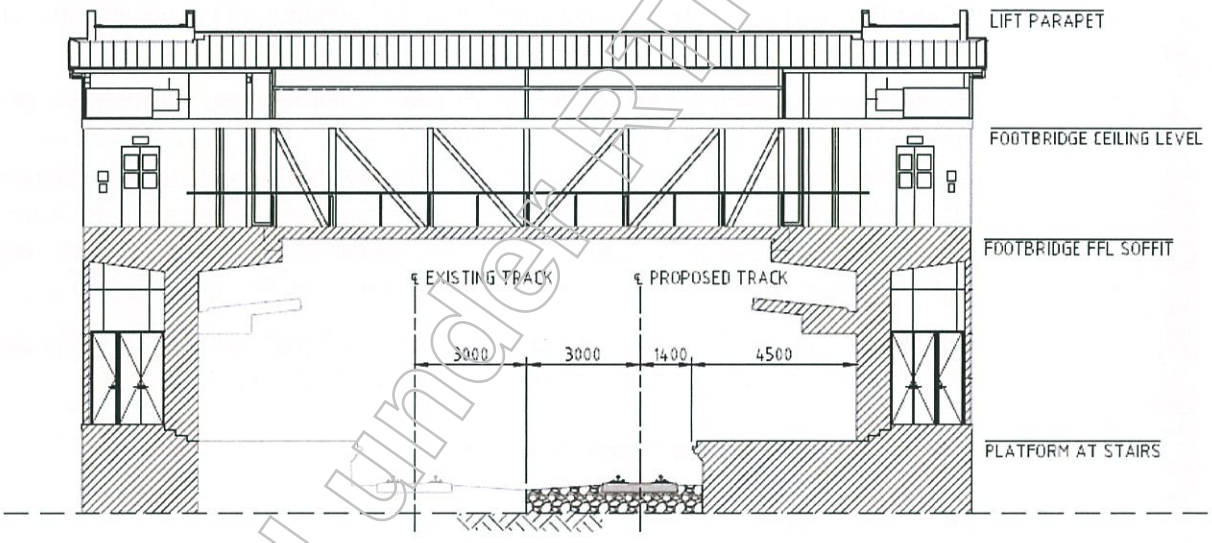


Figure 6 Typical station upgrade cross-section

From discussion with the QR operations team and GHD's operations' assessment, the preferred platform arrangement for Ormiston and Birkdale stations is the addition of a side platform. The advantages are:

- Utilises existing side platforms and rail infrastructure, minimising construction of new infrastructure
- Makes best use of available land minimising corridor widening
- Commuters only need to cross the tracks once either in the AM or in PM peak
- Rail alignment geometry can remain consistent through the station and does not need to diverge around an island platform
- Maintenance access to the platform is achievable without crossing a live railway
- Naturally provides for cross-corridor connections
- Legibility for passenger's wayfinding with a dedicated inbound and outbound platform
- Only require 2 lifts to provide cross corridor connections (island platform require 3)

Birkdale

Birkdale Station lies at QR Chainage 35,520 m and has a single side platform to the north side of the track. Birkdale Station includes a small station building, shelter over the platform core zone and a park and ride facility, all located on the northern side of the rail corridor. The south of the rail corridor has approximately 10 m of verge before its boundary with a landscape buffer to residential dwellings.

The additional platform should take the form of a side platform and be positioned to the west side of the rail corridor in the existing verge. This provides for ease of duplication, minimises impacts to existing rail infrastructure, minimises land take and property impacts, and existing operations can be maintained during construction.

The provision of an additional side platform will be developed during the concept design and this will determine corridor requirements and likely impacts (if any).

Ormiston

Ormiston lies at QR Chainage 30,550 m and has a single side platform to the eastside of the track. Ormiston Station includes a small station building, shelter over the platform core zone and a park and ride facility, all located on the eastern side of the rail corridor. The west of the rail corridor has approximately 14 m of verge before its boundary with public highway and Northern Arterial Road.

The additional platform will be a side platform and be positioned to the west side of the rail corridor in the existing verge. There is a grade difference with the existing station platform and railway on embankment and the verge and road below. The new platform would require a retaining wall or reinforced earth structure to mitigate impacts on the Northern Arterial Road. This provides for ease of duplication, minimises impacts to existing rail infrastructure, minimises land take and property impacts, and existing operations can be maintained during construction.

The provision of an additional side platform will be developed during the concept design and this will determine corridor requirements and likely impacts (if any).

4.4 Land use and environment

4.4.1 General

GHD followed TMR's EPM (2013) and adopted TMR's environmental scoping report (ESR) template to document results of an environmental and cultural heritage assessment including predicting the level of impact and determining the level of future environmental assessment and input. The full ESR and search results is contained in Appendix B.

4.4.2 Database searches

GHD conducted a desktop assessment to gain a preliminary understanding of the mapped environmental values present within and in close proximity to, the proposed duplication corridor. The desktop assessment involved querying the following databases:

- Australian heritage database, Queensland Heritage Register, Brisbane City Council and Redland Shire Council Planning Scheme heritage overlay mapping
- Aerial photography
- Brisbane City Council Online Mapping Services
- South East Queensland (SEQ) Koala Conservation State Planning Regulatory Provisions (SPRP) koala habitat mapping and SEQ State Planning Policy (SPP) koala habitat mapping

- Department of Environment and Heritage Protection (EHP) Protected Plants Flora Survey trigger mapping (EHP, 2016)
- Department of Infrastructure, Local Government and Planning (DILGP) Development Assessment (DA) Mapping
- DILGP State Planning Policy (SPP) interactive mapping system
- Department of Natural Resources and Mines (DNRM) Regulated Vegetation Management Mapping version 8.0 (NRM, 2016)
- Department of Science, Information Technology and Innovation's Wildlife Online Database (DSITI, 2016)
- DNRM Essential Habitat data, version 4.7 (DNRM, 2016)
- DNRM Regulated Vegetation Management Mapping (DNRM 2017)
- Matters of State Environmental Significance Mapping (MSES)
- Queensland Globe
- Queensland Herbarium Regional Ecosystem (RE) Description Database (Queensland Herbarium, 2016)
- Queensland Waterways Waterway Barrier Works Stream order (DAFF 2016)
- Redland City Council Planning Scheme
- Redland Council Online Mapping Services (e.g. Acid Sulfate Soils Overlay Map)
- The Department of Aboriginal and Torres Strait Islander Partnership - Aboriginal cultural heritage search
- The Department of the Environment and Energy's (DEE) EPBC Act Protected Matters Search Tool

An options analysis was not undertaken, as at this stage, there is only a single option to duplicate the rail line along the existing rail corridor.

The ESR has identified key environmental factors for consideration in the project's development. These have been given a risk rating (low, medium or high) as defined by TMR's EPM.

The ESR has also identified potential and likely approval requirements that will be triggered by the proposed project.

4.4.3 Assessment summary

A summary of high risk elements with the recommendation for further assessment is included in Table 2 below. More detail on these elements and potential and likely approval requirements are provided in the ESR contained in Appendix B.

Table 2 Issue summary of risk elements requiring further assessment

ISSUE	RISK	RECOMMENDATION/S
Watercourses – the project crosses a number of watercourses including Hilliards Creek, Tarradarrapin Creek, Tingalpa Creek and Lota Creek.	High	REF to investigate the potential impacts on waterways and the downstream Moreton Bay Ramsar Wetland. Implementation of a water quality monitoring program at REF stage is envisaged in order to collect background data.
Wetlands – the project has the potential to directly impact four areas of mapped Matters of State	High	REF to investigate the potential impacts on wetlands.

ISSUE	RISK	RECOMMENDATION/S
Environmental Significance (MSES) High Ecological Significance (HES) wetland and indirectly impact downstream HES and the Moreton Bay Ramsar Wetland (MNES).		A determination of whether there is a significant residual impact on the MNES and MSES wetlands needs to be made in accordance with the Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE 2013) and Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009 (DSDIP, Dec 2014) respectfully. The MNES assessment will determine whether referral under the EPBC Act is required. These assessments will help identify whether offsets are required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy.
Acid sulfate soils – potential disturbance of acid sulfate soils during construction as a result of excavations.	High	REF to investigate presence of acid sulfate soils.
Flora and fauna – potential impacts on flora and fauna listed as Matters of National Environmental Significance (MNES) and protected plants under the Nature Conservation Act 1992 (NC Act) as a result of alignment location.	High	A determination of whether there is a significant residual impact on the MNES and MSES wetlands needs to be made in accordance with the Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE 2013) and Significant Residual Impact Guideline for matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009 (DSDIP, Dec 2014) respectfully. The EPBC Act referral guidelines for the vulnerable koala (DotE, 2014) will also need to be addressed when undertaking the self-assessment. Flora and fauna assessment surveys may need to be undertaken to help inform the self-assessment. The MNES assessment will determine whether referral under the EPBC Act is required. These self-assessments will identify whether offsets are required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy. A protected plants survey in accordance with the Flora Survey Guidelines – Protected Plants (EHP, Dec 2016) will need to be undertaken for the areas of the alignment that are within the flora survey trigger area (and the 100m buffer area). Exempt clearing notification (when no protected plants are identified) must be made within one year of undertaking the protected plants survey. Animal breeding places to be identified during field survey.
Flora - Marine plant disturbance as a result of the Project footprint.	High	REF to investigate presence of marine plants.
Contaminated Land – potential to impact contaminated land during excavation works.	Medium	REF to investigate presence of contaminated land.

ISSUE	RISK	RECOMMENDATION/S
Cultural heritage – potential to impact Aboriginal cultural heritage as a result of the Project construction.	Medium	Conduct a specialist review of the duty of care guidelines requirements (the Cultural Heritage Duty of Care Guidelines are currently under review with DATSIP intending to release draft revised Guidelines by 28 July 2017). Cultural Heritage clearance to be sought with the relevant Aboriginal parties.

4.5 Flooding assessment

4.5.1 General

The duplication will require widening of the existing railway embankment, with potential implications to the current flood risk.

A preliminary assessment was completed to evaluate the potential flood risk impacts on adjacent properties and other surrounding areas due to the proposed upgrade works.

4.5.2 Approach

A high-scale assessment of flood risk was carried out, with the aim of identifying potential problematic areas when undertaking the railway upgrade works. As such, the assessment performed followed a qualitative approach, i.e. no calculations or flood modelling were undertaken.

The flood assessment focused on cross drainage structures (culverts and bridges). It has been assumed that existing local drainage (i.e. table and cess drains) arrangements that convey flow to the cross drainage locations will be maintained where possible. Where the widening of the existing track formation obstructs existing local drainage features, it has been assumed that relevant drainage modifications will be incorporated in subsequent design developed. The corridor assessment has made provision for longitudinal cess drains within the typical cross sections applied along the corridor to determine corridor impacts. Corridor clearance requirements, including typical cross-sections with provisions for longitudinal cess drains, is further discussed in Section 4.3.3.

4.5.3 Study area

The study area spans across both the Redland and Brisbane city councils, separated by Tingalpa Creek. The entire duplication area is located on low-lying ground near Moreton Bay, with large areas subject to storm-tidal flows. Figure 7 below shows the study area of the flood assessment.

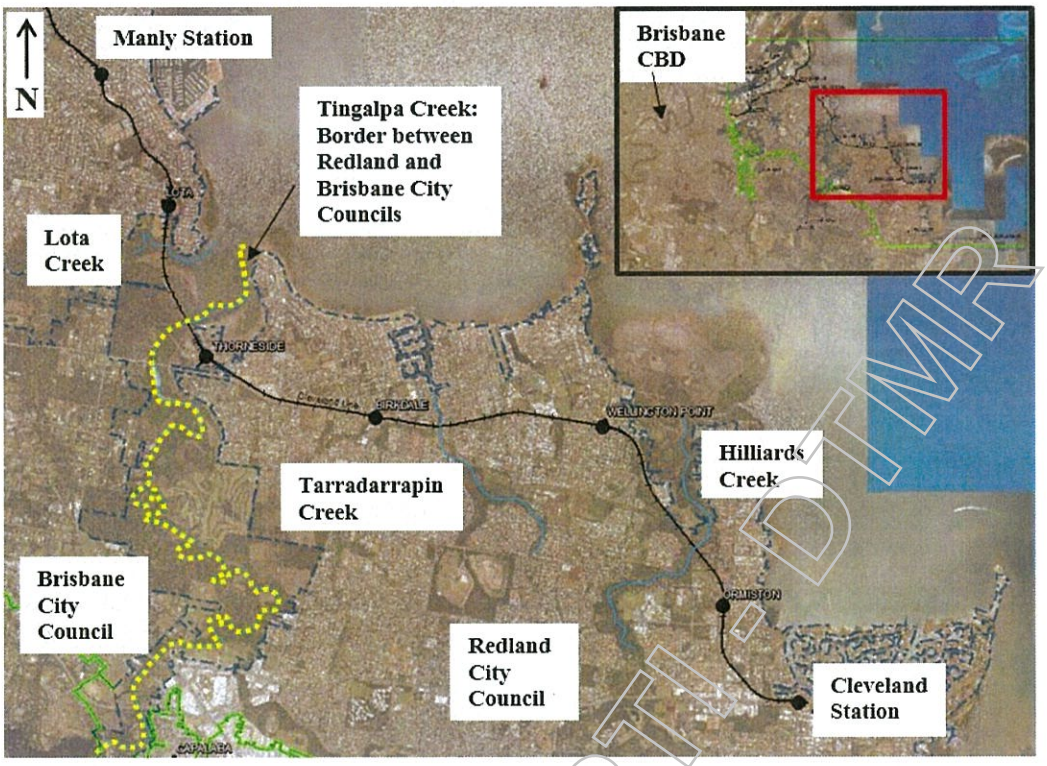


Figure 7: Study area for flood assessment

4.5.4 Data

The following data sources were used for assessing the potential impacts of the duplication.

The BCC Flood Awareness map was used to determine regions along the northern section of the duplication corridor located within the BCC boundaries that are subject to flooding risk. Flood risks are mapped for a range of events between five percent Annual Exceedance Probability (AEP) and 0.05 percent AEP. This was used for the rail line between Manly Station and Tingalpa Creek (border between councils), north-west of Thorneside Station. Data is available at http://floodinformation.brisbane.qld.gov.au/fio/ (last accessed June 2017)

For the section of the railway that lies within the Redland City Council (South of Tingalpa Creek), the publicly available flood prone and storm tide area overlay map was initially used to identify the flood-prone area extents along the corridor highlight any key sections that may be of issue. Flood risk are mapped for a one percent AEP event, for both fluvial and tidal sources. This data is available at: http://gis.Redland.qld.gov.au/redemap/default.aspx (last accessed June 2017)

Once flood prone areas were identified, a LiDAR derived 5m gridded Digital Elevation Model (DEM) (Geoscience Australia, 2015) was consulted to determine main overland flow paths; sections prone to ponding effects as well as general flooding hazards in these areas. For more information on this data source, refer to: http://www.ga.gov.au/metadata-gateway/metadata/record/gcat_22be4b55-2465-4320-e053-10a3070a5236/ (last accessed June 2017)

4.5.5 Existing case assessment

Four major creeks lie within the study corridor: Lota Creek, Tingalpa Creek, Tarradarrapin Creek and Hilliards Creek (refer to Figure 7). Although significant sections in close proximity to these water systems experience storm tide flows or are flood prone, the vast extent of these affected areas are mangroves or vegetative areas. Despite this, there are long reaches of existing rail that lay in flood prone areas. Should floodplain storage be reduced in these areas, possible

undesired afflux effects may be caused on residential land, or critical infrastructure areas. The rail crossings over each of the four aforementioned creeks were examined in greater detail to assess the risk imposed by possible constriction of these channels by the rail duplication.

The presence of these creeks provides efficient drainage to the majority of the study corridor, with most of the low-lying areas lying in close proximity to these waterways. Overland swales or concrete channels provide drainage to the remainder of the area, with these predominantly draining back to these creeks or in some cases directly to the bay. Minimal ponding is therefore expected in the study area. However, there are some areas where local ponding is currently observed.

Based on the data analysed, the existing rail alignment is considered to have a flood immunity of at least one percent AEP. Further catchment flood modelling is required to confirm the exact immunity levels of the rail and formation levels.

4.5.6 Flooding impacts considered

Two possible negative impacts to flood risk may arise as a result of widening the rail corridor:

Loss of floodplain storage:

Where the new rail embankment encroaches on current flood zones, a reduction in floodplain storage volume may cause an increase in flood water levels (afflux) for the surrounding regions (usually upstream). A typical solution is to restore part of this lost volume through allocating compensatory storage in the vicinity of the affected area.

Increased energy losses:

Widening the rail line may require a redesign of the culverts and flow channels currently in use. When the flood waters are forced through a constriction (a section narrower than the natural flood plain or creek channel), hydraulic energy losses are induced, and an increase in upstream water levels. The larger the constriction of flow, the more energy losses are induced. Additionally, extending existing culverts will generate an increase in hydraulic energy due to friction (Manning's roughness induced losses).

Typical mitigation strategies include increasing the capacity of the crossing by adding additional culvert barrels (where possible), or reducing tailwater effects by channeling works downstream of the culvert. Further contraction of the flow can additionally lead to the choking of a channel, which can result in the afflux being larger than expected due to ponding effects.

Critical locations along the rail corridor, in particular major creek crossing points and key flood-prone areas, were assessed in higher detail considering these two potential implications of widening the rail line.

4.5.7 Proposed case assessment

Major crossings

The rail crossings over the four creeks shown in Figure 7 were analysed to determine risks of afflux caused by widening the rail corridor or any narrowing of the crossing channel caused by the development. Duplication chainages are used in the analysis, for ease of reference.

Ch. 21,285 m: Lota Creek rail bridge

There is an existing high flood prone area upstream of the existing crossing, with residential properties (circled in red) having a high likelihood (five percent AEP) of flooding. Widening the corridor west of the existing track may reduce floodplain storage, which in turn could increase the flood risk of these properties. Similarly, a reduction in the hydraulic conveyance of the existing bridge (due to increase inlet energy losses or extra roughness induced energy losses)

could increase the flood risk of the properties currently affected or put new properties at risk of flooding.

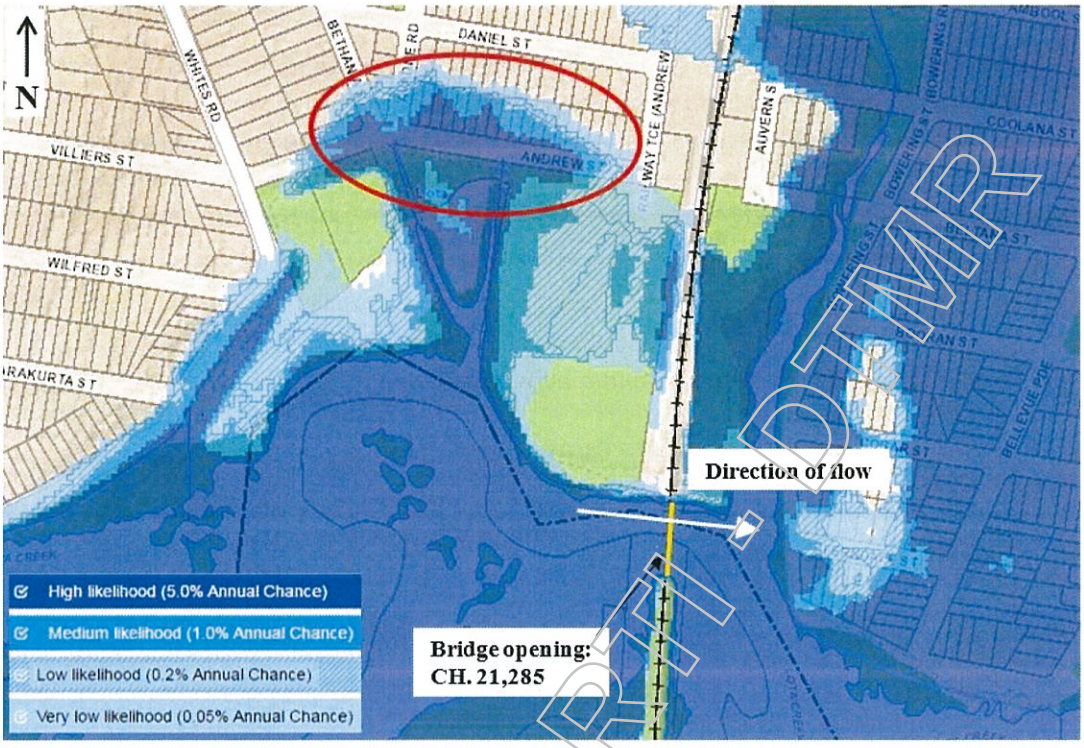


Figure 8: Existing Flood Mapping of Lota Creek rail bridge crossing

Ch. 22,310 m: Tingalpa Creek rail bridge

No residential properties lie in flood prone areas directly upstream of the existing rail line, whilst the nearby water treatment plant lies on elevated land. However, potential afflux effects due to the reduction of floodplain storage, or an increase in hydraulic energy losses due to an extension of the current Tingalpa Creek Bridge may need to be assessed in further detail, to verify that the performance of the treatment plant is not affected.

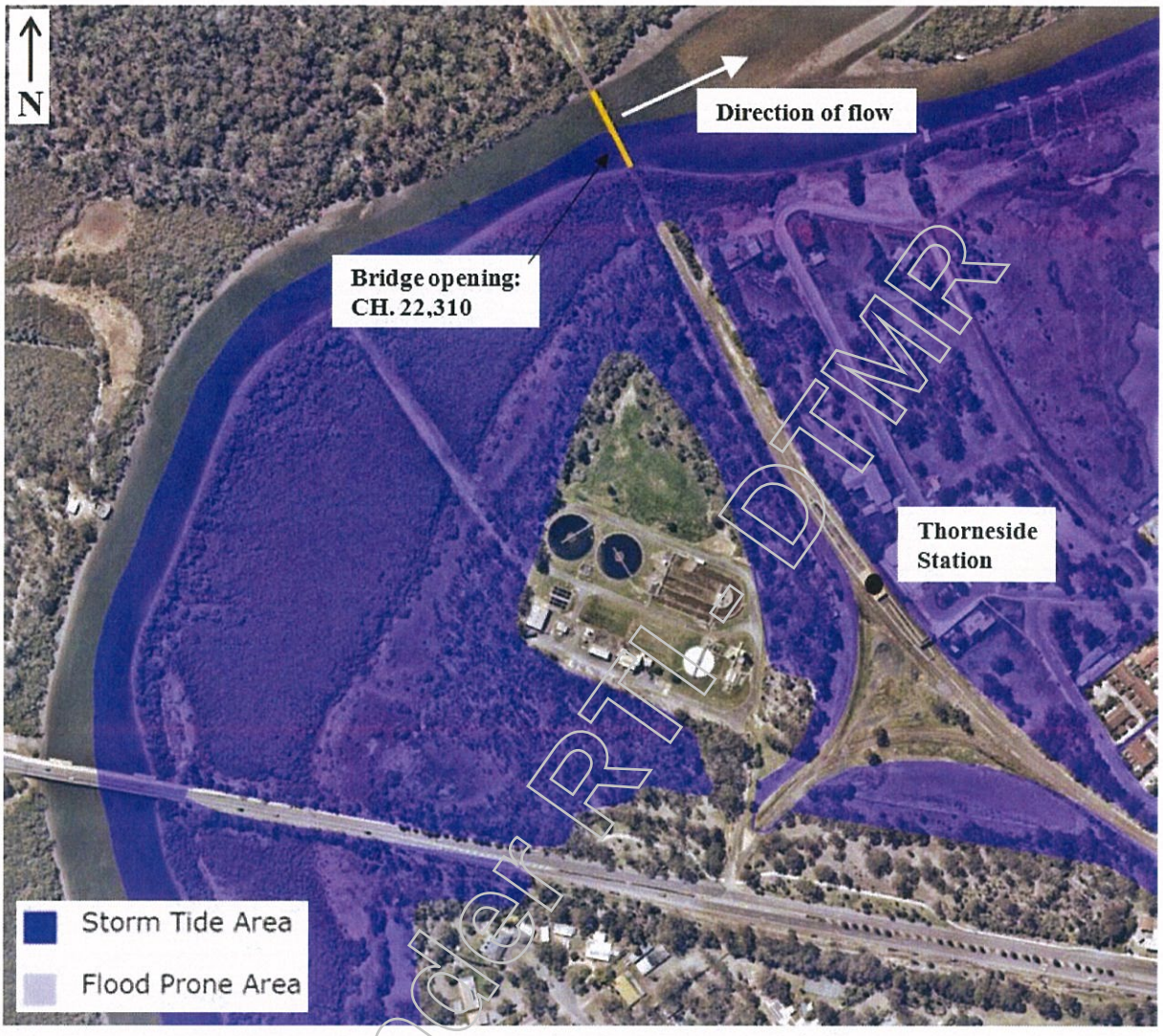


Figure 9: Existing flood mapping of Tingalpa Creek rail bridge crossing

Ch. 25,760 m Tarradarrapin Creek

In the vicinity of the rail line, the Tarradarrapin Creek is mostly contained in a concrete channel (see Figure 10). Despite a flood prone area downstream (shown), this is limited to the parkland area adjacent the creek. Steep banks separate the channel from the residential areas that lie on higher ground, which will minimise the risk of afflux caused by the project affecting any properties.

Figure 10: Existing flood mapping Tarradarrapin Creek rail bridge crossing

Ch. 29,575 m: Hilliards Creek rail bridge

A large flood prone area exists along a 700 m section of the existing railway. Although the majority of this affected area is mangrove, parkland area or sports field, this impact extends into a residential area, circled in red in Figure 11. The expansion of the rail embankment may cause an important reduction of floodplain storage, which could cause material afflux effects upstream of the crossing. Hydraulic modelling of the area would allow a numeric estimation of the extents of these impacts.

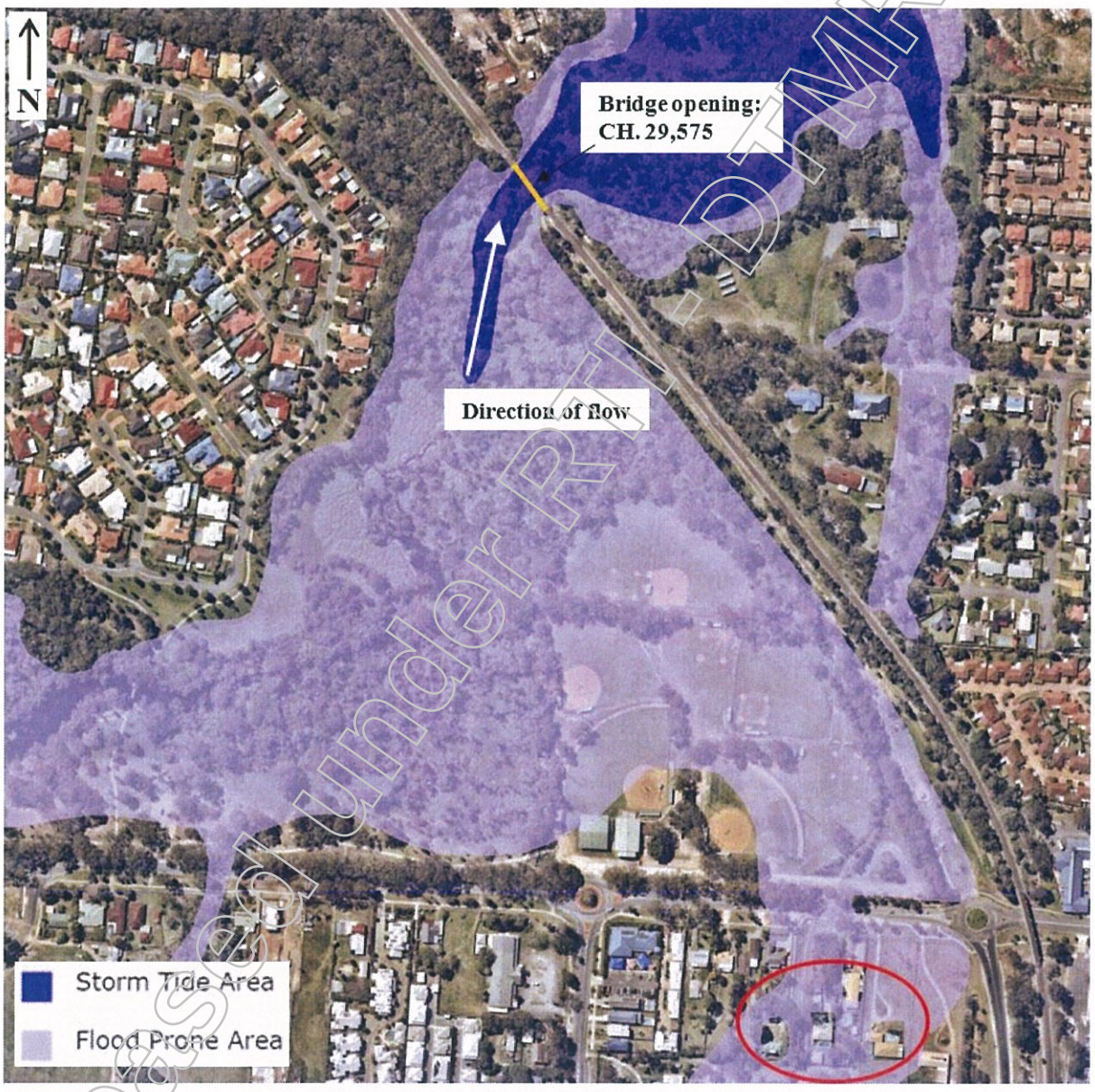


Figure 11: Existing flood mapping of Hilliards Creek rail bridge crossing

Brisbane City Council Area: Ch. 18,775 m to Ch. 22,310 m

Following the assessment of the major watercourses, other flood prone, low-lying areas subject to overland flows were identified within the Brisbane City Council area. An assessment of likely impacts of the duplication on each location identified was undertaken. The potential impacts are described below.

Ch. 19,000 m: Manly Station

Existing case: A low point currently exists at Manly station, with some localised ponding immediately to the East of the station (refer Figure 12).

Possible impacts of duplication: Expansion of the line could remove this flood storage volume, causing afflux for surrounding properties. This impact would be minimised (or altogether avoided) if the new rail line ties in with existing track at Southern end of the station as the duplication widening would be outside of the one percent AEP flood event.

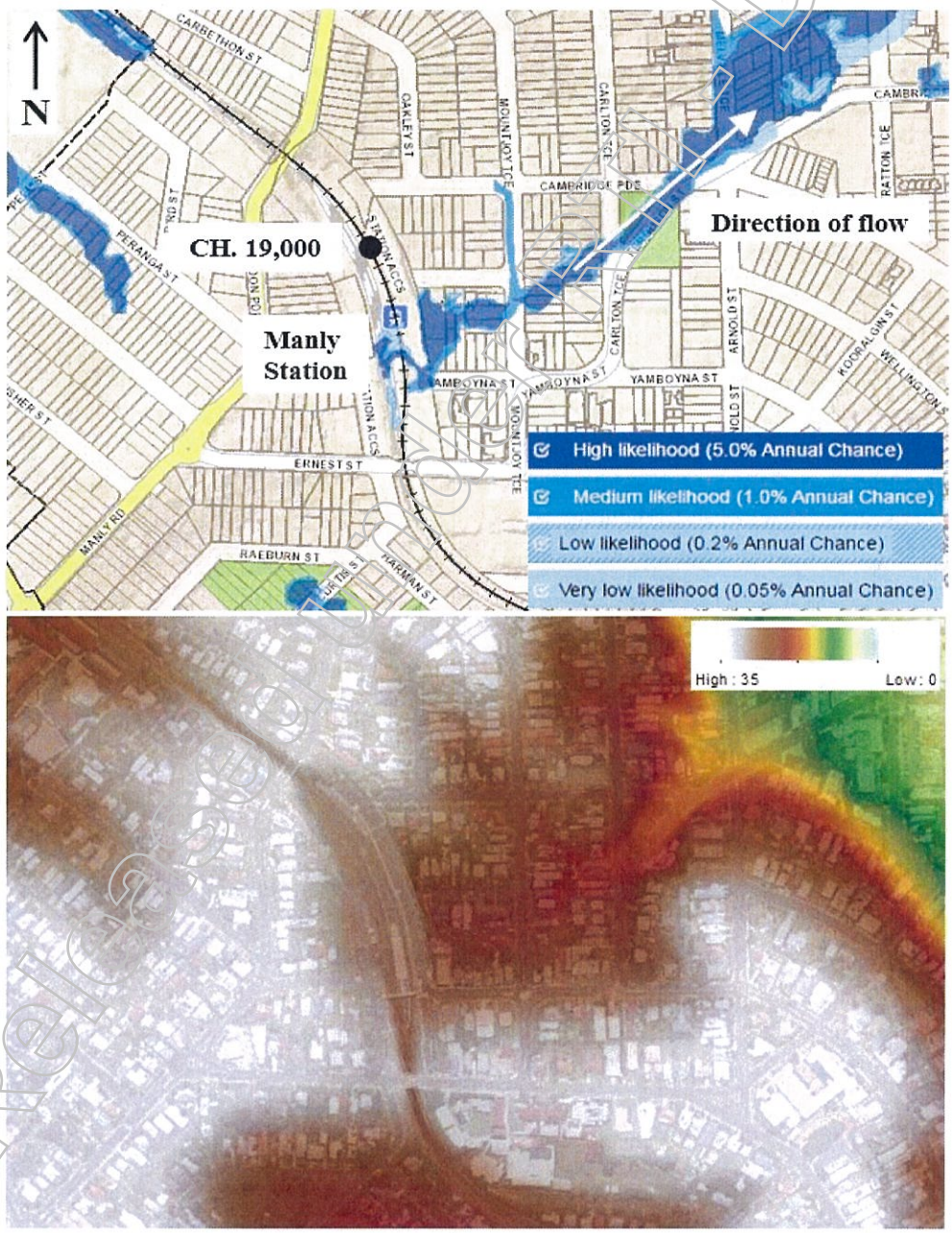


Figure 12: Ch. 19,000 m Manly Station. Top: existing flood extents. Bottom: DEM

Ch. 20,000 m to Ch. 21,285 m: Areas surrounding Lota Creek and Lota station

Existing case: A flood prone area surrounds Lota station extending south to Lota Creek. An overland drainage system exist in the area draining flow towards Lota Creek (see Figure 13), which is the primary source of flooding in the area. The majority of area affected is mangrove or parkland.

Possible impacts of duplication: Widening the rail corridor may reduce areas of flood storage where flood extents currently reach the base of the embankments. Additionally, a reduction in the conveyance of the crossing at approximately Ch. 20,500 m may induce an increase in flood risk for surrounding areas, some of which are residential properties.

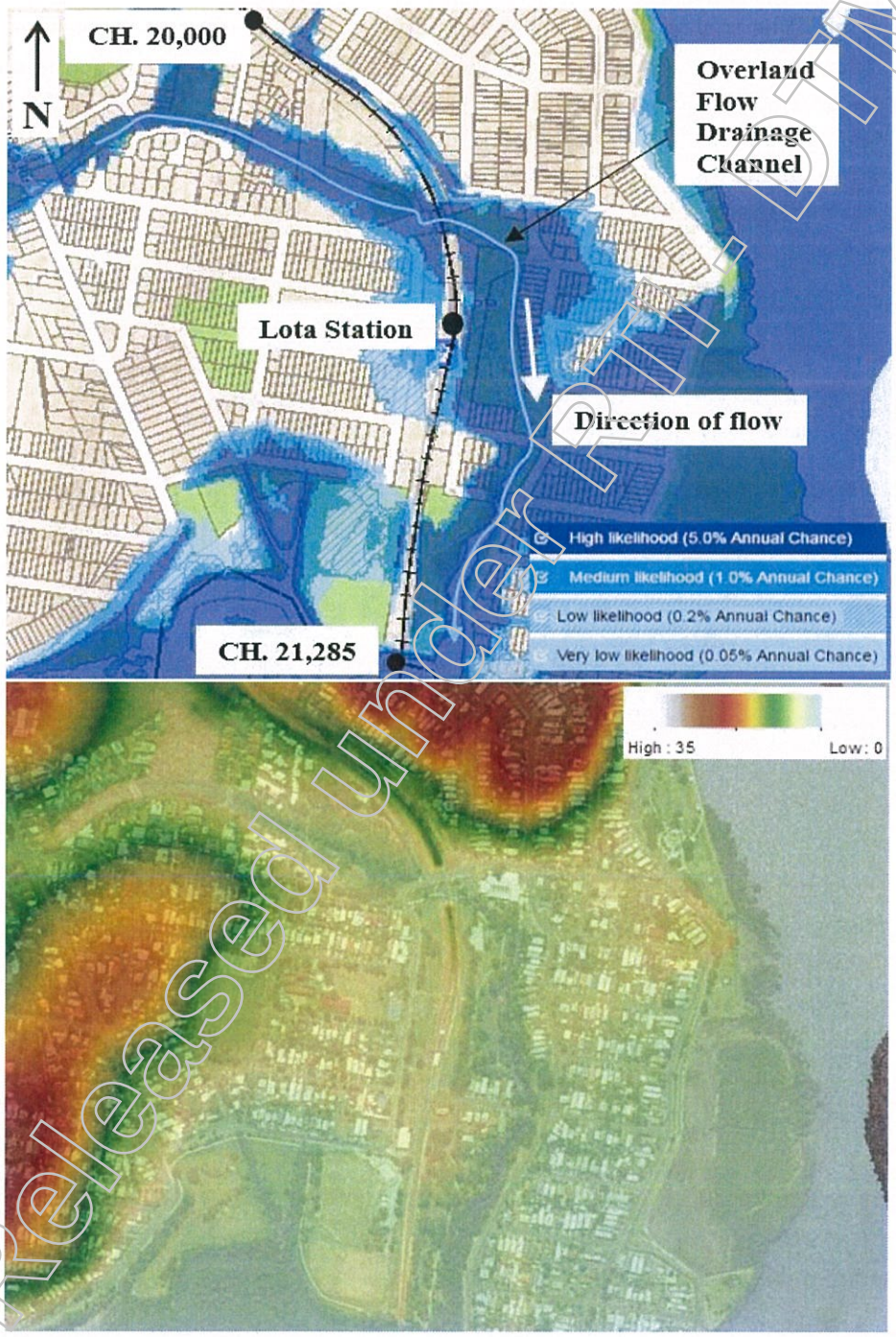


Figure 13: Lota Station, Ch. 20,000 m to Ch. 21,285 m. Top: existing flood extents. Bottom: DEM

Redland City Council Area: Ch. 22,310 m to Ch. 32,325 m

Following the assessment of the major watercourses, other flood prone, low-lying areas subject to overland flows were identified within the Redland City Council area (refer to Figure 14). An assessment of likely impacts of the duplication on each location identified was undertaken. The potential impacts are described below.

Ch. 31,800 m to Ch. 32,000 m: Flooding near Shore Street West

Existing Case: A large area south of the existing rail line is currently prone to storm tides and flooding. No residential lots affected, with flooding limited to vegetated area or swale locations.

Possible impacts of duplication: Loss of floodplain storage due to corridor widening is expected to have little impact on flood risk, as the area between the existing rail line and Shore Street West is currently not impacted by flooding. A reduction of the conveyance of the current culvert providing drainage under the rail line could cause important upstream afflux effects, which could encroach on to the residential areas bordering the current flood extents.

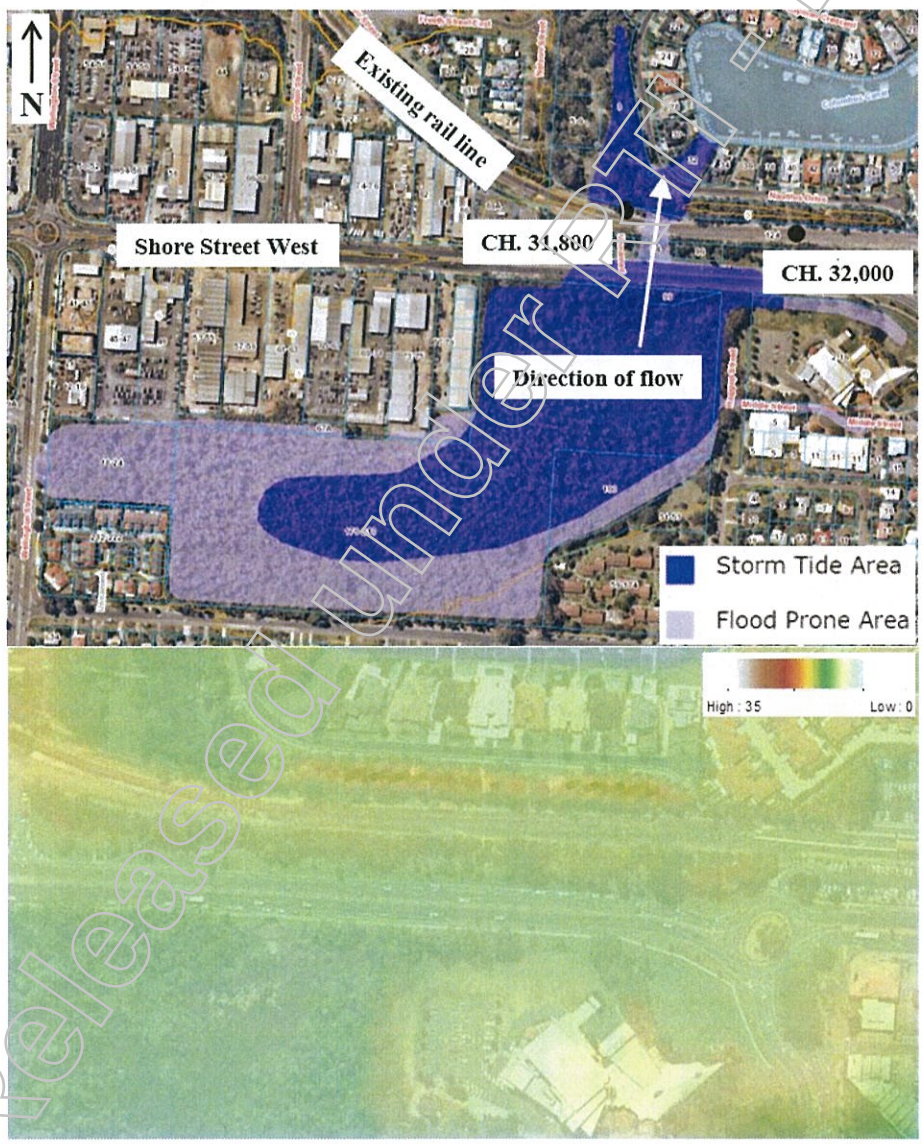


Figure 14: Ch. 31,800 m to Ch. 32,000 m Top: existing flood extents. Bottom: DEM

Ch. 28,150 m to Ch. 30, 350 m: Area between Ormiston and Wellington point Stations

Existing Case: The rail line runs along a low-lying, flood prone area (refer to Figure 15): These areas are predominantly mangrove/vegetated areas, with minimal households impacted in these mapped areas. Possible ponding west of the corridor.

Possible impacts of duplication: Removal of floodplain storage could induce afflux to encroach on residential properties that are in close proximity to the current flood prone areas. Key areas with residential zones bordering current flood extents are circled (red).

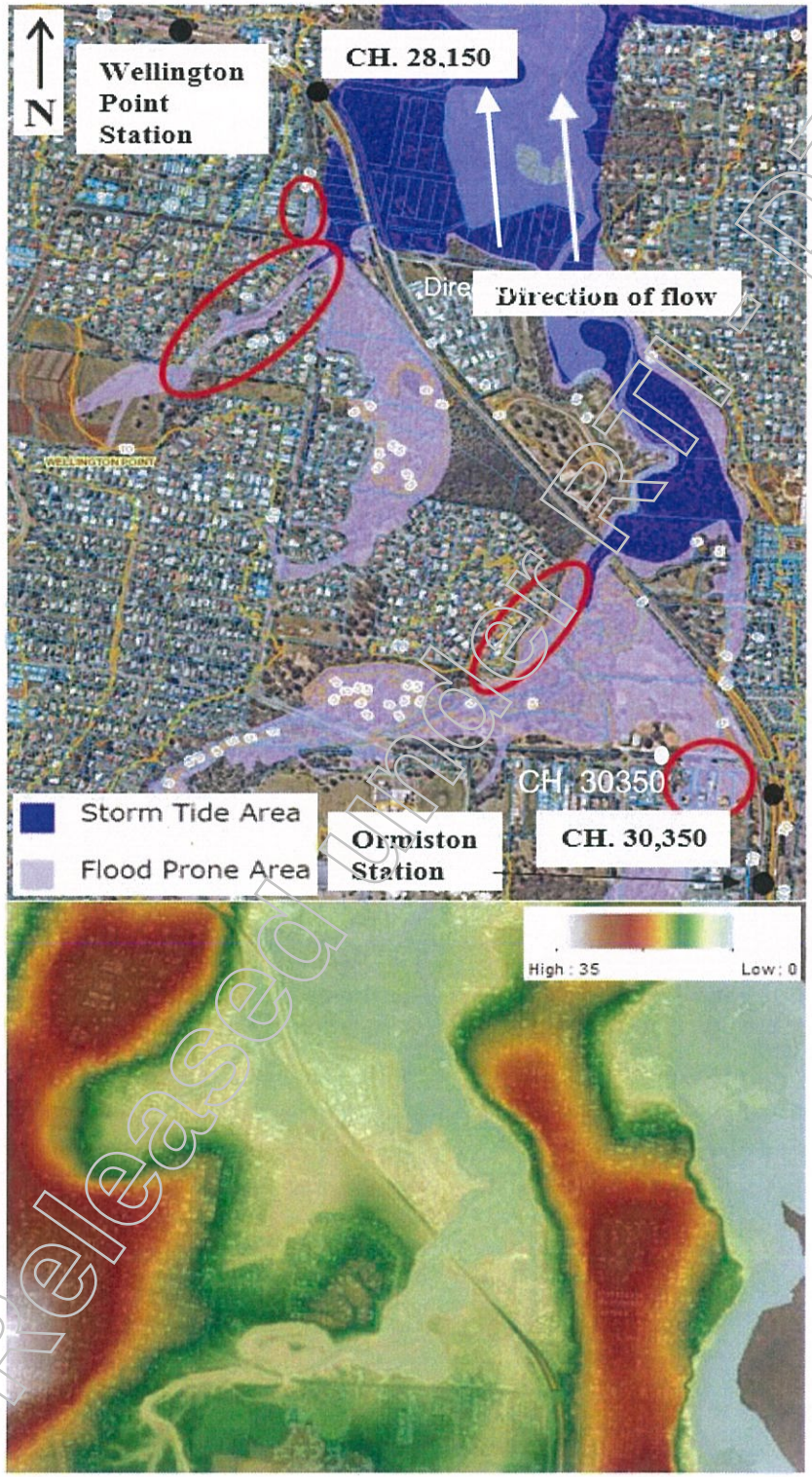


Figure 15: Ch. 28,150 m to Ch. 30,350 m. Top: existing flood extents. Bottom: DEM

Ch. 27,200 m: Redland College

Existing Case: Low-lying ground north of the current rail line (refer to Figure 16). Current flood extents already encroach onto school grounds. As mentioned previously, low-lying area south of the rail corridor is prone to possible ponding.

Possible impacts of duplication: Removing floodplain storage north of the rail line is unlikely to cause a significant increase in flood risk at the school, as flood waters are likely to expand to the right (eastern) floodplain, due to relative terrain levels. Potential increases to energy losses at the culvert under the rail line may cause some afflux upstream, however there seems to be a buffer zone between the current flood extents and residential properties (additionally, these properties are located on higher ground respective to the flow path).

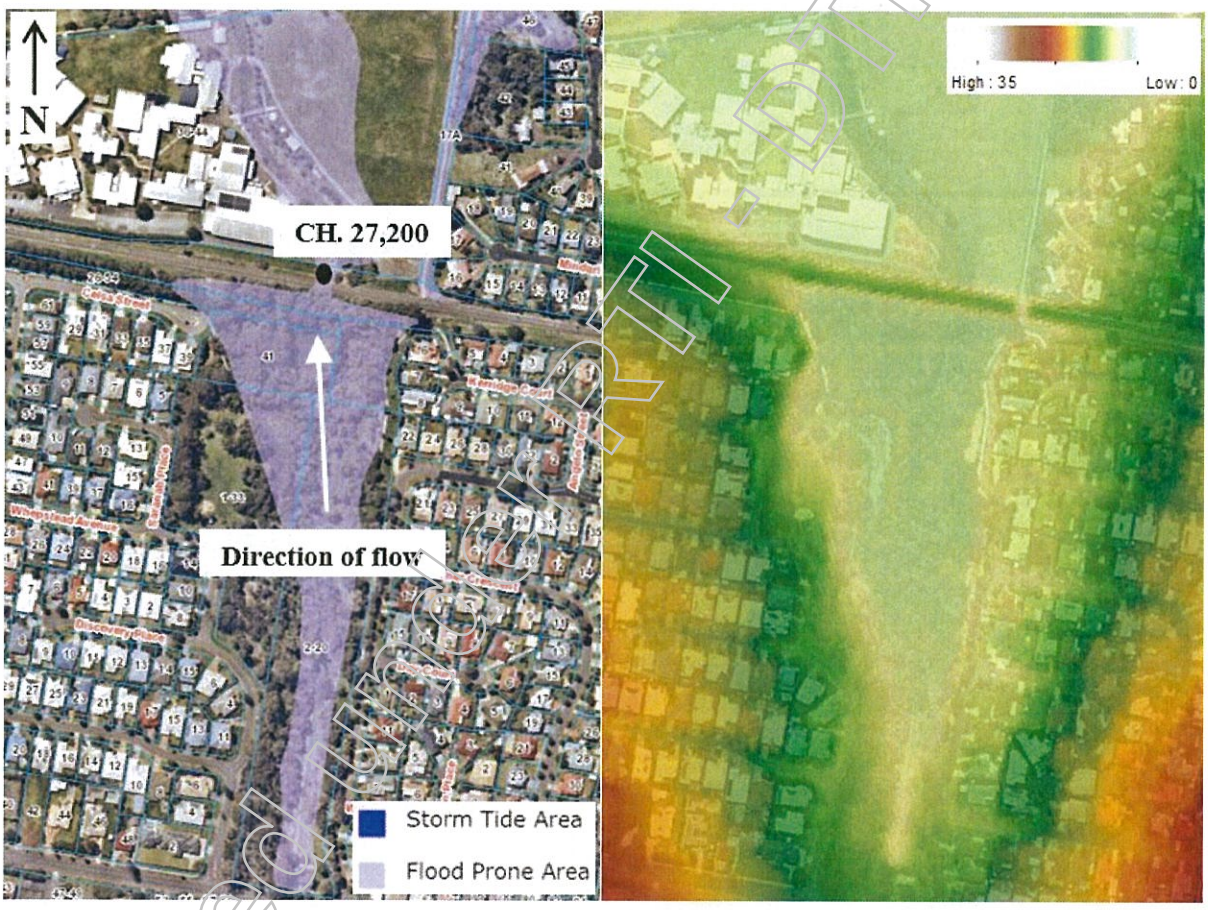


Figure 16: Ch. 27,200 m, Redland College. Left: existing flood extents. Right: DEM

Ch. 25,095 m: Birkdale Road rail bridge

Existing Case: A flood prone area, with a large number of residential properties affected (refer to Figure 17). Minimal flood storage effects observed.

Possible impacts of duplication: Loss of floodplain storage is unlikely to cause an impact on flood risk. However, the new bridge embankments should not further encroach onto the watercourse, to avoid loss of flow conveyance.

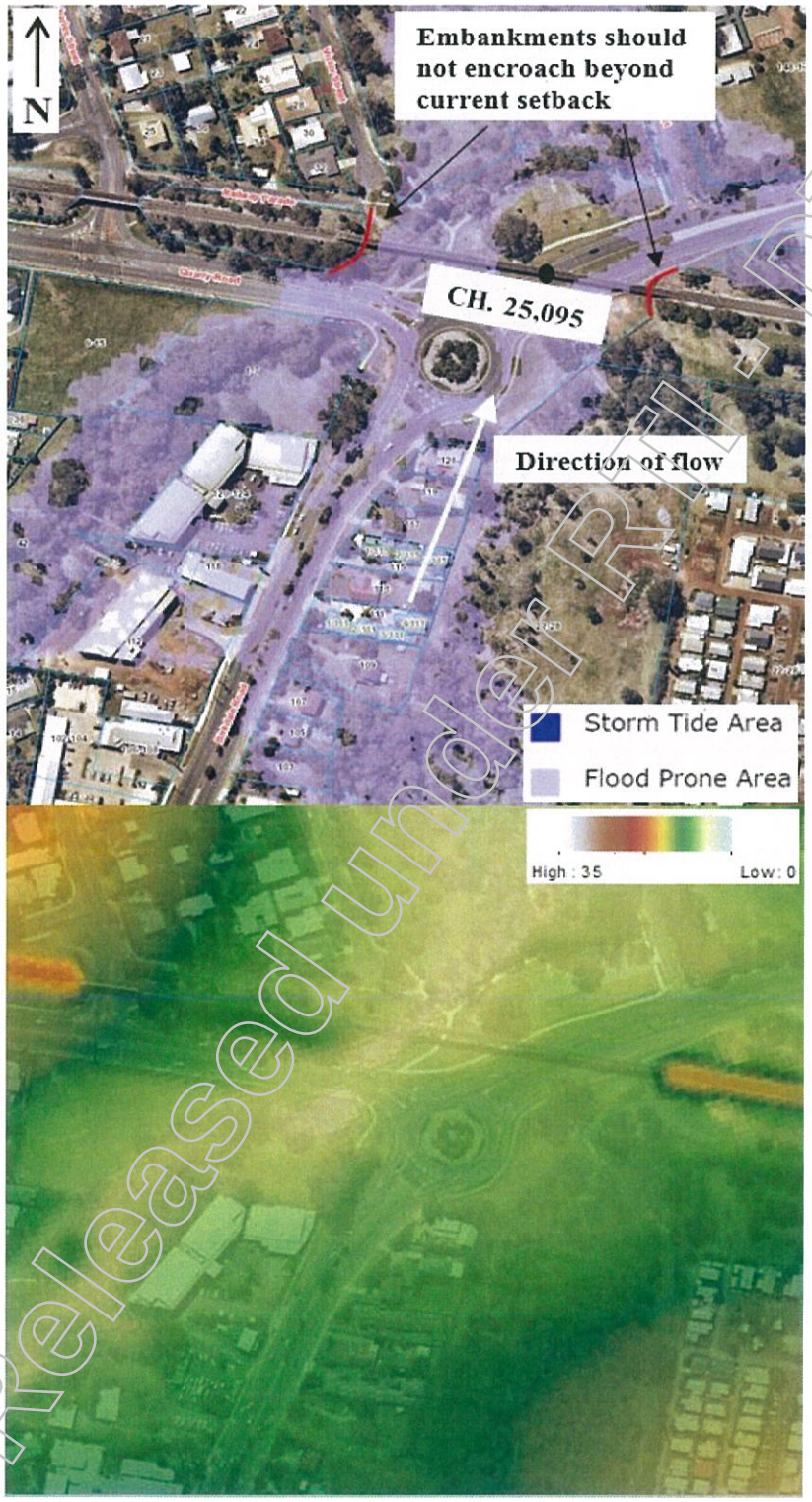


Figure 17: Ch. 25,095 m at Birkdale Bridge. Top: existing flood extents. Bottom: DEM

Ch. 22,310 m to Ch. 23,100 m: Area surrounding Thorneside Station

Existing case: Low-lying area (mostly <3 mAHD), therefore a severe storm tide area (refer to Figure 13). Minimal number of residential properties currently affected. The existing water treatment plant seems to not be currently affected by flooding.

Possible impacts of duplication: Minimal impacts expected due to setback of residential properties, especially if the widening of rail corridor occurs on the Southern side. Although the water treatment plant is located on higher ground and it is unlikely to be notably affected, its hydraulic performance might be affected if nearby water levels are increased. It is recommended to analyse this in later project stages, through a hydraulic modelling exercise.

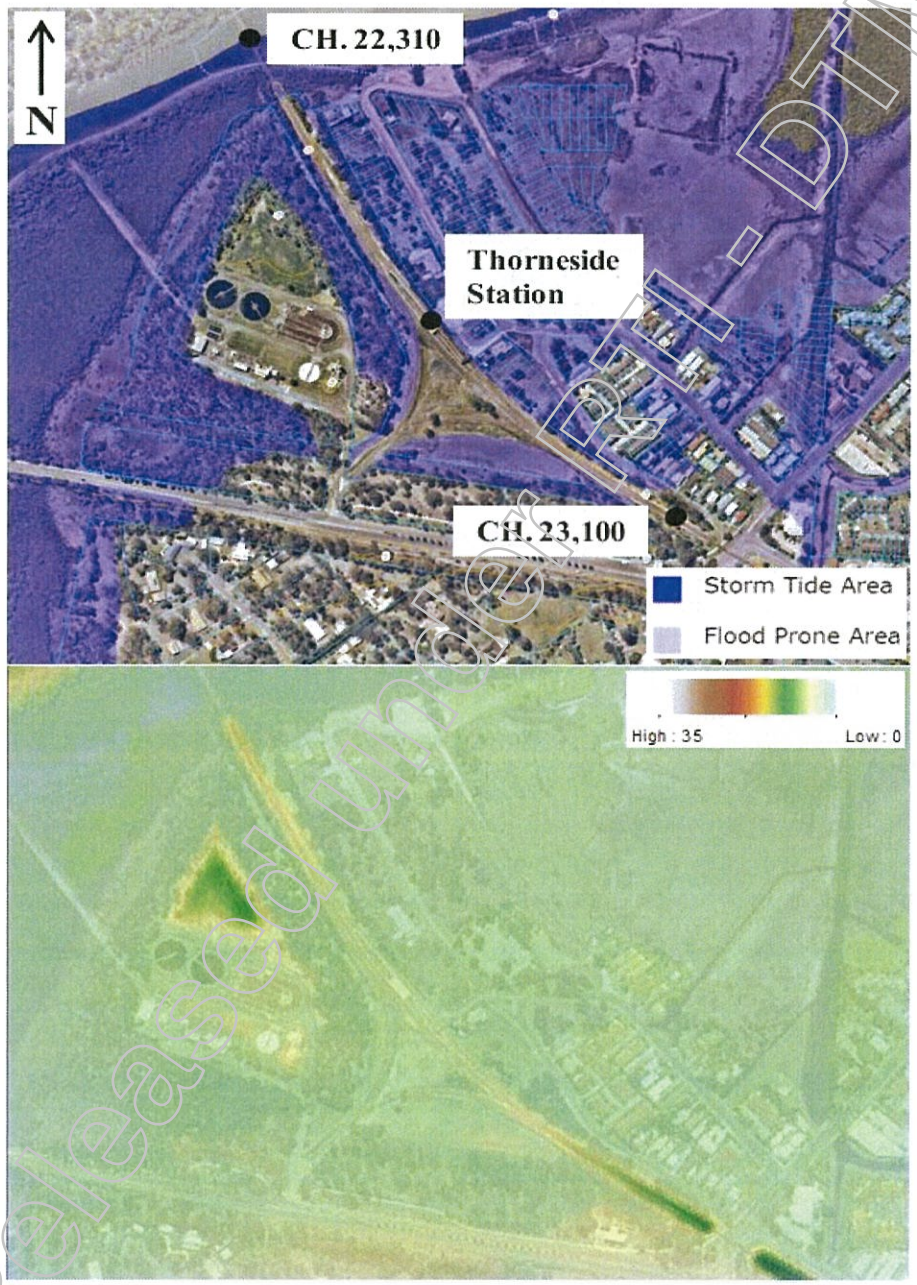


Figure 18 Ch. 22,310 m to Ch. 23,100 m. Top: existing flood extents. Bottom: DEM

4.6 Geotechnical

4.6.1 Desktop study

A desktop study was undertaken to identify the likely geological conditions that exist along the route and provide geotechnical commentary relating to extension of embankments and cuttings to accommodate the duplication.

The desktop study included a review of publically available topographic, soils, geological and acid sulfate soils maps and aerial photography provided by TMR. A review of photographs taken during a walkover survey has also been carried out.

4.6.2 Previous investigations

The following previous geotechnical and environmental investigations were reviewed as part of this desktop study:

- GHD (2003), Thorneside WPCW – Plant Upgrade, Acid Sulfate Soil Investigation, Project No. 41/12259, April 2003
- Douglas Partners (2004), Proposed Timber Bridge Replacement, Hindes Street, Lota. Geotechnical Investigation Report, Project No. 33575, August 2004
- Douglas Partners (2005), Proposed retaining wall, Hindes Street, Lota. Geotechnical Investigation Report, Project No. 33745, November 2005
- GHD (2014), BP Wellington Point Service Station, Baseline Site Contamination Assessment, Project No. 41-28070, October 2014
- GHD (2015), Thorneside Waste Water Treatment Plant, Geotechnical Investigation, Project No. 41-28808, August 2015

A series of borehole records from previous investigations were identified from GHD archives. It should be noted that these borehole records have not been supplied by the client and authority to use them has not been sought.

GHD (2003)

This acid sulphate soil investigation comprised the drilling of seven boreholes to depths of between 2.50 m and 5.00 m at the Thorneside WPCW located adjacent the Line and Thorneside Station. The report noted the presence of Actual and Possible Acid Sulfate Soils (AASS and PASS) from field indicator testing and laboratory testing.

Douglas Partners (2004)[1]

This geotechnical investigation comprised the drilling of six boreholes for duplication of a timber bridge located at Hindes Street, Lota, to depths of between 18.78 m to 21.57 m. The subsurface profile is summarised below:

- Alluvium (clayey sand, gravelly sand, sand, sandy clay) overlying
- Sandstone, siltstone and mudstone of the Woogaroo Subgroup

A cross section of the geology is shown in Table 3 below.

[1] This report is referenced in the 2005 Douglas Partners report. However, a full copy of this report has not been filed electronically.

Douglas Partners (2005)

This geotechnical investigation comprised the drilling of two boreholes to depths of 7.95 m and the excavation of one test pit to 4.0 m. The subsurface profile at these borehole locations is summarised below:

- Topsoil (silty fine sand) overlying
- Filling (gravelly, silty, sandy clay with building rubble) overlying
- Natural/residual (very stiff to hard, sandy silty clay) overlying
- Natural/residual (hard, silty sandy clay) overlying
- Extremely weathered, extremely low strength sandstone becoming moderately to slightly weathered, low to high strength sandstone with depth of the Woogaroo Subgroup

Laboratory tests indicate that the natural sandy, silty clays are medium to high plasticity and cohesive filling is of low plasticity. A single shrink-swell test was carried out as part of this investigation and this indicated that the natural silty/sandy clay is moderately reactive.

GHD (2014)

This contaminated land investigation comprised the drilling of three boreholes to a depth of 5.0 m and five boreholes to depths between 16.00 m to 20.00 m at Main Road Wellington Point. Piezometers were installed in the deeper holes. The subsurface conditions encountered during this investigation are summarised below:

- Filling (silty clay, silty sand and gravel) overlying
- Natural/ duricrust (stiff to very stiff, silty clay) overlying
- Residual Petrie Basalt (stiff to very stiff, clayey silt)

GHD (2015)

This geotechnical investigation comprised the drilling of three boreholes to depths of between 7.26 m and 9.06 m at the Thorneside Waste Water Treatment Plant. The subsurface conditions encountered during this investigation are summarised below:

- Filling (stiff, sandy gravelly clays and clayey sands) overlying
- Alluvium (firm to very stiff, medium to high plasticity sandy clays and clays) overlying
- Extremely to highly weathered basalt. Core obtained as part of previous investigations indicates that the basalt grades to a slightly to moderately weathered, high to extremely high strength basal at elevations of RL 12.38 m and RL –12.50 m

4.6.3 Geology

The Line crosses a number of geological units. Geological maps are contained in Appendix C illustrate the surface geology along the alignment. The following Table 3 summarises the geology encountered along the corridor based on the geological maps referenced above.

Table 3 Published geology with chainage

Start Ch. (m)	End Ch. (m)	Geological Map Symbol	Lithological Description
18,775	20,437	RJbw	Late Triassic to early Jurassic Woogaroo Subgroup: sub-labile to quartzose sandstone, siltstone, quartz rich granule to cobble conglomerate and coal
20,437	21,266	TPb	Paleocene Eocene Petrie Formation: olivine basalt.
21,266	21,611	Qhct	Holocene silt, mud, sand and minor salt; coastal tidal flats, mangroves, supratidal flats, salt pan and grasslands
21,611	22,025	TPb	Paleocene Eocene Petrie Formation: olivine basalt.
22,025	22,226	Td>TPb	Tertiary duricrusted old land surface: ferricrete, silcrete and indurated palaeosols at the top of a deep weathering profile on Petrie Formation basalt.
22,226	22,372	Qhe	Estuarine channels and banks, sandy mud, muddy sand, minor gravel
22,372	22,443	Qhct	Holocene silt, mud, sand and minor salt; coastal tidal flats, mangroves, supratidal flats, salt pan and grasslands
22,443	22,979	Qhc	Holocene mud, sand; undifferentiated coastal plains.
22,979	24,828	Td>TPb	Tertiary duricrusted old land surface: ferricrete, silcrete and indurated palaeosols at the top of a deep weathering profile on Petrie Formation basalt.
24,828	25,521	Qr	Holocene residual soil, colluvium, sand, clay, rock debris
25,521	25,644	Td>TPb	Tertiary duricrusted old land surface: ferricrete, silcrete and indurated palaeosols at the top of a deep weathering profile on Petrie Formation basalt.
25,644	25,845	Qr	Holocene residual soil, colluvium, sand, clay, rock debris
25,845	26,494	Td>TPb	Tertiary duricrusted old land surface: ferricrete, silcrete and indurated palaeosols at the top of a deep weathering profile on Petrie Formation basalt.
26,494	26,527	Qr	Holocene residual soil, colluvium, sand, clay, rock debris
26,527	27,169	Td>TPb	Tertiary duricrusted old land surface: ferricrete, silcrete and indurated palaeosols at the top of a deep weathering profile on Petrie Formation basalt.
27,169	27,362	Qr	Holocene residual soil, colluvium, sand, clay, rock debris
27,363	28,251	Td>TPb	Tertiary duricrusted old land surface: ferricrete, silcrete and indurated palaeosols at the top of a deep weathering profile on Petrie Formation basalt.
28,251	29,530	Qhc	Holocene mud, sand; undifferentiated coastal plains.
29,530	29,976	Qhct	Holocene silt, mud, sand and minor salt; coastal tidal flats, mangroves, supratidal flats, salt pan and grasslands
29,976	30,032	Qa	Holocene clay, silt, sand and gravel; alluvial flood plain.

Start Ch. (m)	End Ch. (m)	Geological Map Symbol	Lithological Description
30,032	31,848	TPb	Paleocene Eocene Petrie Formation: olivine basalt.
31,848	32,162	Qhct	Holocene silt, mud, sand and minor salt; coastal tidal flats, mangroves, supratidal flats, salt pan and grasslands
32,162	32,325	TPb	Paleocene Eocene Petrie Formation: olivine basalt.

4.6.4 Groundwater

The 2004 Douglas Partners investigation at Hindes Street Bridge reported the existence of groundwater at 4.3 m depth in borehole 6 and at 4.7 m depth in borehole 3 of the 2005 investigation and was interpreted by Douglas Partners to be within the Woogaroo Subgroup.

GHD undertook a search of the Queensland Groundwater Database (DNRM, 2013) as part of the 2014 contaminated land investigation and identified twelve registered bores within 1 km of the site investigated. This report notes that available geological and borehole construction information suggest that the registered bores are typically screened through honeycomb and fractured basalt within the Petrie Formation from 4 m to 35 m below ground level. Groundwater levels were recorded at four of the registered boreholes and range in depth from 3 m to 8 m below ground level.

The 2015 GHD investigation at the Thorneside Waste Water Treatment Plant reported groundwater at RL -4.06 m to – 5.10 m.

Given all recorded ground water levels are 3 m and deeper below surface level there are unlikely to be any affects to the duplication and embankment widening. Small portions of the corridor are in cut but there is not expected to be any issues with ground water or cut widening (if required). However, further ground investigation and inspection of the areas of cut is required to confirm ground water levels and assess potential impacts.

4.6.5 Topography and landform

The Cleveland Line ("the Line") between Manly and Cleveland is located within 500 m to 1000 m of Moreton Bay in a low-lying area. The northern end of the route from Manly Station to Lota (Ch. 20,500) is located within the suburbs of Manly and Lota is elevated and gently slopes to the south east from 30 m AHD at Manly Station to 5 m AHD at Ch. 20,500 m. The Line is located within cut through weathered rock of the Woogaroo Group (Figure 19). The slopes appear to have been excavated at 1V:1H. A review of photographs taken in May 2017 does not indicate the existence of any instability or groundwater seepage.

Figure 19 View of cutting at Ernst Street (to south)

Between Lota and Thorneside the Cleveland Line traverses the Lota and Tingalpa Creeks located within a flat low lying mangrove. The low lying mangroves lies between 5 m AHD and 10 m AHD. Views of Lota Creek and Tingalpa Creek are included as Figure 20 and Figure 21 respectively.

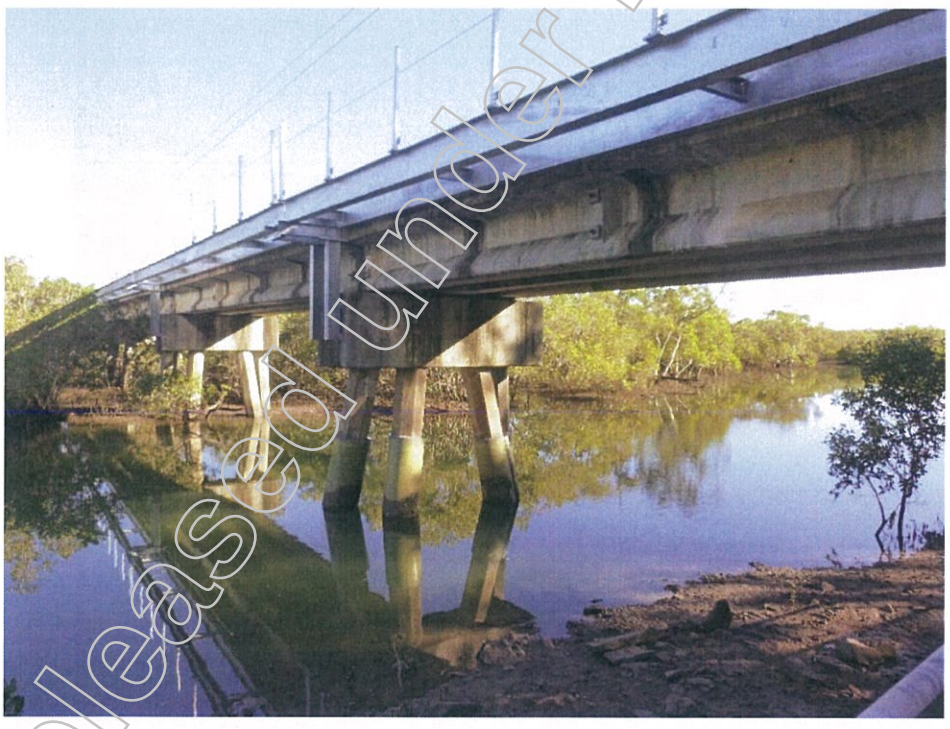


Figure 20 Lota Creek

Figure 21 Tingalpa Creek

From Thorneside to Birkdale the Line gently slopes up to 20 m AHD at Ch. 24,500 m and then slopes gently down to the alluvial floodplain at Ch. 24,750 where the ground is flat at 10 m AHD. Figure 22 below illustrates the flat lying nature of the ground surface in Birkdale.

Figure 22 QR Viaduct at Birkdale Road

The low lying Tarradarrapin Creek is located at the eastern side of this alluvial floodplain at Ch. 25,750 m.

The Line passes through the suburb of Wellington Point at an elevation of approximately 15 m AHD and gently slopes down through a cutting to less than 5 m AHD towards an alluvial flood plain associated with Hilliards Creek. The cutting is associated with ferricrete overlying the weathered Petrie Formation (refer Figure 23). A review of photographs taken in May 2017 does not indicate the existence of any instability groundwater seepage.

Figure 23 View of Cutting in Ferricrete at Ch. 28,000

4.6.6 Acid sulphate soil

The acid sulfate soil map for Tweed Heads to Redcliffe (1:100,000)[2] contained in Appendix C, identifies three separate areas which have been mapped as follows:

- Category S: Acid sulfate soils (ASS) on relatively undisturbed lands. Land where ASS occurs within 5 m of the surface. Virtually all land in this category has at least one "potential acid sulfate soil" layer and some of the land will have an "actual acid sulfate soil" layer.
- Category S_{DL}: Acid sulfate soil on disturbed land such as canal estates, marinas, aquaculture, quarry, urban, industrial likely to contain ASS.
- Category LP: Land with a low probability of acid sulfate soil occurance. Land between the 5 m AHD contours and the Holocene estuarine.

4.6.7 Typical concept ground model below duplication

Based on the review carried out, five broad categories of ground conditions exist along the route. These can be summarised as ground underlain by:

- Residual soils derived from the Woogaroo Subgroup
- Residual soils derived from Petrie Formation Basalts
- Ferricrete overlying residual soils derived from Petrie Basalts
- Alluvial soils comprising firm to very stiff cohesive soils
- Estuarine and mangrove mud deposits

Previous investigations that have been reviewed were restricted to the residual soils, ferricrete and alluvial areas. No investigations that were carried out within the estuarine and mangrove

[2] Queensland Department of Natural Resources and Mines, August 2003

areas were made available. The profiles from the previous investigations have been adopted as follows for the ground models identified above:

- Woogaroo Subgroup (RJbw): Douglas Partners (2004 and 2005 reports)
- Ferricrete overlying the Petrie Formation (Td>Tpb): GHD (2014 report)
- Alluvial soils (Qhc): GHD (2003 and 2015)

4.6.8 Widening of embankments

Current embankments have been constructed with a 1.5V:1H batter profile. Current QR standard formation drawings require a standard embankment batter slope of 1V:2H.

Foundation Conditions - Settlement

The typical assumed ground conditions below the rail embankment for the identified ground models can be expected to undergo settlement and deformation to varying degrees depending on load from the embankment.

Coarse grained soils (i.e. sand and gravel) will undergo initial deformation relatively quickly as the embankment is constructed, with sand creep settlement occurring over time. Settlement of the fine grained soil (clay and silt) are both time dependent, with primary consolidation occurring as excess pore pressures generated during embankment filling is slowly dissipated allowing the soil structure to take up the embankment load, followed by secondary compression. The main risk will be for bridge approach embankments on alluvial soils and interaction of foundation movements with bridge piles.

No assessment of the range of settlement that might occur has been made at this stage.

Foundation Conditions - Stability

Due to the nature of the residual soils identified in the concept profiles it is not anticipated that significant foundation stability issues would arise for most of the alignment.

Where near surface very soft or soft alluvial soils (such as Qhct, Qhe, Qhc, and Qa) exist below the rail embankment, foundation instability could occur if it is not considered in the design. Where these exist some form of basal reinforcement such as the use of a woven geotextile will be required to provide short and long term stability.

ASS/PASS

The field and laboratory tests indicate the presence of Actual Acid Sulfate Soils (AASS) and Potential Acid Sulfate Soils (PASS) in the alluvial soils at Thorneside which is consistent with the regional mapping. Any disturbance to alluvial, estuarine or mangrove mud soils is likely to require lime or other treatment to mitigate soil acidity.

4.6.9 Widening of cut slopes

Field observations and the weathering profile in areas of the Woogaroo Formation and Tertiary ferricrete indicate that the widening of cut slopes at the same batter will have a low probability of instability. Existing cut slopes are approximately 1.5V:1H, or steeper, along the corridor.

4.7 Public utilities

A DBYD search was undertaken along the corridor to identify any PUPs and equipment within the proximity of the duplication. A request for QR rail systems drawings was also made. The impacts of the duplication on QR rail systems is further discussed in Section 4.9.

DBYD information was received from all major public utility providers with the exception of Telstra who require further consultation time and assessment for larger areas like the full length

of the Cleveland Line rail corridor. GHD will identify and assess Telstra PUP information during the concept design stage of the project.

A further request for information was issued to public utility providers for areas where land or property impacts outside the rail corridor were expected. Following this request, Telstra information is still pending. The results from the DBYD assessment for PUPs crossing the rail corridor is summarised in Table 4 below.

Table 4 Summary of DBYD assessment – Road over rail crossings

PUP	Asset type	Location/Impact
Optus	Fibre Optic Cable	Crosses railway line near Gordon St (Ch. 31,480) Alongside Bainbridge St near Wellington St crossing
Queensland Urban Utilities	Water Network Pipelines and Infrastructure	Crosses railway line along Ernest St (Ch. 19,135)
Energex	Cable voltage <33kV	Alongside Station Street near rail corridor (Ch. 28,050) Along wellington street across corridor (Chainage 31,140) Along main road across corridor (Ch. 27,620) Near Earnest Street crossing (Ch. 19,135) Along Gordon Street across corridor (also Cable voltage 33kV or higher nearby) (Ch. 31,480)
Brisbane City Council	Stormwater Drain	Near Earnest St crossing
APA Capital Works	Underground plant (High Pressure/ Class 500)	Along Earnest St crossing
Telstra	Telecom	Not Known, to be identified during concept design.

Table 5 below identifies PUPs in roads close to the corridor. Depending on the duplication infrastructure requirements and corridor widening implications, these have the potential to be impacted.

Table 5 Identified PUPs in roads close to the rail corridor

Nearby Roads	PUP	Asset Type	Location
Alastair St, Manly	APA Group	Distribution Main High Pressure/Class 500	Along street
	Brisbane City Council	Stormwater drain	On street
	Optus	Fibre optic cable	On street
	Energex	Cable voltage <33kV	Near Alastair St
	Qld Urban Utilities	Sewer & Water network pipelines / Infrastructure	Along Street
	Telstra	Telecom	Not Known, to be identified during concept design
Horatio St, Ormiston	APA Group	Distribution Main High Pressure/Class 500	Near Horatio St

Nearby Roads	PUP	Asset Type	Location
Northern Arterial Rd, Ormiston	Optus	Fibre optic cable	Identified along Shore St
	Energex	Cable voltage <33kV	Along street, crosses corridor
	Telstra	Telecom	Not Known
	Optus	Fibre optic cable	Bainbridge St
	Energex	Cable voltage <33kV	Identified near Northern Arterial Rd
	Telstra	Telecom	Not Known, to be identified during concept design
Railway Parade, Thorneside	Optus	Fibre optic cable	Along street, crosses corridor
	Telstra	Telecom	Not Known, to be identified during concept design
Quarry Rd, Birkdale	Optus	Fibre optic cable	Along street, crosses corridor
	Energex	Cable voltage <33kV	Along street, crosses corridor
	Telstra	Telecom	Not Known, to be identified during concept design
Saw Mill Dr, Wellington Point	Energex	Cable voltage <33kV	Along street, crosses corridor
	Telstra	Telecom	Not Known, to be identified during concept design

The concept design will be developed cognisant of the PUPs identified in the DBYD searches. Where possible the concept design will avoid clashing and impacting the PUPs. Where this is unavoidable the clashes will be highlighted on the concept design plan and section drawings.

4.8 Structures

4.8.1 General

A desktop study and site visit was carried out to determine the potential structure impacts of duplicating the rail from Manly to Cleveland. A combination of satellite imagery, a corridor wide structures summary schedule from QR asset management system, EAMS, and a site visit was used to determine potential impacts of the rail track duplication to bridge and culvert structures.

A number of existing structures have been identified along the rail corridor from Manly to Cleveland, including 15 bridges, 23 culverts, one flood way opening and two retaining walls. Footbridges have been identified at Manly, Lota, Thorneside and Wellington Point railway stations but these are not impacted by the duplication. Refer to Table 6 below for a summary of the structures. A more detailed structures schedule including likely impacts is contained in Appendix D.

Table 6 Structure types along rail corridor from Manly to Cleveland

Structure Type	Number of Structures
Road over Rail Bridges	5
Rail over Road Bridges	6
Rail over Water Bridges	4
Footbridges	4
Major Culverts	23
Floodway opening	1
Retaining Walls	2

Utilities will need to be considered for bridge expansion, widening and construction at all locations. These are further discussed in section 4.7.

The sections below detail the existing structures and the options that are considered feasible to widen the structures where required.

4.8.2 Existing structures

Road over rail bridges

Five road over rail bridges exist at Ernest St (Manly), Main Rd (Wellington Point), Fernbourne Rd/Station St (Wellington Street), Wellington St (Ormiston) and Gordon St. (Ormiston). The key characteristics of each structure are described below:

- Ernest St Bridge is a one span bridge to the south of Manly station (refer to Figure 25). From site observations, the exact form of the bridge sub-structure is unknown. The abutment could either be a head stock with reinforced spill through or reinforced earth embankment with a bench seat support. The span accommodates one track and in its current form would not be able to accommodate a second track.
- The Main Rd bridge is a 3 span bridge with one track under its middle span. The other two spans contain shotcrete spill throughs from the abutments. In its current form, this bridge could not accommodate a second track. Refer Figure 26 below for the span arrangement.
- Fernbourne Rd/Station St bridge already spans over two tracks therefore no expansion works are required. Refer to Figure 24 below that shows the approach and wing-wall of the structure taken from the public footpath above.
- The Wellington St and Gordon St bridges are very similar structures and both have two spans that appear to be the same width. The existing single track is located under the eastern span of each bridge, and a maintenance access road under the western span. The duplicated track may be located in the western span of each bridge structure, provided the geometry and clearance is sufficient. In this case no modification to the bridge would be required. Refer to Figure 27 and Figure 28 for photographs of these bridge arrangements.

In summary, it appears possible that three road bridges may accommodate the second track, Ernest St and Main Rd bridges will need to be modified and no duplication is required at Fernbourne Rd / Station St.

Figure 24 Station Street Road bridge approach

Figure 25 Ernest St Bridge

Figure 26 Main Road Bridge layout

Figure 27 Gordon St Bridge

Figure 28 Wellington Street Bridge

Rail over road bridges:

Six rail over road bridges exist at Hindes St (Lota), Thorneside Rd (Thorneside), Charles St (Birkdale), Birkdale Rd (Birkdale), Hardy Rd/Badgen Rd (Birkdale) and Sturgeon St (Ormiston). None of these bridges currently provide for a second track.

Duplication of these bridges, by building a new bridge parallel to the existing, could be readily accommodated. The corridor generally appears to be wide enough at all locations with only minor land impacts anticipated. The actual footprint of the proposed duplicated, parallel bridge structure will be developed during concept design where land impacts will be determined.

Site-specific constraints that have been identified are listed below:

- Hindes St – two sets of old timber piers and abutment exist approximately 8 m to the west of the bridge. A plaque is present stating that QR retained the piers as a memorial to the role of timber bridges in Brisbane's transport history. The new bridge would be located along the alignment of the old piers.
- Road intersections are present adjacent to the Thorneside Rd, Charles St, Birkdale Rd and Sturgeon St bridges. These should not affect the location of the bridges but should be considered when setting out the piers.
- Charles St Bridge has high retaining walls off the abutments that will need to be considered, refer Figure 29.

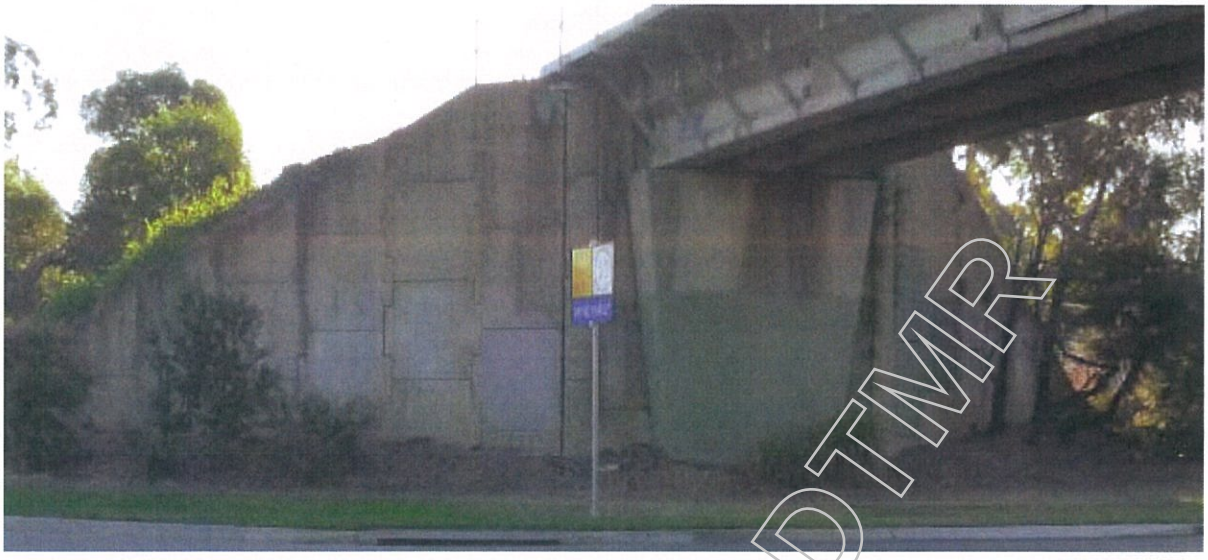


Figure 29 Large retaining walls at Charles Street Bridge

In summary, duplication of all rail over road bridges to the west/south of the existing bridges is considered feasible and no major impacts or constraints have been identified at this stage.

Rail over water bridges

Four rail over creek bridges exist at Lota, Tingalpa, Tarradarrapin and Hilliards Creek. All four locations appear to have a sufficiently wide corridor. Lota, Tingalpa and Hilliards Creek crossings appear to be in swampy/waterway locations, with Tarradarrapin Creek much closer to residential areas. Adding a new bridge to the south / west of the existing bridges is considered feasible, no major impacts or constraints have been identified at this stage.

Footbridges

All footbridges at Manly, Lota, Thorneside and Wellington Point railway stations extend over two platforms (two tracks). Therefore, no additional expansion is believed to be required. If, however, the opportunity to upgrade all stations along this section of the rail corridor during the duplication is taken then each of these bridges would need to be replace with a new footbridge with lift and stair access.

Culverts and floodway openings

The 24 culverts and floodway crossings could not be easily located on site or on satellite imagery. However, it is envisaged that these structures could be lengthened to accommodate a second track. Special consideration may be required where culverts are located where the duplication ties in to existing infrastructure. Some structures, in the order of five culverts, will not need lengthening as they are either located at the stations or where there are already two tracks present. Further details on culvert size, type and form is included in the structures schedule contained in Appendix D.

Retaining walls

The retaining walls observed on site should not be impacted by the track duplication. Some retaining walls will be required where the corridor width is constrained and adjacent high-value land use is present and therefore earthwork footprint needs to be reduced to minimise land impacts. Where less significant land-uses flank the corridor and the duplication requires corridor-widening, land impacts will be identified during the concept design development.

4.8.3 Concept design options

As discussed in the previous sections, some bridge widening and expansion works will be required as part of the duplication, these are:

- Road over Rail – two bridges to be modified or widened.
- Rail over road or creek – new parallel bridges to be built adjacent to existing bridges on the western side.
- Culverts and floodway openings – lengthening of existing structures.

Road over rail bridges

Two road over rail bridges require expansion work – Ernest St and Main Rd. Both bridges have only one open span suitable for a railway track. They will require expansion to provide an open span to accommodate the duplicated track. These bridges are considered the most difficult to program and construct from rail operations and road traffic management perspective. Below describes three general construction options for the bridge expansions and one opportunity. These will be developed in the concept design phase as typical details – one per option used.

Option 1: Add a back span to the existing bridge

A new back span could be constructed to the end of the existing bridge and would be designed long enough to install the second track in the back span. Piles would be installed adjacent to the existing abutment (the existing abutment may not have the capacity to support an extra span) and at the location of the new abutment. The ground would be excavated and the new abutment and deck would be dropped in place.

Pile installation could occur during night works with the top of the pile temporary backfilled to the existing road level before the road opens again. While the road is excavated, a permanent diversion would be required to re-direct traffic. Once the decks are in place, traffic diversion could be removed. The excavation of the earth under the bridge could occur during rail shut down, or the back span could be excavated while trains are operating if a safe working distance can be established.

Option 2: Replace existing bridge with a new bridge in its place

A new bridge could be constructed at the location of the existing bridge. Similar to Option 1, piles could be installed during night works at both abutments. The existing bridge structure could then be demolished, requiring traffic diversions and rail shut down. Once complete, the new deck could be dropped in and the span of the new bridge would be designed to accommodate two tracks in the one span.

Option 3: Replace existing bridge with a new bridge located adjacent to the existing structure

A new bridge could be constructed adjacent to the existing bridge, offline to the traffic network. Once complete, the road would be permanently realigned with some potential land and property impacts. To tie in the road to the new bridge would require minor temporary traffic diversions, and the old bridge would be demolished, requiring a rail shutdown. The new bridge would be designed to accommodate two tracks in the one span. This option would require more land resumption and permanent road realignment.

Option 4: Replace the spill through of existing bridge with a retaining wall

The spill throughs from the bridge could be excavated and replaced with a permanent retaining wall. This could be done by benching down from the headstock and installing soil nails, or other soil retaining methods. With the spill through removed, the second track may be able to be placed in this recently excavated span without impacting the superstructure or live traffic. This

solution is highly dependent on the bridge foundation design, and if two tracks could fit geometrically underneath the bridge. It may also require a slew of the existing track.

Each bridge has been individually assessed with one of the options above being selected as the most feasible based on site constraints. The bridge assessments and the site-specific constraints identified are described below. These will be further developed through the concept design stage.

Ernest Street:

Ernest Street is a major road crossing of the railway that provides the main access to Manly waterfront amenities and local residential area. Shutting down the connection over the railway would require an alternative crossing with potential diversion routes some kilometres away. A school abuts up to the rail corridor on the eastern end of the bridge, and if the new bridge were to be installed to the south with a permanent road realignment, this land would need to be acquired. The school may also generate a large volume of traffic in the immediate area of the bridge, making long-term traffic diversions unfeasible.

Option 2 is recommended if an alternative feasible road diversion during construction can be agreed with BCC road authority. Option 1 could be considered, but the rail's horizontal geometry may not suit this arrangement, given its close proximity to Manly Station. Option 3 requires a new parallel structure, which would impact several properties and property accesses on the bridge road approaches.

Option 4 may be the best solution (minimal impact on traffic network), but is highly dependent on the existing bridge foundation and achievable clearances through the existing bridge to accommodate the duplicated track. Therefore, Option 2 is considered the most feasible subject to further survey and investigation of the bridge structure and a review of as-built documentation is undertaken during a future project stage to confirm the most viable option.

Main Road:

Main Road is a major crossing providing the main access north to south from Wellington Point. There is a service road (Harris St) adjacent to Main Road on the east that could be used as a permanent road realignment. The road would need to enter the roundabout on the south of the rail line at a skewed angle with some land resumption.

Given the arrangement of the existing piers, at this stage Option 3 is believed to be the most feasible arrangement, which requires a permanent road realignment. To minimise resumptions and the road deviation, this could be constructed in a staged approach where part of the new bridge is constructed offline to the east of the existing bridge and the remainder constructed in stages with temporary traffic switches. However, if this is not preferred, Option 2 could be considered with a temporary traffic diversion via Badgen Road or Station Street.

Since the Main Road bridge has three spans with the existing track in the middle span, adding a back span would provide no benefit as identified in Option 1.

Option 4 may be the best solution (minimal impact on traffic network), but is highly dependent on the existing bridge foundation and achievable clearances through the existing bridge to accommodate the duplicated track. Therefore, Option 3 is considered the most feasible subject to further survey and investigation of the bridge structure and a review of as-built documentation is undertaken during a future project stage to confirm the most viable option.

Constructing under this bridge would be difficult given the tight space and limited access.

Rail over road and water bridges

The concept design shall consider new parallel bridge structures to the south/west of the existing bridges to accommodate the duplicated track. Some bridges may require special consideration for utilities and site-specific concerns, but this should not be a significant impact to the options presented in this assessment. A typical elevation and section of a rail over road bridge being duplicated using standard QR box girders is shown below in Figure 30.

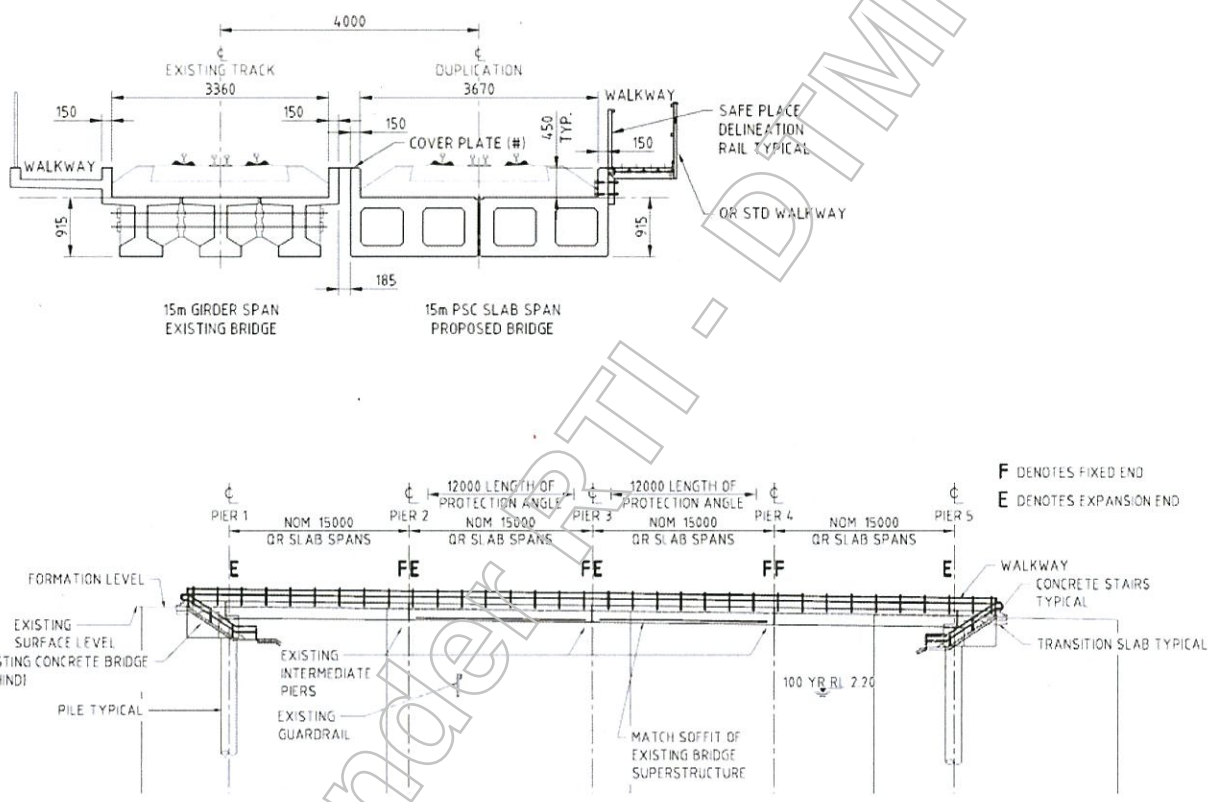


Figure 30 Typical elevation and section of a rail bridge duplication

Culverts and floodway

The concept design shall consider the culverts and floodway opening to be extended under the new track formation and tie into the existing infrastructure where identified. Again, some culverts may require special treatments or full replacement due to condition or residual service life, but this should not be a significant impact to the design or land impacts. As-built information of culverts was not available for consideration for the design. During a future stage of project development, a condition survey of all culverts should be undertaken and review of as-built information to ascertain extension or replacement requirements.

The concept design will make provision for longitudinal cess drains to convey flows to culverts. Where wider table drains to convey large over land flows are identified these will be relocated to the outside of the duplication. If significant scour protection (rip rap) is identified at the downstream end of a culvert this will be extended to the outside of the duplication. Where these are identified the rail corridor will be widen to suit. However, based on initial corridor assessment of aerial imagery, LIDAR survey and route site visit no major table drains, major culvert structures or extended scour protection have been identified.

4.9 Rail systems

4.9.1 Signalling

The signalling section of the BSA between Manly station and Cleveland station is based on the RCS, with three aspect signalling, track circuits, automatic warning systems and points machines. This section of railway is controlled from the Control Centre in Mayne and operates as a single, bidirectional line between Manly and Lota stations, Lota and Thorneside station, Thorneside and Wellington Point station, and Wellington Point and Cleveland station. In the existing arrangement Manly and Lota stations have Vital Processor Interlockings and Thorneside (including Birkdale), Wellington Point and Cleveland (including Ormiston) stations have Relay Based Interlockings. There are no level crossings in the section that is proposed for duplication.

As part of the proposed duplication works signalling will need to be upgraded between Manly and Cleveland. At this stage it is not known what are operational requirements in respect to the headway (same or improved headway) but it is envisaged that both railway lines would have bidirectional running and that additional crossovers would need to be installed at some locations/stations in order to minimise the effect of broken rolling stock on the operational railway. The decision on three or four aspect signalling will be driven by headway and operational requirements. It is also important to note that upgrade of signalling system or re-signalling of the sections of the railway will generally require upgrade of the signalling power systems (in signalling locations), signalling equipment rooms and power equipment rooms to latest Australian Standards (AS3000) and power source upgrade due to increased power load.

The upgraded signalling system could be based on conventional remote control signalling which would be controlled from the Control Centre in Mayne, or alternatively this line could be considered as part of the broader strategy in respect to ETCS implementation in the BSA.

If conventional remote signalling is proposed consideration will need to be given to overall signalling architecture in respect to:

- signals (three or four aspect)
- points machines (mounted on sleeper or in-bearer)
- train detection technology (track circuits or axle counters); automatic warning system (existing profile or low profile)
- interlocking arrangement (centralised interlocking for the whole section or individual interlockings at each station)

If ETCS Level 2 is proposed consideration will need to be given to the overall Brisbane Signalling Suburban Strategy. Currently ETCS Level 2 is proposed for implementation between Milton and Northgate (the Inner City area). If ETCS level 2 is chosen for the signalling upgrade as part of the Manly to Cleveland station duplication then all other stations between Manly and Roma Street would need to be converted to ETCS Level 2 as well. The timing of this project would also need to be considered as the Milton to Northgate ETCS Level 2 project estimated completion in Q3-2023.

In order develop a conceptual signalling solution in a later project stage the following items will need to be agreed:

- Track layout with horizontal and vertical gradients
- Civil track speed
- Type of rolling stock, with details on deceleration, accelerations and total length of the units

- Type of signalling technology (RCS or ETCS)
- Headways for the line, and operations decision on three or four aspect signalling if RCS
- Preferred architecture (centralised interlocking for the whole section or individual interlockings at each station) if RCS
- Type of points machines (mounted on sleeper or in-bearer)
- If conventional (mounted on sleeper) points machines are used, what type i.e. electrical, electro-hydraulic, electro-pneumatic, etc. is preferred
- Preferred train detection technology (track circuits or axle counters)
- Automatic warning system (existing profile or low profile)
- Signal mounting, masts (traditional masts or foldable masts) or signal portals

The signalling concept design will need to be integrated with other disciplines like overhead wiring, power systems, communications, track and station/platforms. Signalling real estate and access requirements would be also checked during integration activities.

4.9.2 Traction power & OHLE

Metropolitan electrification system

QR's electrification system is designed to supply 25,000 Volts at 50 Hertz alternating supply to a roof-mounted pantograph on electric rollingstock. The Brisbane Metropolitan system is serviced by two compatible distribution systems: A BTS and an ATS. The Cleveland line is a BTS.

One or two rails of each electrified track in conjunction with mid-point connections and return conductors, are used as part of the traction return system to supply electric rolling stock. The rails are held at earth potential to avoid the risk of electric shock. Electric energy is delivered to a roof mounted pantograph via a contact wire suspended from a catenary wire. All wiring is held in place to maintain ideal pantograph /contact wire interaction.

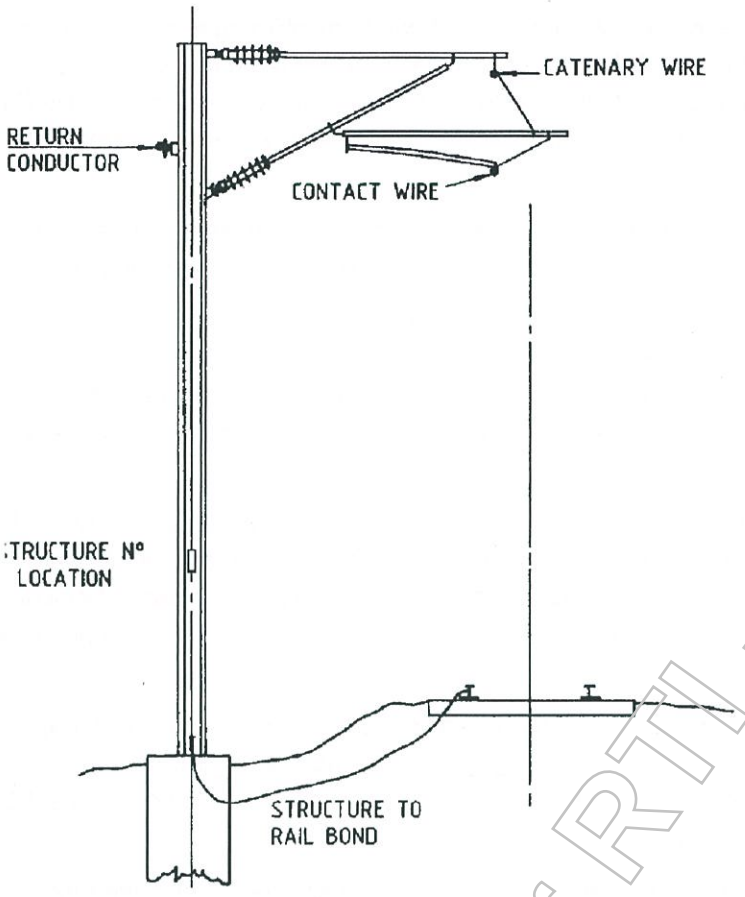


Figure 31 Typical cantilever support

The OHLE is automatically tensioned to maintain a constant wire tension, the contact wire height may vary from 4200 mm to 5850 mm above rail. The electrification system is monitored and controlled remotely (via SCADA system) by an ECO available 24 hours a day, 7 days a week. The ECO monitors and controls the electrification system to maintain a safe and reliable operation at all times.

Cleveland Line

The Cleveland Line, Manly to Cleveland section, currently consists of a single electrified line with passing loops at most of the stations. Along the majority of this section the OHLE contact system is supported by cantilever frames mounted on universal channel masts. The OHLE masts located on the outside/cess of the track. Generally, the OHLE masts are located to the north / eastern side of the single-track sections along the corridor.

However, the section of corridor south of Manly station to approximately 300 m north of the Alexandra Road Bridge has OHLE supported by side OHLE masts on the opposite, (western side) of the track. If they remained in their current positions they would be located between the duplicated track and the existing. This is not ideal for safe and efficient maintenance access and therefore it is proposed that new OHLE masts be installed opposite to the other side of the track prior to the duplication being constructed i.e. one mast to the outside of each track.

Through the passing loop at station island platforms the OHLE is supported in a similar manner by cantilever OHLE masts located either side of the tracks in the cess. At Birkdale and Ormiston stations with a single track and side platform arrangement the OHLE masts are located on the platforms and support my cantilever masts.

The proposed duplication will require new OHLE along its alignment. Where the existing track is positioned to one side of the corridor, it is proposed that the existing track remains in-situ and

the duplication is applied to the western side, thereby maintaining existing clearances and minimising impacts to the existing track and rail infrastructure. In this situation the most feasible solution to support the required OHLE is for new single span cantilever side OHLE masts to be located in the cess. The existing OHLE side masts will remain in-situ, unaffected by the duplication.

Where the duplication proposes to slew the existing track, as described in section 4.3, it is proposed to use portal structures over the existing and proposed track locations.

Portal structures would support the OHLE for both tracks (slewed and duplicated) both in the permanent and temporary locations during construction staging. These structure types allow the existing track to operate using the new OHLE while the exiting cantilever side OHLE mast supports are decommissioned thus maintaining the staged operability of the Cleveland line during duplication construction.

Initial assessment of the corridor suggests that slewing of the existing track would be required and cost effective in two sections of track between Manly and Lota stations. Slewing is also potentially required where the duplication joins the existing passing loops at stations, if realignment of the existing is required. This will be determined during the concept design development.

At the southern end of Manly station there is a lineside isolator switch which, depending on the exact duplication tie-in points and slewing of existing track, is likely to be impacted by the duplication. The isolator switch structure would need to be relocated prior to the duplication as part of the electrification duplication and sectioning strategy.

The image below shows the isolator switch at the southern end of the platforms.

Figure 32 Isolator switch

If the train headways are to be significantly reduced to provide an increased timetable, the increasing trains and power demand.

A power study will need to be need to be undertaken to assess current grid power supplies, lineside sectioning and isolation requirements. It is highly likely that existing feeder stations, electrical sectioning, lineside switching and track sectioning would need to be either duplicated or updated.

The proposed OHLE arrangements and required clearances are shown in the typical cross section drawings contained in Appendix A. These cross sections will form part of the basis of the duplication concept-design development.

4.10 Local roads

Brisbane City and Redland City councils control the local road network. There are five road over rail bridges controlled by the councils. These are identified and further described in the Bridges section 4.8 of this report.

There are currently no level crossings of Cleveland Line between Manly and Cleveland, including occupational crossings.

The duplication has the potential to impact roads adjacent to the corridor notably at Ormiston and Birkdale stations that are to be upgraded with addition of a platform and footbridge. Potential impacts on local roads include reduced access to properties and narrowing or realignment. Roads that run adjacent to the rail corridor and have the potential to be impacted by the duplication are listed below.

Table 7 Roads running adjacent to the rail corridor

Corridor Chainage	Road name
30,285 – 31,150	Northern Arterial Rd (Ormiston)
23,200 – 25,100	Quarry Rd (Birkdale)
23,200 – 24,850	Railway Parade (Thorneside)
19,680 – 20,515	Alastair St (Lota)

The concept design will aim to mitigate any impacts to roads by use of retaining structures or reduction in the railway cross-section. Where this is not possible, localised road re-alignments may be required.

The local road network provides access to the RMAR at a number of points along the corridor. Based on initial assessment these access points are not likely to change. However, with the duplication, the provision or location of RMARs may change based land use or environmental constraints and alternative access from the local road network will need to be investigated during the concept design stage.

Table 8 below shows the location of access points from the local road network to the rail maintenance access road (RMAR) that have been identified from aerial mapping.

Table 8 Access point locations on local road network

Corridor Chainage (m)	Road name	Corridor access comments
31,750	Nelson St -West (Ormiston)	On-track-vehicle access point corridor
31,150	Northern Arterial Road/ Wellington St intersection (Cleveland)	Potential new access
29,750	Beckwith St (Ormiston)	Access from cul de sac via track, gate to corridor
28,600	Duncan Street (Wellington Point)	Informal access via 57 Duncan St.
27,700	Wellington Point Station (Wellington Point)	Access via car park
26,900	Anson Rd – East (Wellington Point)	Access from cul-de-sac , gate to corridor
26,900	Celsa St (Wellington Point)	Access via informal access track, gate to corridor.

Corridor Chainage (m)	Road name	Corridor access comments
26,000	Pandanus St (Birkdale)	Access via informal access track, gate to corridor.
25,100	Birkdale Road (Birkdale)	Access gate off Birkdale Road/ Quarry Road roundabout northeast arm.
24,550	Quarry Road (Birkdale)	Access gate opposite intersection with Rosewood St.
22,700	Rickett Road (Birkdale)	Access from Thorneside water treatment works access road to disused siding triangle.
21,800	Chelsea Road (Birkdale)	Access track from the main road
20,800	Railway Terrace (Lota)	Access gate on Railway Tce.
20,500	Hindes St (Lota)	Access gate on Hindes Road.
19,550	Gannon Avenue - West (Manly)	Access from Gannon Avenue, gate to corridor
19,300	Barrinia St - East (Manly)	Access from cul de sac, gate to corridor

4.11 Constructability

For the 13 km duplication, it is envisaged that two construction areas will be required for material handling, stores, site offices and welfare facilitates etc. Ideally, these would be located a third and two thirds along the corridor length. The two sites have been identified close to these positions that provide sufficient space for the anticipated construction activities, plant, equipment and materials required. The first site is to the south of Thorneside station at corridor Ch. 22,800 m shown in Figure 33.

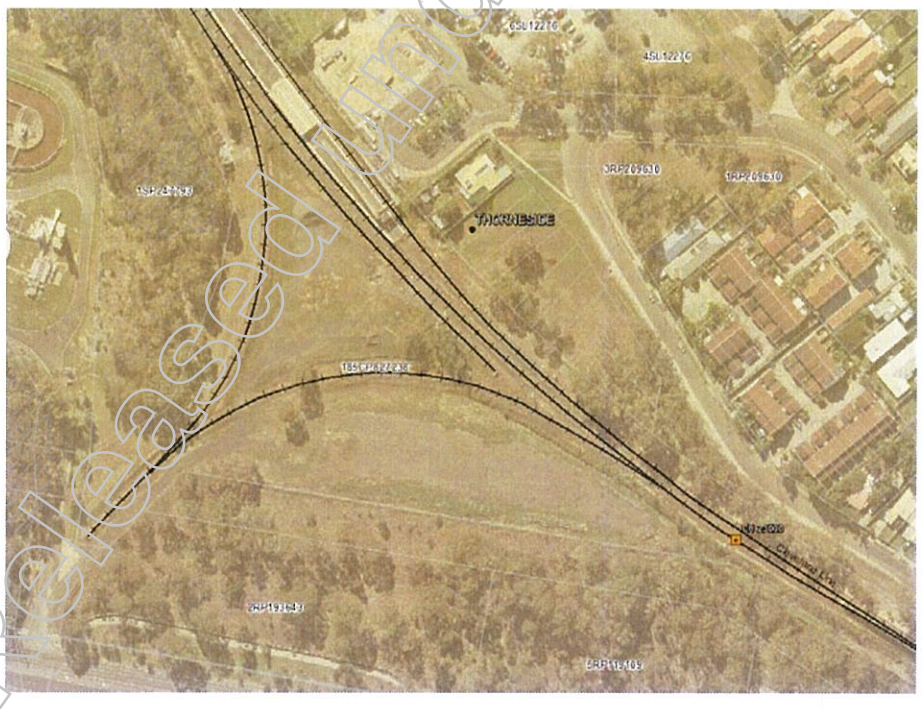


Figure 33 Thorneside primary construction site

This is a disused railway triangle turn back siding. The land is already owned by the government and therefore no temporary land resumption is required. This site is substantial and would be ideal as the primary construction site with site facilities, offices, stores etc.

The second site is located at chainage 28,300 m just south of the Station Street (Wellington Point) road over rail bridge to the west of the corridor. This site is smaller and would be a secondary construction site used mainly as a material handling and storage area.

4.11.1 Construction sequencing

The first stage of the duplication construction would be to secure the site and erect boundary fencing and a demarcation fence along the existing live railway at 3 m offset – potentially 2.1 m offset if agreed with QR. Following mobilisation and fencing, clearing and grubbing can commence. The first major work activity would be to start the embankment and cutting widening along the corridor and extending existing drainage culverts that are affected. The construction of the embankment widening would include RMAR and longitudinal cess drainage. The embankment widening would be done while the existing track is in operation.

Next stage would be bridge widening. Rail over bridges would be widened by building a parallel structure with the existing railway in operation. The road over rail bridges would need to be widening in stages with some railway processions. Structure construction options are further discussed in Section 4.8.

Once the earthworks and structures are complete the track formation and capping can be laid and compacted. Then the new OHLE support structures would then be constructed, including super portals where required. Following the OHLE installation the ballast and rails can be installed and existing track slewed into position. Finally the rail signalling will be installed. At this point construction practical completion stage has been reached.

4.11.2 Testing and commission

Following practical completion testing and commissioning will commence. First static testing and commissioning will be undertaken to validate and verify individual components, equipment and isolated sub-systems. An approval is required to proceed to the next stage.

Once approved dynamic testing and commissioning can commence by energising the OHLE traction power and signalling systems. This will enable dynamic testing of the rollingstock along the railway, mimicking different operational scenarios i.e. normal services, degraded mode, emergency operation etc. This is to check that all systems and sub-systems are fully integrated, working and provide for safe operations. Another approval is required before the infrastructure can be handed over and the operator can start driver training and pilot service runs.

After a nominal two weeks of non-revenue services with no faults, safety issues or major snagging items being identified then driver training and route familiarisation can commence. Following satisfactory completion of driver training full revenue services can commence.

4.11.3 Approvals process

The gateway approvals process and party responsible for the approval sign off is dependent on procurement and contract model used. There are significant risks around roles and responsibilities if part of the systems or sub-systems fails any part of the commissioning or testing with subsequent impacts to the project program, cost, and operation to the railway.

In the case of a PPP the proponent company is normally self-certifying and must demonstrate its compliance and competency by providing assurances that its management and safety systems are suitably robust. The proponent normally submits evidence and documentation of such, the owner has the opportunity to review but the final validation and an independent verification by the proponent and owner approves compliance.

In traditional and design and construct contracts dynamic testing is provided by the operator/ maintainer with the final approval and acceptance being provided by the owner and/ or Rail Infrastructure Manager as defined by ONRSR major project guidelines.

5. Rail operations

5.1 General

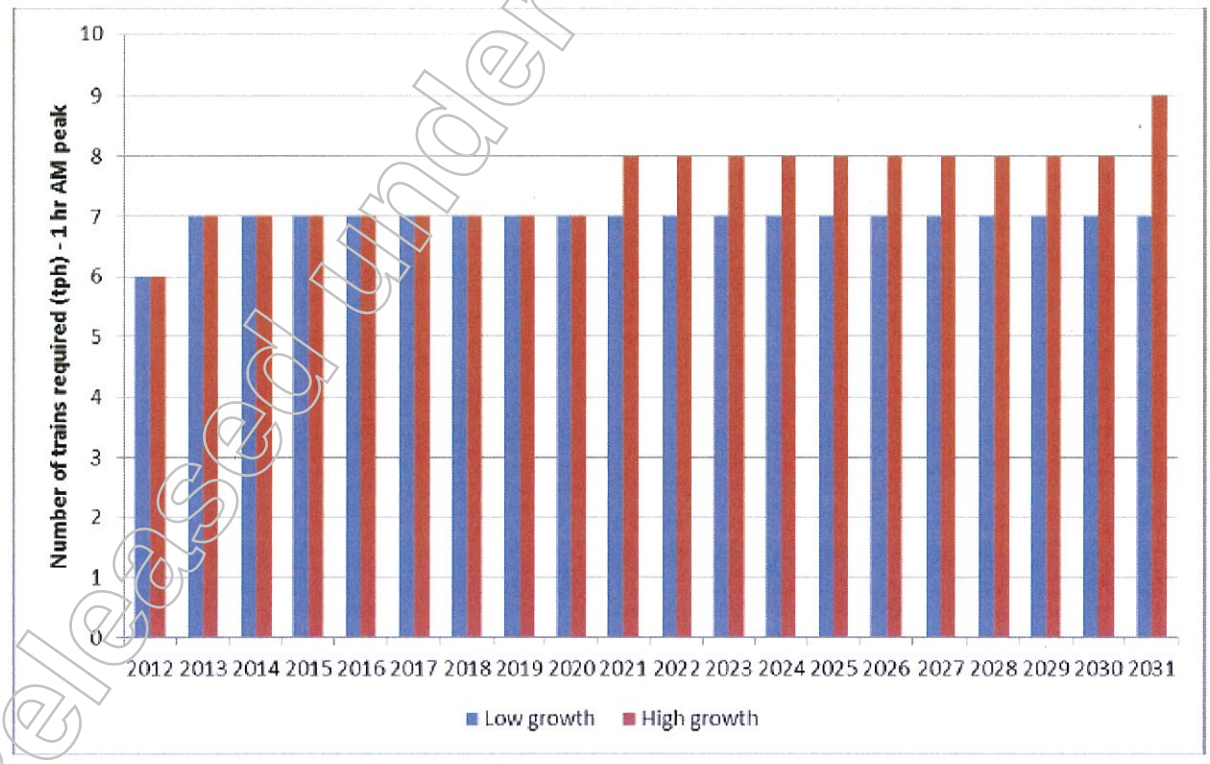
A staging and operations assessment of the Cleveland line wide capacity improvements, including the duplication was undertaken. This review was based on the previous TMR SEQCI project and the QR requirements.

5.2 SEQCI outcomes

The SEQCI assessed the future train demand of the SEQ rail network, identified key network capacity constraints and then made recommendations on infrastructure options that could increase the network capacity to meet the forecast demand. Part of the study focused on the Eastern Corridor, which included the Cleveland Line passenger service from Manly to Cleveland.

The SEQCI report forecasted demand of the Cleveland Line passenger network through to 2031. Table 9 below shows the predicted demand.

Table 9 Extract from SEQCCI: Predicted train demand, Eastern Corridor, 2009-2031



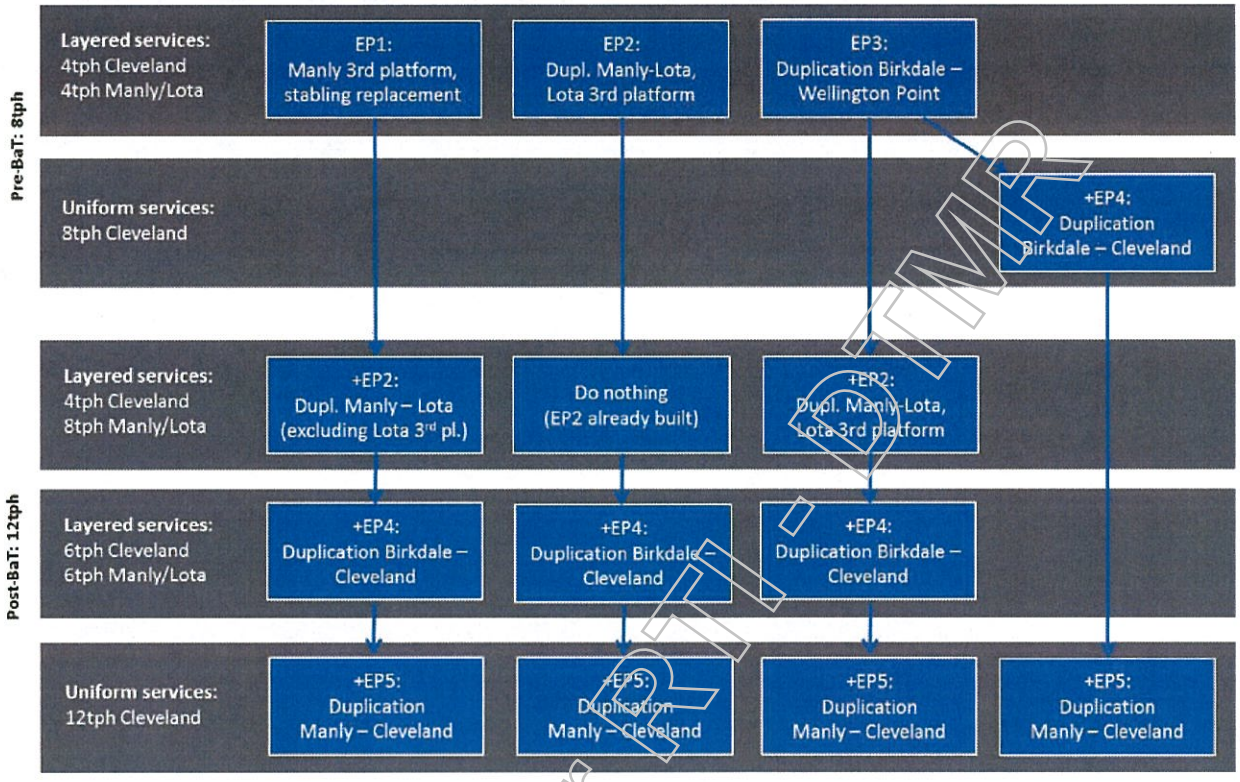
Infrastructure options were developed to increase capacity along the corridor and were based on two different service patterns: uniform and layered. The options were developed to progressively bring capacity increases on line as the demand triggers required. Table 10 shows these options developed by the SEQCI study

Table 10 Extract from SEQCI: Cleveland passenger options overview

Option description	Cost	Capacity upgrade (existing)	Longevity / comment
EP1 – Cost Focus – *Manly third platform*	$13m	4 tph (4 tph)	Improves reliability with new Sector 2 timetable. Meets demand to approximately 2020. Loss of stabling for 2 trains at Manly (requires replacement). May be difficult to stage next step.
EP2 – Operational Focus – *Manly to Lota duplication, third platform at Lota*	$51m	5 tph (4 tph)	Meets demand to approximately 2030. Significantly improves reliability. Would allow for layered up to 12 tph from Lota and 4 tph from Cleveland (express from Lota/Manly).
EP3 – Operational Focus – *Birkdale to Wellington Point duplication*	$41m	5 tph (4 tph)	Meets demand to approximately 2020. Improves reliability (and reduces/removes crossing conflicts at Wellington Point).
EP4 – Passenger Focus – *Birkdale to Cleveland duplication*	$90m	6 tph (4 tph)	Meets demand to approximately 2030. Significantly improves reliability. Would allow for layered 6 tph service from both Manly and Cleveland (express from Manly).
EP5 – Passenger Focus – *Manly to Cleveland duplication*	$205m	12 tph (4 tph)	Exceeds demand beyond 2031. Significantly improves reliability. Would allow for uniform 12 tph from Cleveland.

A summary of the staging options considered in the SEQCI report to meet the forecast demand is shown in Table 11 below.

Table 11 Extract from SEQCI report section 6.2.2.1. Summary of Eastern Corridor passenger options



Note that the BaT project referenced in the SEQCI graphic (refer Table 11) above has now been refreshed and is now been developed and promoted as Cross-River Rail (CRR). The ultimate duplication is not required until CRR is implemented.

5.3 Queensland Rail Cleveland Line operational requirements

A meeting with QR's Strategic Operational Planning Senior Manager was held on 15 May 2017. This highlighted the following key capacity and operational requirements linked to the duplication;

- The Cleveland Line currently provides for 6-car train. There has been previous discussions internally within QR about seven car train consist, as recommended in the SEQ SSI report.
- Generally, side platforms are preferred for station layouts along the corridor except at termini stations where island platforms are preferred. This is subject to site constraints, cross-corridor connectivity and topography.
- The first phase of the duplication would be ideally Birkdale to Wellington Point to facilitate the Cleveland line service passing movement and remove the Manly turn back constraint
- A third platform at Manly has been investigated by QR and is considered inappropriate and is not their preferred solution to capacity constraints. Partial duplication as above is preferred.
- Duplication of the whole Cleveland line prior to CRR will increase reliability but is not required for capacity as this is limited by the "inner core" (Park Road to Bowen Hills) capacity. CRR is required to increase capacity of the "inner core" before the benefits of the duplication will be realised on the Cleveland line.

- The current Cleveland terminus island platform is sufficient to meet future capacity requirements.

5.4 Capacity upgrades investigated

From the review of the capacity improvements to the Cleveland Line rail corridor three functional groups of infrastructure upgrades have been identified:

1. Adjustment of Stations and station areas, notably including the terminating arrangements for the inner-tier of inner-city service levels (currently terminating at Manly);
2. Duplication of single-track sections; and
3. Upgrading of crossovers, junctions and turn-back functions, (notably Murarrie, Cannon Hill and Lytton Junction).

While the Park Road to Manly section of the Cleveland line is outside stage 1 - duplication technical assessment and concept design scope rail operations assessment has included the entire Cleveland line; Park Road to Cleveland. It is important that operations assessments be viewed from a line-wide perspective to fully understand operational requirements and implications. Some opportunities identified in the operations assessment discussed below are currently outside the scope of this project. Confirmation by TMR to extend this project scope to investigate these opportunities and develop concepts is required.

The SEQCI study indicated that, in the service growth plans developed in response to forecast demand, the enhancements relating to stations, signalling, and the inner-tier (or "layering") of peak services would be triggered before track duplication between Manly and Cleveland. It is therefore essential that station and junction requirements be defined first, as these will influence the alignment and provision of new track work.

5.4.1 Station reconfiguration at Manly or Lota

At present, the inner tier (or "layering") off peak services originate or terminate at Manly station. Previous studies, including SEQCI, and QR have identified Manly station as a significant corridor capacity constraint.

The identified responses in the SEQCI include:

- A 3rd platform at Manly
- A 3rd platform at Lota and duplication to Lota

Lota was identified as the preferred location as it is less spatially constrained (in the sense of available land, natural and urban environment) than Manly, and also potentially supports considerably simplified staging, as Manly could continue to operate while Lota is reconfigured and upgraded.

Key operational requirements

- Terminate inner-tier of service
  - Without a facing conflict
  - Without obstructing through services (to or from Cleveland)
  - Without overlaps conflicting with other moves
- At a speed that supports 12 trains per hour comprised of a mix of through and terminating services

Recommended upgrade

For the purposes of evaluation, triple track three platform terminating configurations should be identified for either Lota or Manly. Manly station is extremely constrained and has existing stabling that would be impacted by the third platform, so the preferred options is a third platform at Lota. It should be noted that this is additional to the primary requirements of the duplication and is seen as an opportunity to add further operational flexibility to the Cleveland line and wider SEQ network.

5.4.2 Duplication Manly to Cleveland

The ultimate duplication from Manly to Cleveland will be influenced by station configuration and staging considerations.

In light of the Cleveland station over-run rail accident in 2013, and consequent speed restrictions on the approach to Cleveland station, consideration should also be given to track design assisting in the management of the over-run risk, while restoring more efficient, faster approach speeds to Cleveland station.

Stabling interfaces which are yet to be defined may also influence the duplication alignment to support the geometry necessary both for stabling access, and for approach crossovers.

There are differing proposals on priorities for staging of duplication between Manly and Cleveland. In all cases, duplication to eliminate the simultaneous arrival and turnback conflict and passing constraint at Manly is essential. Beyond this, service concepts nominated in SEQCI study identified duplication between Manly and Thorneside as the first priority. In contrast, QR has nominated the Birkdale to Wellington Point section as the earliest priority for duplication.

Key operating requirements

- Integrate with operational requirements of stations.
- Support operation at the highest speed – aim for an alignment design with horizontal curvature which does not constrain operating speed.
- Support staging which enables the existing line to remain operational, with the exception of focussed shut-downs when necessary to switch track centres.

Recommended upgrade

- Track alignments should meet the interfaces defined by station requirements.
- Horizontal alignment should be, wherever possible, optimised within the corridor, noting that existing formation and services locations will impose some practical limit with respect to cost.
- A concept staging plan for the duplication has been identified to support evaluation of the merits of construction approaches with relation to cost and operational disruption. This is detailed in Section 6.

5.4.3 Lytton Junction upgrade

The Lytton Junction upgrade, characterised as a freight operational improvement in SEQCI, has significant benefits for passenger services as it reduces the duration for which freight moves obstruct both facing and following passenger moves.

Key operating requirement

- Support faster operation of freight trains through Lytton Junction onto the down Cleveland line, to minimise junction occupancy time.

Recommended upgrade

- The configuration and geometry of the approach and crossover ladder from Lytton Junction to the Down Cleveland line should be redesigned to support 60 km/hr operation.

5.4.4 Murarrie Holding Road and Murarrie loop

At present there is approximately 1.5 km of disused fourth track at Murrarie, which once formed both the arrival road for the industrial line, and a passing loop for port trains. The loop is now unable to be used for passing freight trains, as the section between turnouts is too short.

Past proposals for passenger train holding and freight passing-loops (including those proposed by ARTC and various freight proponents) are likely to have conflicting requirements.

Key operating requirements

- In a capacity as a freight passing-loop, the key requirement is for freight trains of both narrow and standard gauge to be able to diverge to a passing loop at a satisfactory speed.
- In a capacity as a passenger train holding road, the line and turnouts must be electrified, including the crossover ladder at the City end of Murarrie

From a design perspective, these requirements are compatible, and can therefore both be satisfied by the same infrastructure. This will leave the choice of operational priorities open for future consideration.

Recommended upgrade

- The full 1.5 km length of the former industrial arrival road and passing loop should be redesigned as a single dual-gauge passing loop with 60 km/hr crossovers to-and-from the dual-gauge main line.
- Additionally, the western end should be configured to support narrow-gauge Down passenger trains to cross to the down Cleveland line.

5.4.5 Cannon Hill turn back

Under operating arrangements where there is a deficit of daytime inter-peak stabling on the Cleveland corridor and an excess at Clapham, it is necessary to turnback trains at Cannon Hill such that they do not cross through the Down Cleveland at Park Road.

Key operating requirements

A turnback in the Cannon Hill area would preferably support conflict-free termination and turnback.

At a minimum the Cannon Hill turnback should support turning back up to 8 trains per hour from a flow of 16 trains per hour

Recommended upgrade

A turnback in the Cannon Hill area should preferably be in between the running lines, and include a crew platform to support them changing end.

6. Recommendations

6.1 Findings

Generally, the duplication is feasible with some land impacts along the corridor. Where these impacts are on low-value land then land take is recommended. Where corridor widening would impact high-value land uses mitigation measures such as retaining walls should be considered in the concept design development.

The infrastructure improvements and additions required for the duplication are as follows:

- Second track between Manly and Cleveland
- Station upgrades, including side platform, footbridge with lift and stair access at Birkdale and Ormiston stations
- Provision (space proofing) for a third platform at Lota to support turn back options using a layer service pattern
- OHLE cantilever side masts with 'super portals' used where slewing requires
- Relocation of sectioning equipment at Manly station
- Upgrading of signalling equipment
- Road over bridge lengthening or replacement
- Rail over bridge parallel structures
- Extended culverts

The duplication concept-design development will make provision for these when determining the future corridor requirements.

The local road authorities, (BCC and RCC), should be consulted on the likely temporary traffic management requirements and impacts to the road network during bridge expansion construction.

Following concept design direct consultation with any affected PUP owners is recommended to assess likely impacts and any protection or diversion works that may be required. This should be undertaken once the design has been developed to a stage where the preferred infrastructure footprint is known. To minimise the risk of affecting PUPs during construction further intrusive and ground penetrating radar surveys are recommended.

Consultation with QR is recommended on typical cross sections, operations and maintenance functions, clearances requirements and potential relaxations that may have to be considered to minimise land impacts of the duplication and corridor widening on neighbouring properties.

It is recommended that later project stages should include a power study and subsequent OLHE design. The power study is required to determine current network capacity and what the future duplication traction power requirements are. Where deficiencies in the existing Energex network are identified new bulk power supplies may be required to support the duplication operation.

For this project, a number of environmental risks were considered high and as a result, the project has been given a high environmental project classification. With an environmental project classification of high, a Review of Environmental Factors is typically the next step in the environmental assessment process.

6.2 Flooding assessment

The current assessment indicates that the impacts on flood risk due to widening of the existing rail line seems to pose minimal risks along the majority of the proposed project area. However, there are some locations of potential concern, where a numerical assessment (i.e. flood modelling) is required to quantify the extents of the impacts. In summary:

As a general rule, it is recommended to minimise loss of floodplain storage. Where this is unavoidable, floodplain storage compensation opportunities should be considered as a mitigation measure.

Culverts, bridges and other flow-crossing points should be designed to maintain the current flow conveyance and avoid an increase in localised energy losses, which could cause an afflux in flood depth upstream.

After analysing the existing flooding conditions, surface elevations and proximity of housing and/or infrastructure along the existing Manly-Cleveland rail line, it is apparent that the following areas are of concern:

- Ch.20,000 m to Ch.21,285 m: Areas surrounding Lota Creek and Lota station, including the Lota Creek Rail Bridge at CH. 21,285 m.
- Ch. 28,150 m to Ch. 30, 350 m: Area between Ormiston and Wellington point Station.

It is recommended that in later project stages, hydraulic modelling is undertaken for those areas of interest to quantify the likely hydraulic impacts caused by the proposed project.

6.3 Rail corridor requirements

Generally the typical cross sections contained in Appendix A, based on QR standard formation drawings will be used in the development of the concept design. Relaxations or alternatives will investigate where corridor constraints, adjacent high-value land use and land availability dictate. In this situation, a hierarchy of alternative treatments and mitigation measures will be agreed with TMR for the assessment of land impacts and requirements.

The cross-sections make provision for the following:

- Dual track at 6 m centres, note this may be reduced to 4 m at existing road over bridges to minimise works required and disruption to rail operations.
- Type 1 Rail Maintenance Access Road (RMAR), except through structures.
- Longitudinal cess drains with maintenance access (1:5 slope)
- Catch bank on the top of large cuts greater than 3 m
- OHLE side poles or super portals
- Boundary fence

6.4 Structures

As-built information of all structures, including bridges and culverts, will be required to fully assess the exact structural form and viable expansion and lengthening options and construction methods. A condition survey is also recommended to confirm the residual service life of the existing structures. In some cases, it may be required to replace the entire structure.

6.5 Recommended Staging and operational opportunities

Based on the previous SEQCI report and discussion with QR the preferred staging for the duplication is as follows,

Stage 1. Birkdale to Wellington Point (solves Manly turn back issue)

Stage 2. Wellington Point to Cleveland

Stage 3. Manly to Birkdale (ultimate duplication Manly to Cleveland)

It is recommended that the scope of the study be extended to investigate other operational efficiencies that can be gained from minor infrastructure improvements in the sections north of the Manly to Cleveland study area, notably at Lytton, Murarrie and Cannon Hill.

7. Limitations

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Appendices

Appendix A Corridor drawings

Project locality plans (2 sheets)

- 41-30842-SK004 & 41-30842-SK005

Typical cross-sections (2 sheets)

- 41-30842-G003 & 41-30842-G004

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June 14, 2017

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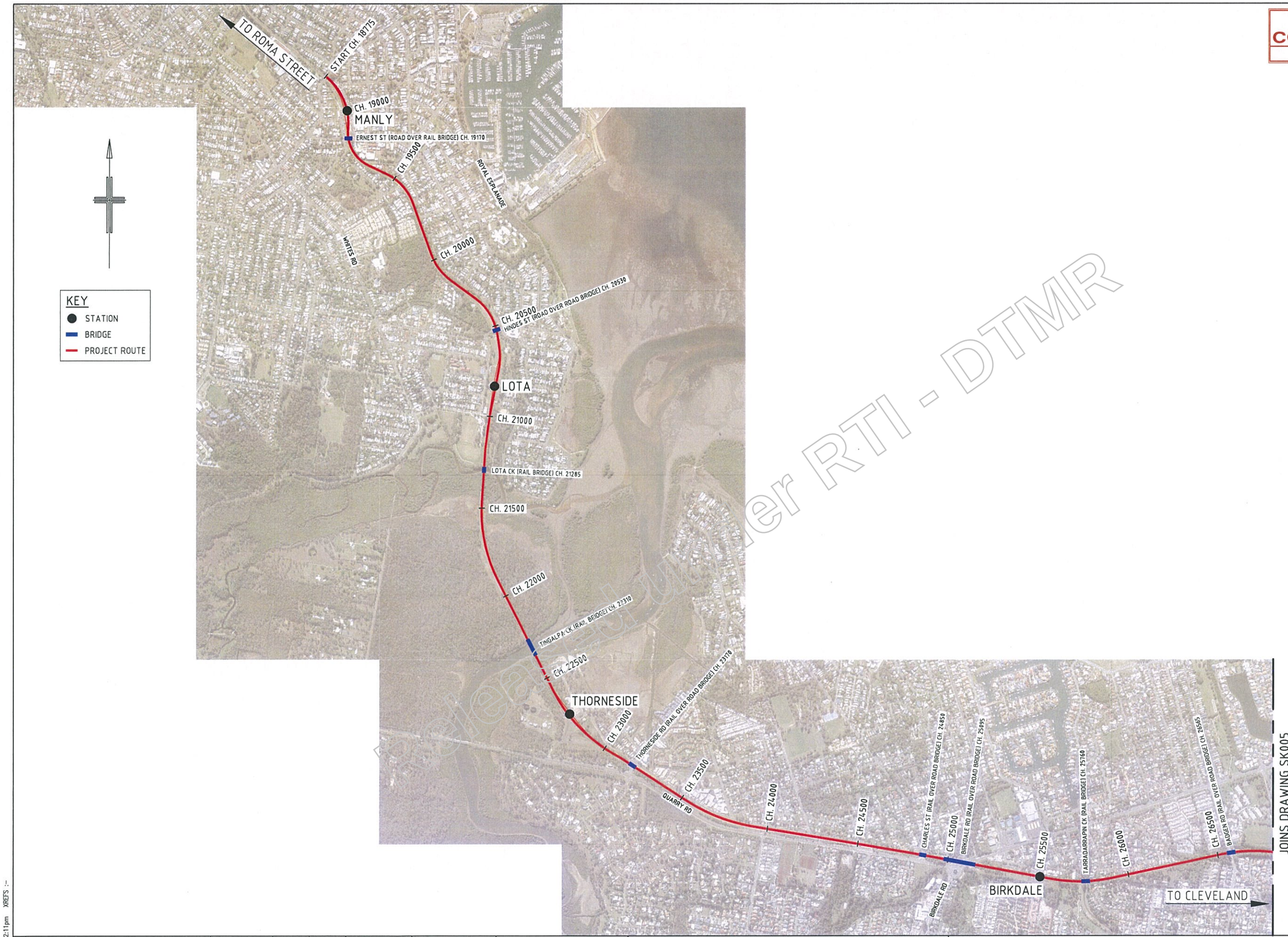

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Dimensions shown in metres except where shown otherwise

GHD project number 41-29914

SEQ - METROPOLITAN NETWORK
CLEVELAND LINE
MANLY TO CLEVELAND

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

MANLY TO CLEVELAND DUPLICATION
LOCALITY MAP
SHEET 1 OF 2

Drawn: R. BANGALAN
Designed: J. BILLINGTON

ENGINEERING CERTIFICATION (RPEQ)				
ENG. AREA	NAME	SIGNATURE	NO.	DATE
CIVIL	P. DURE-WILCOCK		16923	14/06/17

Queensland Government

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Series Number	1 of 2
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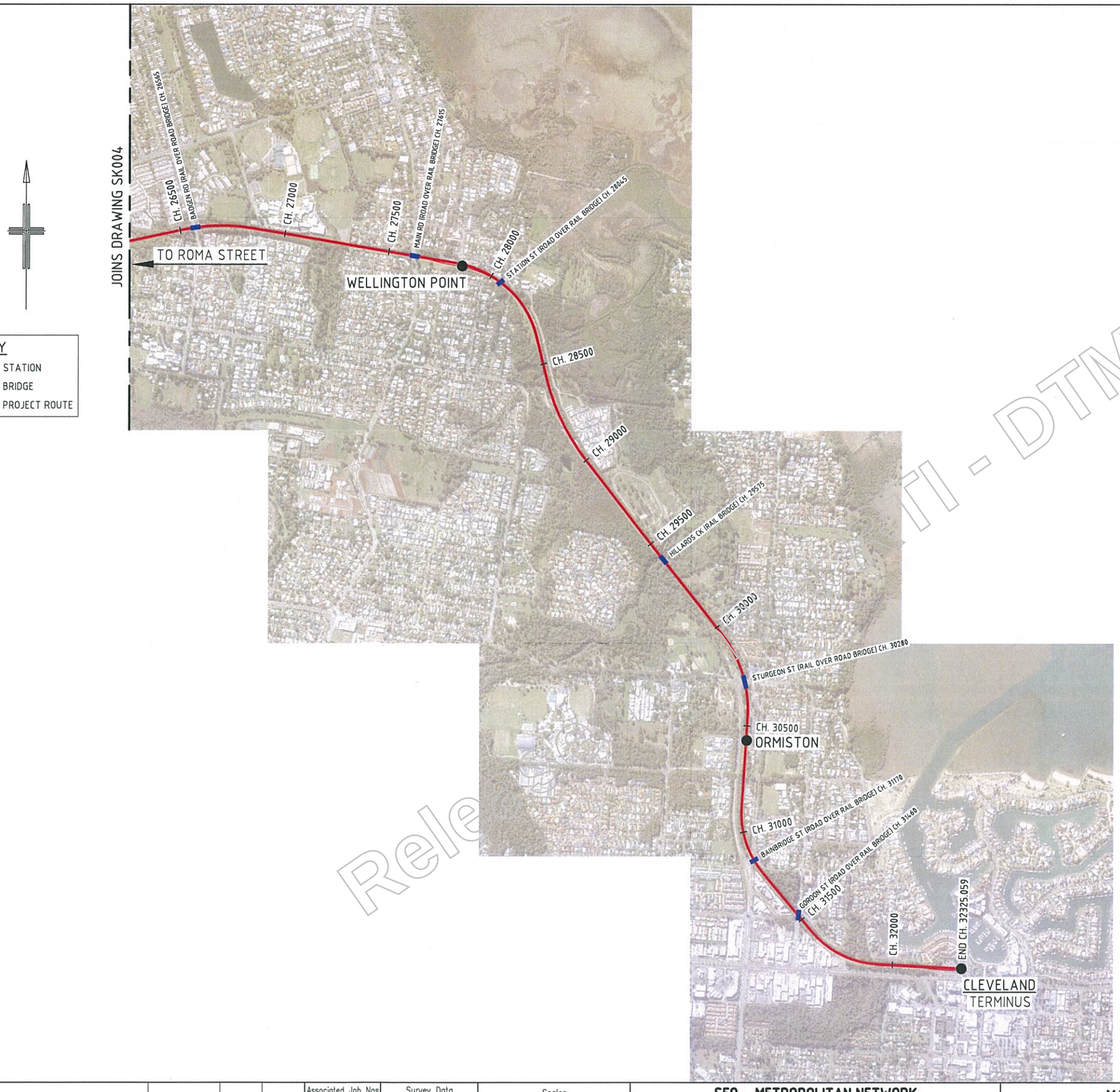

KEY
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- BRIDGE
- PROJECT ROUTE

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Dimensions shown in metres except where shown otherwise

GHD project number 41-29914

SEQ - METROPOLITAN NETWORK
CLEVELAND LINE
MANLY TO CLEVELAND

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

MANLY TO CLEVELAND DUPLICATION
LOCALITY MAP
SHEET 2 OF 2

Drawn: R. BANGALAN
Designed: J. BILLINGTON

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
CIVIL	P. DURE-WILCOCK		16923	14/06/17

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Job No.	
Contract. No.	
Drawing No.	SK005 | A
Series Number	2 of 2

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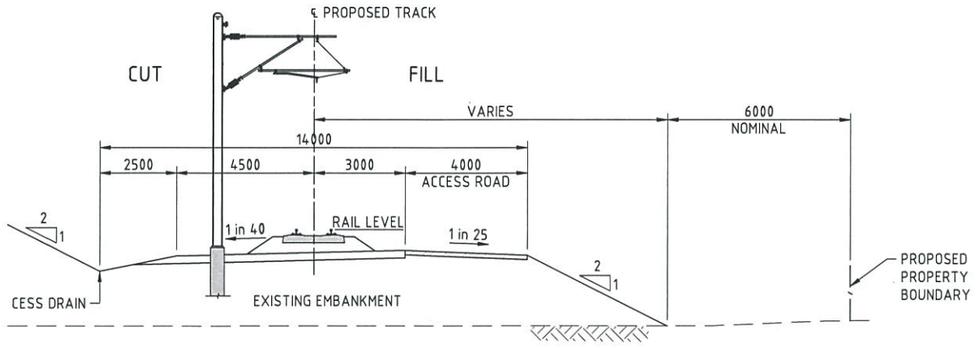

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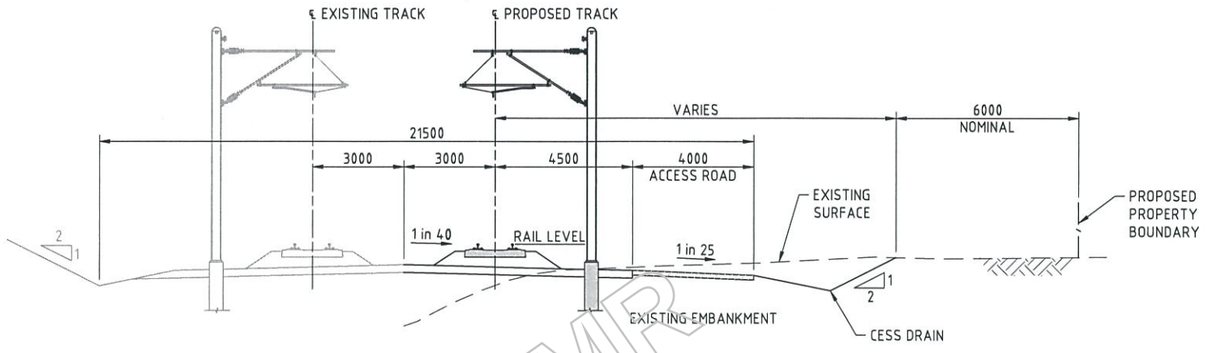

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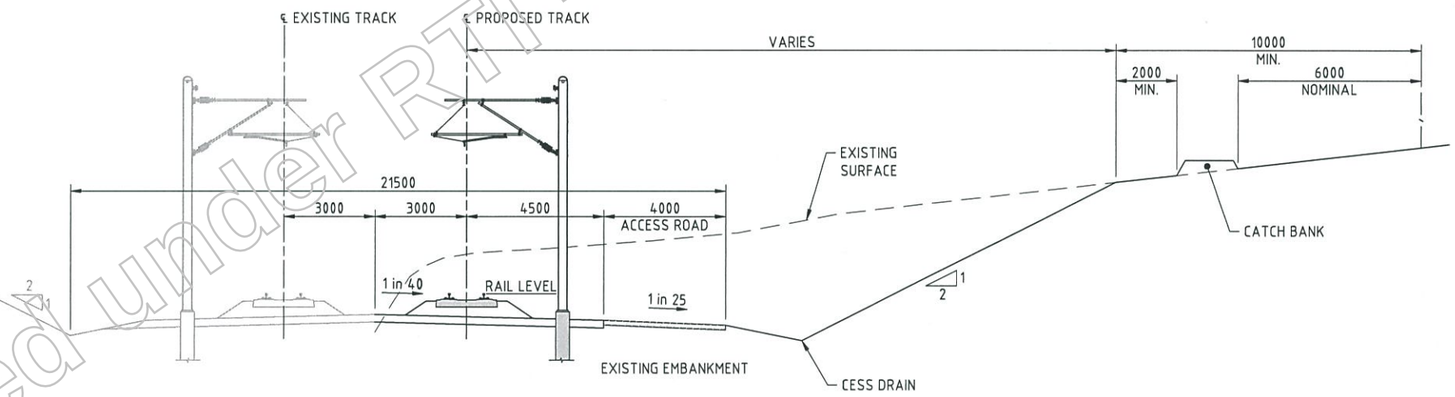

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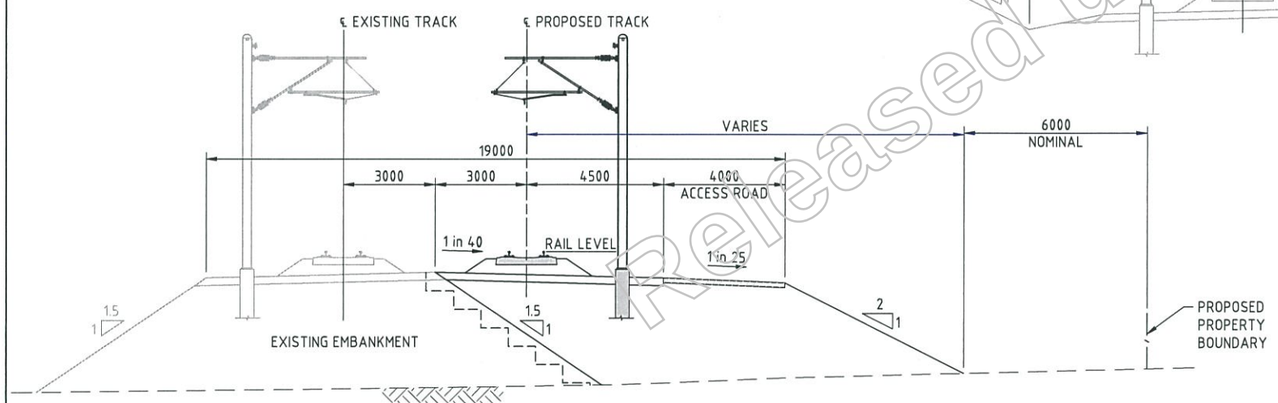

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NOTES

1. TYPICAL SECTIONS BASED ON QR STANDARD TRACK FORMATION DRAWINGS DESIRABLE MINIMUMS.

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	Revisions/Descriptions	Certification	Date	Microfiled

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Dimensions shown in millimetres except where shown otherwise

GHD project number 41-29914

SEQ - METROPOLITAN NETWORK
CLEVELAND LINE
MANLY TO CLEVELAND

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

MANLY TO CLEVELAND
TYPICAL CROSS SECTIONS
SHEET 1 OF 2

Drawn: R. BANGALAN
Designed: J. BILLINGTON

ENGINEERING CERTIFICATION (RPEQ)				
ENG. AREA	NAME	SIGNATURE	NO.	DATE
CIVIL	P. DURE-WILCOCK		16923	

Queensland Government

Job No.
Contract. No.
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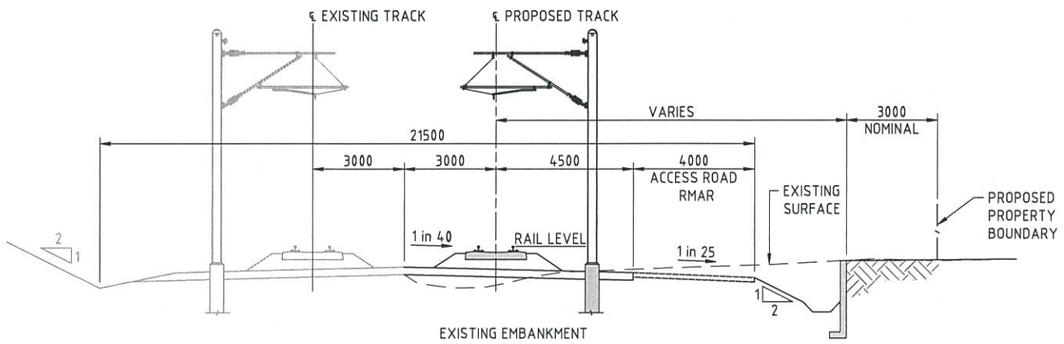
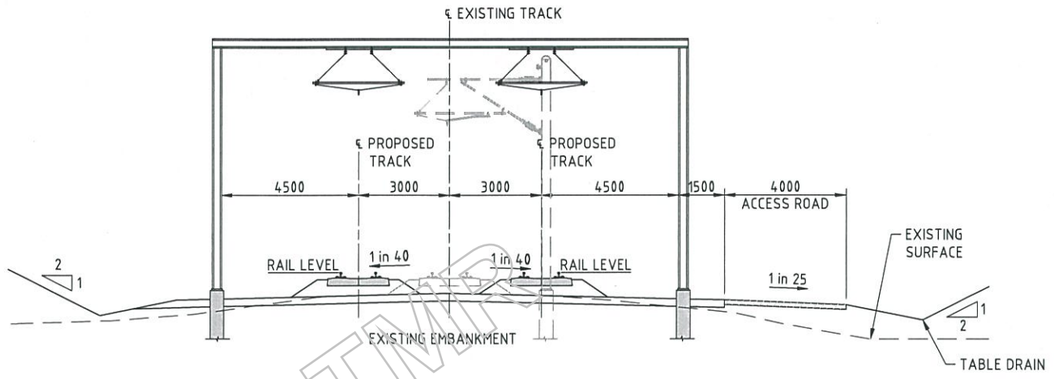
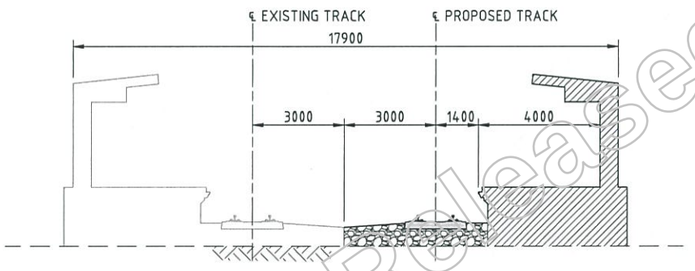


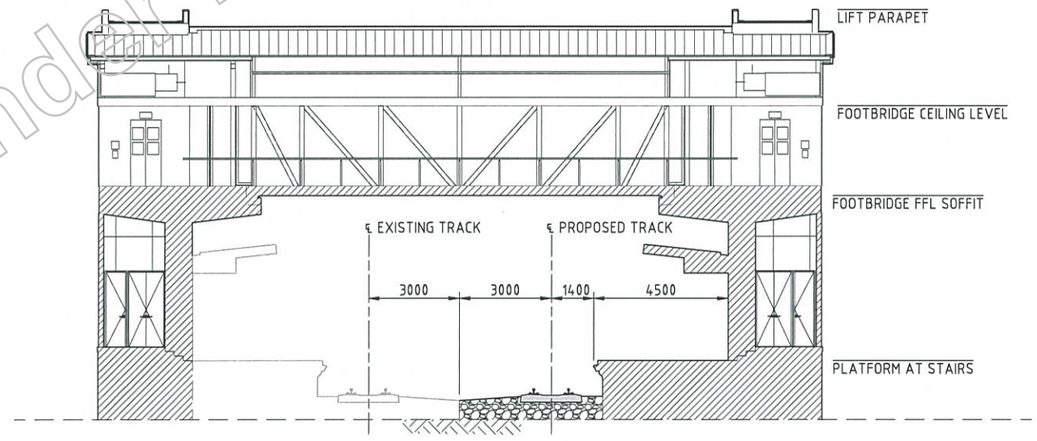
TRACK DUPLICATION WITH RETAINING WALL
SCALE 1:100



TRACK SLEW AND DUPLICATION WITH PORTAL
SCALE 1:100



TRACK DUPLICATION AT STATION PLATFORM
SCALE 1:100



TRACK DUPLICATION AT STATION PLATFORM WITH FOOTBRIDGE
SCALE 1:100

NOTES

1. BOUNDARY FENCE AT STATION LOCATIONS TO SUIT SITE CONDITIONS.

A	DRAFT CONCEPT			
	Revisions/Descriptions	Certification	Date	Microfiled

CAD FILES | G:\41\30842\CADD\Drawings\41-30842-G004.dwg

Last Modified :- Jun 14, 2017 - 12:27pm XREFS :-

Associated Job Nos

Auxiliary Drg Nos

Survey Data: Datum | Horiz. Grid | Height Origin | Survey Books

Scales: 0 1000 2000 3000 4000 5000mm — SCALE 1:100 AT ORIGINAL SIZE

Dimensions shown in millimetres except where shown otherwise

GHD project number 41-29914

SEQ - METROPOLITAN NETWORK
CLEVELAND LINE
MANLY TO CLEVELAND

Reference Points

Preceding RP	Dist. to start of job (km)	From start to end of job	From end to Following RP	Following RP

Through Chainage from

MANLY TO CLEVELAND
TYPICAL CROSS SECTIONS
SHEET 2 OF 2

Drawn: R. BANGALAN
Designed: J. BILLINGTON

ENGINEERING CERTIFICATION (RPEQ)

ENG. AREA	NAME	SIGNATURE	NO.	DATE
CIVIL	P. DURE-WILCOCK		16923	

Queensland Government

Job No.	
Contract. No.	
Drawing No.	G004 A
Series Number	4 of 16

MRR_Detail (02/14)

Appendix B Environmental scoping report

Transport and Main Roads

Environmental Scoping Report

Manly to Cleveland Rail Upgrade

Project No: 41/30532

Connecting Queensland
www.tmr.qld.gov.au

Queensland Government

PROJECT DETAILS			
TMR Region	Metropolitan Region		
Project Name / Description	Manly to Cleveland Rail Upgrade (TTA17-039)		
Project Number	4130842		
Project Location	Manly to Cleveland Rail		
Local Government Area	Brisbane City Council and Redland City Council	**QTRIP WBS**	
Road No / Facility No		**DMS Reference**	

REPORT PREPARATION			
I have prepared this report based on the best information available at the time. I have taken into account, to the fullest extent possible, all actual and potential environmental impacts of the project.			
Name	Emma Rothwell	**Signature**	Not Relevant
Position	Senior Environmental Consultant	**Date**	13/06/2017
REPORT REVIEW			
Name	Georgina Rowe	**Signature**	Not Relevant
Position	Senior Environmental Scientist	**Date**	13/06/2017

VERSION HISTORY			
Version No.	**Date**	**Changed by**	**Nature of Amendment**
A	13/06/2017	GHD Pty Ltd	Original Draft

PROJECT MANAGER ACCEPTANCE			
I agree that this report has been prepared based on the project scope at the time, and accept responsibility for ensuring any future changes to the scope are appropriately assessed.			
Name	Paul Dure-Wilcock	**Signature**	Not Relevant
Position	Principal Civil Engineer	**Date**	13/6/2017

***Note**: This Environmental Scoping Report shall remain current for 12 months. A review will be required after this time should further subsequent assessment or management actions not be undertaken.*

Contents

SUMMARY

An environmental component classification of [~~low / medium /~~ high – refer to Section 5] has been determined based on the identified environmental risks associated with works proposed by the project

HIGH		
Further detailed environmental assessment (Review of Environmental Factors and Environmental Management Plan (Planning)) is required prior to finalisation of the Business Case. **Issue summary of risk elements requiring further assessment**		
ISSUE	**RISK**	**RECOMMENDATION/S**
Watercourses – the Project crosses a number of watercourses including Hilliards Creek, Tarradarrapin Creek, Tingalpa Creek and Lota Creek.	High	REF to investigate the potential impacts on waterways and the downstream Moreton Bay Ramsar Wetland. Implementation of a water quality monitoring program at REF stage is envisaged in order to collect background data.
Wetlands – the project has the potential to directly impact four areas of mapped Matters of State Environmental Significance (MSES) High Ecological Significance (HES) wetland and indirectly impact downstream HES and the Moreton Bay Ramsar Wetland (MNES).	High	REF to investigate the potential impacts on wetlands. A determination of whether there is a significant residual impact on the MNES and MSES wetlands needs to be made in accordance with the Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE 2013) and Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009 (DSDIP, Dec 2014) respectfully. The MNES assessment will determine whether referral under the EPBC Act is required. These assessments will help identify whether offsets are required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy.
Acid sulfate soils – potential disturbance of acid sulfate soils during construction as a result of excavations.	High	REF to investigate presence of acid sulfate soils.
Contaminated Land – potential to impact contaminated land during excavation works.	Medium	REF to investigate presence of contaminated land.
Flora and fauna – potential impacts on flora and fauna listed as Matters of National Environmental Significance (MNES) and protected plants under the *Nature Conservation Act 1992* (NC Act) as a result of alignment location.	High	A determination of whether there is a significant residual impact on the MNES and MSES wetlands needs to be made in accordance with the Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE 2013) and Significant Residual Impact Guideline for matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009 (DSDIP, Dec 2014) respectfully. The EPBC Act referral

		guidelines for the vulnerable koala (DotE, 2014) will also need to be addressed when undertaking the self-assessment. Flora and fauna assessment surveys may need to be undertaken to help inform the self-assessment. The MNES assessment will determine whether referral under the EPBC Act is required. These self-assessments will identify whether offsets are required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy. A protected plants survey in accordance with the Flora Survey Guidelines – Protected Plants (EHP, Dec 2016) will need to be undertaken for the areas of the alignment that are within the flora survey trigger area (and the 100m buffer area). Exempt clearing notification (when no protected plants are identified) must be made within one year of undertaking the protected plants survey. Animal breeding places to be identified during field survey.
Flora - Marine plant disturbance as a result of the Project footprint.	High	REF to investigate presence of marine plants.
Cultural heritage – potential to impact Aboriginal cultural heritage as a result of the Project construction.	Medium	Conduct a specialist review of the duty of care guidelines requirements (the Cultural Heritage Duty of Care Guidelines are currently under review with DATSIP intending to release draft revised Guidelines by 28 July 2017). Cultural Heritage clearance to be sought with the relevant Aboriginal parties.
An Options Analysis ~~was /~~ was not undertaken as part of this report (Section 4).		

Future environmental assessment and management actions, their timing and estimated costs are detailed in Future Actions & Cost (Appendix A). They shall be incorporated into the project's Primavera Schedule and Cost Estimate.

1 INTRODUCTION

In accordance with TMR's Environmental Processes Manual (2012), the purpose of the Environmental Scoping Report (ESR) is to assign an environmental component classification level to the project of low, medium or high. This classification directs the actions and required outputs during future phases of the project to ensure potential impacts on the environment are identified and managed where appropriate. Guidance in completing the report is available from the Procedure: Environmental Scoping Report.

1.1 Project Background

The Department of Transport and Main Roads (TMR) propose to upgrade the Cleveland Rail Line to meet future requirements and facilitate the efficient movement of people and freight.

The Cleveland Rail Line is a rail corridor located between Park Road junction and Cleveland station, and is approximately 37 km in length. The line primarily supports commuter movements to Brisbane's Central Business District, eastern suburbs and Redland City, and accommodates freight movements to the Port of Brisbane.

The single track section between Manly and Cleveland limits the effective capacity of the entire Cleveland Line. In particular, the current configuration does not allow for an improvement on 15-minute frequencies between Manly and Cleveland in either direction.

The Park Road to Cleveland – Rail Upgrade Planning Project includes two stages:

- Stage 1: Duplication between Manly and Cleveland.
- Stage 2: Stabling opportunities between Park Road and Cleveland.

This ESR is for Stage 1 only (hereafter referred to as the Project).

1.2 Project Scope

The project scope involves the following elements and activities –

The existing Manly to Cleveland section of the Cleveland Line currently consists of:

- A single (electrified) track from Manly to Cleveland
- Stations at Manly, Lota, Thorneside, Birkdale, Wellington Point and Ormiston
- A double track terminal station at Cleveland
- Passing loops at Lota, Thorneside and Wellington Point
- Two holding roads at Manly station.

The project proposes to duplicate the track between Manly and Cleveland stations and upgrade Ormiston and Birkdale stations with a second platform and lift and stair access.

1.3 Project Location and Climate

The Project is located between Manly and Cleveland in the Brisbane City Council Local Government Area (north of Tingalpa Creek) and the Redlands City Council Local Government Area (Figure 1).

Figure 1 Project location
G:\41\30842\GIS\Maps\PDF\41_30842_002_ProjectLocation_rev_A.pdf

Data has been obtained from the Bureau of Meteorology (BoM) website (http://www.bom.gov.au) for climate information surrounding the Project to determine any potential effects of climate. The information sourced from the BoM includes the following:

- Mean maximum and minimum temperatures (monthly and annual)
- Mean annual rainfall, seasonal variations and number of rain days.
- 9 am and 3 pm conditions including temperature, humidity and wind speeds

The nearest BoM meteorological monitoring station to the site that is also located along the coastline is Brisbane Airport (ID 040842) and a summary of the meteorology (1992-2017) is provided in Table 1.

Table 1 Climate statistics for Brisbane Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature													
Mean maximum temperature (°C)	29.0	29.1	28.0	26.0	23.6	21.2	20.9	21.9	24.2	25.5	26.9	28.1	25.4
Mean minimum temperature (°C)	21.3	21.2	19.7	16.4	12.9	10.7	9.1	9.8	12.8	15.6	18.3	20.1	15.7
Rainfall													
Mean rainfall (mm)	136.4	118.4	107.6	75.8	101.1	69.7	28.9	40.1	34.7	69.5	97.7	126.3	1048.9
Decile 5 (median) rainfall (mm)	94.4	118.8	90.6	50.2	55.4	55.2	20.8	25.6	25.4	45.6	97.8	109.0	1077.5
Mean number of days of rain ≥ 1 mm	9.0	8.6	9.1	7.4	7.1	5.8	4.0	4.0	4.6	5.6	8.6	9.2	83.0
9 am conditions													
Mean 9am temperature (°C)	26.4	26.2	25.1	22.4	19.0	16.1	15.3	17.0	20.5	22.6	24.1	25.6	21.7
Mean 9am relative humidity (%)	66	68	67	67	68	70	65	60	59	59	62	64	65
Mean 9am wind speed (km/h)	15.5	14.3	14.3	14.5	15.7	15.6	16.3	15.3	15.0	15.5	16.2	16.2	15.4
3 pm conditions													
Mean 3pm temperature (°C)	27.4	27.5	26.4	24.5	22.3	20.0	19.6	20.4	22.5	23.6	24.9	26.5	23.8
Mean 3pm relative humidity (%)	63	63	61	58	56	55	50	50	55	58	61	62	58
Mean 3pm wind speed (km/h)	23.3	21.2	20.8	18.8	16.7	16.5	17.8	20.4	24.0	25.3	24.8	24.7	21.2

Source: BoM

1.4 Scoping Assessment Methodology

The environmental scoping report was developed to assess the environment and heritage risks associated with the Project and identify risks and approval requirements for the next stages. The aim of the environmental scoping report was to conduct a desktop assessment to gain a preliminary understanding of the mapped environmental values present within close proximity to the proposed Project alignment. The desktop investigation involved querying the following databases:

- Australian heritage database, Queensland Heritage Register, Brisbane City Council and Redland Shire Council Planning Scheme heritage overlay mapping

- Aerial photography
- Brisbane City Council Online Mapping Services
- South East Queensland (SEQ) Koala Conservation State Planning Regulatory Provisions (SPRP) koala habitat mapping and SEQ State Planning Policy (SPP) koala habitat mapping
- Department of Environment and Heritage Protection (EHP) Protected Plants Flora Survey trigger mapping (EHP, 2016)
- Department of Infrastructure, Local Government and Planning (DILGP) Development Assessment (DA) Mapping
- DILGP State Planning Policy (SPP) interactive mapping system
- Department of Natural Resources and Mines (DNRM) Regulated Vegetation Management Mapping version 8.0 (NRM, 2016)
- Department of Science, Information Technology and Innovation's Wildlife Online Database (DSITI, 2016)
- DNRM Essential Habitat data, version 4.7 (DNRM, 2016)
- DNRM Regulated Vegetation Management Mapping (DNRM 2017)
- Matters of State Environmental Significance Mapping (MSES)
- Queensland Globe
- Queensland Herbarium Regional Ecosystem (RE) Description Database (Queensland Herbarium, 2016)
- Queensland Waterways Waterway Barrier Works Stream order (DAFF 2016)
- Redlands City Council Planning Scheme
- Redlands Council Online Mapping Services (e.g. Acid Sulfate Soils Overlay Map)
- The Department of Aboriginal and Torres Strait Islander Partnership - Aboriginal cultural heritage search
- The Department of the Environment and Energy's (DEE) EPBC Act Protected Matters Search Tool

2 ENVIRONMENTAL FACTORS & RISK IDENTIFICATION

WATER	*Risk Rating – N/L/M/H
Factors Identification - *Factors present, or potentially present, within / near to the project footprint*	
☒ Freshwater (Surface and groundwater, including wetlands) ☒ Marine (Coastal, marine environment and non-freshwater) The project area is located within the Logan-Albert drainage basin and crosses a number of watercourses including Hilliards Creek, Tarradarrapin Creek, Tingalpa Creek and Lota Creek. **Freshwater and estuarine waterways for waterway barrier works** The following waterways are mapped as waterways requiring waterway barrier works development approval or compliance with a self-assessable code for waterway barrier works under the *Fisheries Act 1994*: • CH 20500 - Green (low) waterway (stream order 1 under *Water Act 2000*) • CH 25000 – Orange (moderate) waterway (stream order 1) • CH 25750 – Red (high) waterway (Tarradarrapin Creek) (stream order 1) • CH 29600 – Red (high) waterway (Hilliards Creek) (stream order 2) • CH 30000 - Green (low) waterway (stream order 1) **Tidal waterways for prescribed tidal works and waterway barrier works** There are two waterways that will require a prescribed tidal works development approval for the proposed crossings: • CH 21300 – tidal waterway (Lota Creek) • CH 22300 – tidal waterway (Tingalpa Creek) **Fish Habitat Area** No mapped Fish Habitat Area **Coastal protection** The rail line is within the coastal zone. The Project is within the Coastal Management District (CMD) between CH 20650 and CH 23150. The CMD runs parallel to the railway line between CH 29100 and CH 29350. Lots adjacent to the rail corridor within the CMD include: • 2SP20518236 (Freehold (FH)) • 1RP227162 (FH) • 5RP902627 (FH) • 624SP104139 (Reserve)	High

- 635SP104139 (Reserve)
- 1RP33378 (FH)
- 43SP133481 (FH)
- 2RP197268 (FH)
- 4RP197268 (FH)
- Lota Creek (Unallocated State Land (USL))
- Tingalpa Creek (USL)
- Railway Parade Park (FH)
- 1SP247793 (FH)

Coastal hazard area

- The railway corridor is excluded from the coastal hazard area mapping.
- Erosion prone area, outside the rail corridor, CH 28200 to CH 28500
- Medium stormtide inundation area, outside the rail corridor CH 28200 to CH 28600
- High storm tide inundation area, outside the rail corridor, CH 28200 to CH 28500

Wetlands

The alignment is adjacent to the Moreton Bay Ramsar wetland between CH21300 and CH21600 and is within the mapped wetland for approximately 100 m south of Lota Creek.

The rail alignment is not within a wetland protection trigger area.

Matters of State Environmental Significance (MSES) - High ecological significance (HES) wetlands are mapped at the following chainages: CH 21300 to CH 21600, CH 22250 to CH 22700, CH 27100 to CH 27300 and CH 28600 to CH 28900.

Groundwater

The Project area is located within the Logan Basin catchment and is affected by the *Water Plan (Logan Basin) 2007* and the Logan Basin resource operations plan. The Project is within the Redlands subcatchment (10). There are no Groundwater Management Areas within the Logan Basin catchment.

Aspects & Impacts - *Proposed project aspects with the potential to impact on factors identified*

Planning & Design – Design of waterway crossings can mitigate operational impact and also the construction impact to waterbodies (including wetlands) and fauna that utilise the wetlands and therefore also has the potential to impact offset requirements. Additionally, design could impact the requirement for water barrier works development approval. To avoid development approvals, waterway crossings could be designed to meet the self-assessable code *WWBW01-P3 Construction and maintenance of culverts* for culvert crossings or to meet the definition for a single or multi-span bridge that is not a waterway barrier. Details are provided in the legislation section below.

It is envisaged that a water quality monitoring program would be implemented during the design phase.

Construction - Construction activities may require the construction of a temporary waterway barrier and prescribed tidal works, which could trigger a development approval(s). However, if this work is conducted in accordance with the *WWBW02: Temporary waterway barrier works code for self-assessable development* then a development approval can be avoided.	
Operation – there is the potential for operational impacts from the rail line on fauna species utilising the Moreton Bay Ramsar wetland and HES wetlands along the alignment, however potential impacts may be avoided through planning and design.	
Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☒ Applicable legislation	*Coastal Protection and Management Act 1995* (CPM Act) *Environmental Offsets Act 2014* *Fisheries Act 1994* *Environmental Protection Act 1994* *Sustainable Planning Act 2009* (being replaced in July 2017 by the *Planning Act 2016*)*Environment Protection and Biodiversity Conservation Act 1999* *Water Act 2000*
☒ Identified permits, codes or other requirements	***Fisheries Act 1994*** Operational works for waterway barrier works (permanent infrastructure) or: • Undertaken in accordance with the self-assessable code WWBW01–P3; Construction and maintenance of culverts. This code does not apply to construction of new waterway barriers on purple or grey (tidal) waterways. • Designed to meet the definition for a single or multi-span bridge that is not a waterway barrier. Operational works for waterway barrier works (temporary construction infrastructure or: • If the construction work can be conducted in accordance with the WWBW02; Temporary waterway barrier works; a waterway barrier work development approval will not be required for construction. ***Coastal Protection and Management Act 1995*** Operational works for tidal works (prescribed tidal works) or work in a coastal management district Interfering with quarry material on state coastal land Quarry allocation notice ***Environment Protection and Biodiversity Conservation Act 1999*** A self-assessment using *The Matters of National Environmental Significance – Significant impact guidelines 1.1* (Department of the Environment and Energy, previously Department of the Environment (DotE) 2013) should be undertaken to determine the potential for significant residual impact to wetlands of international importance (Moreton Bay Ramsar Wetland). This assessment will determine whether referral under the EPBC Act is required.

	Environmental Protection Act 1994 A determination of whether there is a significant residual impact on the MSES wetland needs to be made in accordance with the *Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009* (DSDIP, Dec 2014). ***Environmental Offsets Act 2014*** Where impacts on MNES and MSES are determined to have a significant residual impact, offsets may be required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy. ***Water Act 2000*** WSS/2013/726 Version 1.02 Riverine protection permit exemption requirements

SOIL / LAND MANAGEMENT	***Risk Rating -**
Factors Identification - *Factors present, or potentially present, within / near to the project footprint*	
☒ Soil types ☒ Problem soils (eg erodible, saline, ASS) ☒ Contaminated land ☒ Topography ☒ Geology **Soils and Geology** There are two land resource areas mapped within the Project area; coastal plains and red volcanics (Department of Primary Industries, 1994, Moreton Region Land Resource areas, scale 1:250000). <u>Coastal Plains</u> Landform – alluvial plains, swamps, sand dunes, tidal flats Soils – Humic gleys, humus podzols, coarse structured clays, solonchaks Geology – estuarine clays, alluvium, dune sands <u>Red volcanics</u> Landform – steep mountains, hills and rises Soils – shallow black earths and prairie soils, lithosols, non-calcic brown soils Geology – basalt, andesite, dolerite, gabbro **Acid Sulfate Soils** The majority of the alignment is land that is below 5 m AHD or land above 5 m AHD and below 20 m AHD. The start of the alignment between CH 18775 and CH 19500 is above 20 m AHD. Potential for disturbing acid sulfate soils exists within the majority of the project area	High

where excavations extend below 5 m AHD. **Contaminated land** Environmental Management Register (EMR) and Contaminated Land Register (CLR) searches have not been undertaken for the impacted lots. The majority of the corridor runs through residential areas with schools, childcare centres and parks or previously undeveloped land. Three areas of industry along the corridor include the Thorneside Sewage Treatment Plant and industrial buildings located north of the corridor near Thorneside/Birkdale and south of the corridor near Cleveland, which could potentially contain contaminated land. The rail line and associated stations may also be listed on the CLR or EMR. **Topography** The topography within the Project area is generally flat with some slight undulations. The start of the alignment CH 18775 is the highest point of the alignment.	
Aspects & Impacts - *Proposed project aspects with the potential to impact on factors identified*	
Planning & Design – Acid sulfate soils have the potential to impact on adjacent sensitive environments (i.e. wetlands, marine plants, Moreton Bay). A preliminary acid sulfate soil investigation within the areas of disturbance likely to contain ASS should be undertaken. Avoidance should considered during the design where feasible. If dewatering of groundwater is required, it is envisaged that a preliminary groundwater investigation be undertaken to determine the suitability for discharge to surface or stormwater or for irrigation or dust suppression. Permanent erosion and sediment control should be incorporated into the design. It is envisaged that a site investigation would be conducted to determine the potential for contaminated land on impacted lots.	
Construction – The risks associated with contamination are the off-site migration of aqueous and free phase contaminants to surface and ground water sources, as well as the potential cross-contamination of clean soils with contaminated material. Risks to the environment may be most pronounced where contamination adversely impacts on water quality and the ecological functioning of waterways and Moreton Bay. During the construction works, if suspected contaminated soil or waste material is identified, the material will be required to be assessed and appropriately managed. It is envisaged that an acid sulfate soils management plan will need to be implemented during construction. The off-site migration of soils poses a risk to the local environment due to the risk of sedimentation of waterways and reduced potential for rehabilitation success due to loss of topsoil in the form of sheet and gully erosion. Off-site migration of soils to nearby waterways may result in an adverse impact on water quality and ecological functioning of waterways, wetlands and Moreton Bay. An erosion and sediment control plan will be required for construction.	
Operation - Soil disturbance is not expected in the operational phase of the Project. Provided appropriate treatments are integrated into the design and rehabilitation is undertaken satisfactorily post construction (particularly for erosion and ASS), no significant impacts to soil as a result of the operational phase of the Project	

are anticipated.	
Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☒ Applicable legislation	*Environmental Protection Act 1994* *State Planning Policy, April 2016*
☒ Identified permits, codes or other requirements	***Environmental Protection Act 1994*** Application for a disposal permit for contaminated soil. ***State Planning Policy, April 2016*** Queensland Acid Sulfate Soil Technical Manual (2014), Soil Management Guidelines v4.0.

FLORA AND FAUNA	***Risk Rating -**
Factors Identification - *Factors present, or potentially present, within / near to the project footprint*	
☒ Protected fauna (including terrestrial, marine, amphibious and aquatic animals) ☒ Protected flora, ecosystems and habitat ☒ Pest flora and fauna (including spraying or treating pests with chemicals) **Protected fauna** The EPBC Act Protected Matters Report identified the following as potentially occurring or potentially having habitat within 2 km of the project area: • 14 endangered and critically endangered bird species • four endangered mammal species • three endangered reptile species • one critically endangered shark species • 32 vulnerable species of birds, fish, mammal, reptile and shark The Queensland Department of Environment and Heritage Protection (EHP) Wildlife Online search identified critically endangered, endangered and vulnerable species as being recorded within 2 km of the project area including: • Critically endangered or endangered species (great knot, curlew sandpiper, eastern curlew, lesser sand plover and red knot). • Vulnerable species (koala, grey-headed flying fox, Western Alaskan bar-tailed godwit, greater sand plover, tusked frog, dugong (unlikely to be impacted due to distance to the coast line) and beach stone-curlew). Essential habitat areas are mapped inside the rail corridor or immediately adjacent at the following chainages: • CH 21600 to 22300 • CH 27100 to 27300 Due to the wider surrounding environment, there is potential that protected bird species may overfly the area or occasionally visit for foraging purposes. Mammal	High

species, namely bats, are considered unlikely within the immediate project area due to the surrounding residential development; however, they may occasionally overfly the area.

Protected flora

DNRM Regulated Vegetation mapping identifies remnant vegetation inside the rail corridor or immediately adjacent at the following chainages:

- CH 19800 to 20000
- CH 21250 to 22400
- CH 27100 to 27300

The rail corridor intersects two *High Risk* areas identified on the EHP Protected Plants Flora Survey Trigger Map at the following chainages:

- CH 18875 to 22500
- CH 23100 to 24000

The EPBC Act Protected Matters Report also identified the following flora as likely to occur or may occur within 2 km of the project area:

- One (1) endangered plant (lesser swamp-orchid [*phaius australis*]). This species has previously been recorded within 2 km of the rail corridor in the northern region of the alignment.
- Nine (9) vulnerable plant species. None of these species were previously recorded within 2 km of the alignment.

The EHP Wildlife Online search identified a number of 'least concern' species of native plants and naturalised species that were introduced to Queensland as being recorded within 2 km of the project area. As mentioned above, endangered plant (lesser swamp-orchid) was also recorded.

The EPBC Protected Matters Report identifies two threatened ecological communities, 'Lowland Rainforest of Subtropical Australia' and 'Subtropical and Temperate Coastal Saltmarsh', as potentially occurring within 2 km of the rail corridor. These communities are not located within the project corridor, however may be associated with remnant vegetation immediately outside of the corridor.

Marine Plants

As the rail corridor is located within a tidal zone and crosses tidal watercourses, it is likely marine plants will be disturbed.

Matters of State Environmental Significance

The SPP Mapping (DNRM) showed the rail corridor intersects with the following MSES:

- Wildlife habitat: CH 19800 to 20000, 21250 to 21600, 27100 to 27300, 28100 to 28500, 28750 to 30750, 31200 to 31500, 31750 to 32400
- Regulated vegetation: CH 21300, 21500 to 22400, 23300 to 23600, 27100 to 27300
- Regulated vegetation intersecting a watercourse: CH 20500, 21300, 22250,

23250, 25000, 25750, 27250, 29550, 30000

- High ecological significance wetlands: CH 21300 to 21600, 22250 to 22700, 27100 to 27300, 28600 to 28900

Additionally, wildlife habitat and regulated vegetation adjoin the railway corridor.

Koala

There are a number of areas within the alignment that trigger both the South East Queensland Koala Conservation Planning Regulatory Provisions (SPRP) (Nov 2015) and State Planning Policy (SPP) 2016 for koala habitat as follows:

SPRP

- CH 21000 – CH 28000: Within priority koala assessable development area and medium value rehabilitation under SPRP
- CH 28000 – CH 32325: Within priority koala assessable development area, medium value rehabilitation and medium value bushland under the SPRP

SPP

- CH 18755 – CH 19000: Within 'low value other' area under SPP
- CH 19000 – CH 20000 and CH 28000 – CH 32325: Within medium value rehabilitation and medium value bushland under SPP
- CH 20000 – CH 21000: Within low value rehabilitation under SPP
- CH 21000 – CH 28000: Within medium value rehabilitation

Both the Brisbane City Council and Redlands City Council have mapped koala habitat area. The Redlands planning scheme has an additional regrowth koala habitat area mapped.

Pest flora and fauna

Forty-three (43) species are listed as invasive on the EPBC Protected Matters Search Report including 22 pest flora, eight birds, one frog, ten mammals and two reptiles.

Review of the EHP Wildlife Online results indicates that pest species may be present within the area; however, the rail corridor and surrounding area is regularly maintained by QR and as such existing weed species presence is considered low.

Aspects & Impacts - *Proposed project aspects with the potential to impact on factors identified*

Planning & Design – Clearing to be avoided for investigations in the design phase where possible.

Measures from Table 4 of the Koala Conservation SPRP incorporated into design and CEMP as per the EHP and TMR Memorandum of Agreement for government supported transport infrastructure within the South East Queensland Koala Protection Area (MOA).

Construction – Declared environmental weeds are at risk of being spread. The project will impact flora and fauna through disturbance or removal of vegetation (including habitat). The construction phase has the potential to increase animal mortality, change drainage patterns, edge effects and temporary degradation of aquatic habitat.

Operation – Operation of the rail line has the potential for declared and environmental pest species to spread

within the rail corridor, there is also the potential for vehicle/train strikes.	
Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☒ Applicable legislation	*Nature Conservation Act 1992* *Vegetation Management Act 1999* *Environment Protection and Biodiversity Conservation Act 1999* *Biosecurity Act 2014* *Environmental Offsets Act 2014* *Fisheries Act 1994* *Local Law No. 6 Protection of Vegetation* (Redlands Shire Council area) *Natural Assets Local Law 2003* (NALL) (Brisbane City Council area) South East Queensland Koala Conservation Planning Regulatory Provisions (Nov 2015)
☒ Identified permits, codes or other requirements	***Nature Conservation Act 1992*** Flora Survey Guidelines – Protected Plants (EHP, Dec 2016) Protected Plant Permit OR Exempt clearing notification (protected plants) Requirements for tampering with a protected animal breeding place in Queensland, (EHP, May 2016) TMR's Species Management Plan (low risk impacts) 29 June 2016 (expiry 1 July 2019) **South East Queensland Koala Conservation Planning Regulatory Provisions** EHP and TMR Memorandum of Agreement for government supported transport infrastructure within the South East Queensland Koala Protection Area. ***Environmental Protection Act 1994*** A determination of whether there is a significant residual impact to MSES needs to be made in accordance with the *Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009* (DSDIP, Dec 2014). ***Environment Protection and Biodiversity Conservation Act 1999*** A self-assessment using *The Matters of National Environmental Significance – Significant impact guidelines 1.1* (DotE 2013) should be undertaken to determine the potential for significant residual impact to protected flora or fauna. This assessment will determine whether referral under the EPBC Act is required. ***Environmental Offsets Act 2014*** Where impacts on MNES and MSES are determined to have a significant residual impact, offsets may be required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy.

	Fisheries Act 1994 Operational work that is the removal, destruction or damage of a marine plant ***Natural Assets Local Law 2003* (NALL) (Brisbane City Council area)** Permit to work on protected vegetation (required for work on freehold land only) ***Local Law No. 6 Protection of Vegetation* (Redlands Shire Council area)** Permit permitting damage to protected vegetation (required for work on freehold land only) ***Vegetation Management Act 1999*** The Project is not assessable development for clearing of native vegetation (as defined in the *Vegetation Management Act 1999)* under Schedule 24, Part 1, Item 1 (11) of the Sustainable Planning Regulation 2009 – clearing for the construction of community infrastructure (rail transport infrastructure) that is government supported transport infrastructure. ***Biosecurity Act 2014*** Compliance will be required during the construction phase to prevent spread of existing pest species and the introduction of new declared pest species. Prohibited invasive plants and restricted invasive plants must be controlled within the area of works. ***Environmental Offsets Act 2014*** Where impacts on MNES and MSES are determined to have a significant residual impact, offsets may be required in accordance with the Queensland environmental offsets framework and EPBC Act environmental offsets policy.

CULTURAL HERITAGE	***Risk Rating -**
Factors Identification - *Factors present, or potentially present, within / near to the project footprint*	
☐ Indigenous heritage ☐ Historical and European heritage ☐ Natural Heritage and Iconic Places **Cultural heritage** Three cultural heritage site points are located within 2 km of the rail corridor including: • LB:A42 – Earthern Arrangements (Quandamooka Coast Claim) • LB:A48 – Scarred/Carved Tree (Quandamooka Coast Claim) • LB:F33 – Scarred/Carved Tree (Quandamooka Coast Claim) These points are located at least 200 metres away from the rail corridor and are unlikely to be impacted. The Aboriginal Parties for the area are: • Turrbal People (QC1998/026)	Medium

• Quandamooka Coast Claim (QC2017/004) **Local and State heritage** Two local heritage places are located adjacent to the railway corridor including: • Manly State School Lot 429 SL9450 - East of corridor at CH19100 to 19400 • Ormiston Fellmongery Lot 1 RP123669 - West of the corridor at CH30000 Ormiston Fellmongery is also a State Heritage listed. **National heritage** No National or World Heritage places are located within 2 km of the rail corridor.	
Aspects & Impacts - *Proposed project aspects with the potential to impact on factors identified*	
Planning & Design – The 'duty of care guidelines' are currently under review and it is envisaged that a specialist review of the new requirements will be required. (Based on the desktop review, a determination is unable to be made as to whether the land is sufficiently disturbed in order to meet the current Category 4 (Areas previously subject to Significant Ground Disturbance). Additionally it is envisaged that a cultural heritage clearance will be sought with the relevant Aboriginal parties during the planning phase. Noting also that should an Environmental Impact Statement is required under the EPBC Act then a Cultural Heritage Management Plan (CHMP) is likely to be required.	
Construction - Earthworks may unearth cultural heritage material. Mitigation and management measures for potential Aboriginal cultural heritage should be included within a CEMP.	
Operation – Operation of an additional railway line within the existing rail corridor is unlikely to have impacts to cultural heritage.	
Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☒ Applicable legislation	*Environmental Protection and Biodiversity Conservation Act 1999* *Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984.* *Aboriginal Cultural Heritage Act 2003* *Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines, April 2004, Department of Aboriginal and Torres Strait Islander Partnerships (revision expected 29 July 2017)*
☒ Identified permits, codes or other requirements	The Cultural Heritage Duty of Care Guidelines are currently under review with DATSIP intending to release draft revised Guidelines by 28 July 2017. It is envisaged that a specialist review of the new requirements will be required. It is envisaged that a cultural heritage clearance will be sought with the relevant Aboriginal parties during the planning phase. Should an Environmental Impact Statement be required under the EPBC Act then a Cultural Heritage Management Plan (CHMP) is likely to be required.

PUBLIC AMENITY / HEALTH	*Risk Rating -
Factors Identification - *Factors present, or potentially present, within / near to the project footprint or associated with the project*	
☒ Noise/vibration sensitive receivers ☐ Chemicals, dangerous goods and explosives ☒ Environmental nuisances ☒ Residential areas ☒ Commercial areas ☒ Public facilities ☐ Structures ☐ Aesthetic values **Sensitive receptors** The surrounding land uses can be identified as predominantly low and medium density residential under both the Brisbane City Council (BCC) and Redlands Planning Schemes. Other land uses include community facilities/ purposes and commercial industry as well as conservation and open space. The conservation areas that surround the middle part of the alignment have high ecological significance according to Brisbane City Council's planning scheme. There are a number of significant landscape tree sites and adjoining sites between CH 18775 and CH 19500 as mapped on the BCC planning scheme. There are two areas within the BCC planning scheme that are mapped as having a wetland overlay, these are located near CH 20000 and CH 21000. There are a number of heritage sites that may be triggered as sensitive receptors, these are recorded in the heritage section above. There are a large number of public recreation areas that reside alongside the rail corridor. There are a number of schools, day-cares and hospitals within proximity to the rail corridor, they are listed below. • Wynnum State School – 400m NW of CH 18775 • Manly State School – near CH 18900 • Lota State School – near CH 20750 • Birkdale State School – near CH 25200 • Wellington Point State School – near CH 26500 • Redlands College – near CH 26500 • Ormiston State School – near CH 30500 • Jumping Beans Childcare – near CH 30250 • Wellington Point Day care centre – near CH 27500	Medium

• Goodstart Early learning – near CH 23000 • Wynumm Hospital – near CH 20000	

Aspects & Impacts - *Proposed project aspects with the potential to impact on factors identified*

Planning & Design – The proposed project is a duplication of an existing rail line and therefore the alignment is fixed and there is no opportunity to avoid sensitive receptors. Consultation with potentially impacted stakeholders should be undertaken during the planning and design stage.

Construction – Impacts to sensitive receptors will include increased noise and vibration levels and dust during the construction phase of the rail duplication.

The Contractor will be required to comply with the General Environmental Duty under the *Environmental Protection Act 1994* and environmental protection policies for air and noise in their Construction Environmental Management Plan.

Operation - Impacts to sensitive receptors will include increased noise and vibration levels during operation.

Legislation – *identify any applicable permits, codes or other regulatory requirements*

☒ Applicable legislation	*Environmental Protection Act 1994* *Environmental Protection (Noise) Policy 2008* *Environmental Protection (Air) Policy 2008*
☐ Identified permits, codes or other requirements	

RESOURCE USE AND MANAGEMENT	***Risk Rating -**
Resources Identification – *Resources potentially used or impacted upon by the project*	
☒Energy use and greenhouse gases ☒ Water use (including bulk water supply and water supply schemes ☒ Other natural resources and use ☒ Waste and waste management **Energy use and greenhouse gases** Safeguard against the future impacts of climate change where foreseeable by minimising carbon footprints and energy use. The primary sources of energy during construction will be electricity, for ancillary activities such as lighting, workplace cooling and heating and general power requirements, and non-renewable fossil fuels for operating mobile/ fixed generation sets and to operate vehicles, plant and equipment. The operation of the electric railway will require electricity energy use which has associated greenhouse gas emissions. The energy use and greenhouse gas emissions associated with the maintenance of the proposed railway are not likely to be significant. **Water use** Minimise water use and maximise opportunities for rainwater and groundwater,	Low

reuse during construction and rehabilitation. **Other natural resources and use** Consider the use of timber felled during clearing to be utilised onsite either as habitat piles, creation of nest boxes, or mulched and used as a nutrient rich ground cover to prevent erosion. **Waste and waste management** Minimisation and recycling of waste. A waste hierarchy will be considered for the Project with opportunities for waste minimisation as a priority followed by recycling.	
Aspects & Impacts - *Proposed project aspects with the potential to impact on resources identified*	
Planning & Design –Incorporate energy efficient devices in the design of the Project.	
Construction – The construction phase is likely to have the greatest impact on waste generation and water use and is the phase when natural resources such as vegetation is disturbed. Construction plant and machinery also contributes to the carbon footprint of the project and reporting of energy and emissions data to TMR may be required by the contractor.	
Operation - In general terms, the provision of public transport is seen as a significant contribution toward long term energy conservation as the new rail link is likely to result in a reduction of private vehicle trips, particularly during peak periods.	
Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☒ Applicable legislation	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 2008* *Environmental Protection (Air) Policy 2008* *Environmental Protection Regulation 2008* *Waste Reduction and Recycling Act 2011* *National Greenhouse and Energy Reporting Act 2007*
☒ Identified permits, codes or other requirements	***Waste Reduction and Recycling Act 2011*** Waste should be managed in accordance with the waste and resource management hierarchy. ***National Greenhouse and Energy Reporting Act 2007*** TMR will need to consider all operations across the State to determine if a threshold is met triggering reporting requirements under the National Pollutant Inventory and/or National Greenhouse Energy and Reporting Act 2007. If triggered, energy and emissions data will need to be reported under the National Greenhouse and Energy Reporting Scheme.
SPECIAL AREAS AND LAND TENURES	***Risk Rating -**
Resources Identification – *Special areas and land tenures potentially impacted upon by the project*	
☒ Coastal Zone	Low

☐ Wild Rivers – N/A ☐ Transport land and transport declarations ☐ Protected and recreation areas ☐ Forestry Land ☐ World Heritage (Marine Parks, Wet Tropics etc) ☐ Commonwealth Land ☒ State owned/managed land ☒ Native Title and indigenous land tenures ☐ Local Planning Instruments ☐ State Planning Instruments ☐ Other special areas1 **Coastal Zone** – within the coastal zone **Wild Rivers** – this was repealed **Transport land** – within a railway corridor **Roads** The rail alignment crosses the following local roads: • Gordon Street (road overpass) – CH 31450 • Wellington Street (road overpass) – CH 31200 • Sturgeon Street (rail bridge) – CH 30300 • Station Street (road overpass) – CH 28100 • Main Road (road overpass) –CH 27600 • Hardy/Badgen Road (rail bridge) – CH 26550 • Charles Street (rail bridge) – CH 24800 • Saint James Street/ Thorneside Road (rail bridge) – CH 23200 • Hindes Street (rail bridge) – CH 20500 • Ernest Street (road overpass) – CH 19200 • Gordon Parade (road overpass) – CH 18775 The rail alignment crosses one State controlled road: • Birkdale Road (rail bridge) - CH 25050 (state-controlled road and state-controlled roads bridges) **Protected areas** – conservation park located upstream of the site (approximately 1 km)	

[1] Other special areas includes: State development areas, Integrated Resort Development Areas, Brisbane Forest Park, Queensland Reconstruction Authority Areas, Southbank, Strategic Cropping Land, Major Hazard facilities, Iconic Places, Urban Development Areas, Key Resource Areas and any other special features that are identified as applying to your project site.

Recreation areas - located adjacent to the railway corridor for the majority of the alignment

Forestry land – none

World heritage – none

Commonwealth land – none

State owned/managed land – the railway corridor is lands lease and includes the following lots:

172 SP130039	3 RP902627	253 CP827243
173 SP130039	191 SP130041	254 RP911805
2 RP33152	185 CP827238	39 RP14087
2 RP33156	250 CP827239	257 SP171299
2 RP33159	151 SL12206	61 CP827245
2 RP33166	251 SL12206	75 CP827246
4 SP190114	152 CP827240	157 SL12216
181 SP130040	252 CP827241	158 SL12217
3 SP190113	156 CP827242	159 SP273106
39 SP133477	251 RP911804	

Native title and indigenous land tenures – Quandamooka Coast Claim Determination is over the southern portion of the railway corridor (CH 22500 to 32325)

Local planning instruments

- Redland City Council – Redlands Planning Scheme. Zoning for "Community Purposes"
- Brisbane City Council – Brisbane City Plan. Zoning – SP3 "Special Purpose – Transport Infrastructure"

State planning instruments – South East Queensland Regional Plan - railway corridor, stations "public passenger transport facility"

Special areas – none

Aspects & Impacts - *Proposed project aspects with the potential to impact on resources identified*

Planning & Design – If any works are required outside the corridor then these will require review of land use and tenure aspects. There are several rail and road bridges to be duplicated, which may require Road Corridor Permits.

Construction – Refer to other sections of Scoping Report. A Traffic Management Plan may be required if the construction generates additional traffic on any local or State controlled road.

Operation – Refer to other sections of Scoping Report

Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☒ Applicable legislation	*Land Act 1994* *Transport Infrastructure Act 1994* *Sustainable Planning Act 2009* (being replaced in July 2017 by the *Planning Act 2016*) *Native Title Act 1993*
☒ Identified permits, codes or other requirements	***Land Act 1994*** Roads may be required to be closed permanently or temporarily. A permanent road closure changes the status from 'road' to 'unallocated state land'. The area of road may be incorporated into the applicant's adjoining freehold or leasehold land or included in an existing reserve or set apart as a new reserve. Once an application is submitted its review will include an assessment of whether native title issues need to be addressed. ***Sustainable Planning Act 2009*** The Project is exempt development in accordance with s. 232(2) of the *Sustainable Planning Act 2009* and Schedule 4, Table 5 of the *Sustainable Planning Regulation 2009.* ***Transport Infrastructure Act 1994*** Applicants wishing to undertake an activity, works or erect a structure within a road corridor must apply for a Road Corridor Permit from TMR.

OTHER ACTIVITY REQUIRMENTS	***Risk Rating -**
Factors Identification – *Other legislative relevant activities potentially associated with the project*	
☐ Other activity requirements2	List and describe (refer to Reference page of the EMS for data and information sources). If 'N' (nil / negligible), provide brief explanation.
Aspects & Impacts - *Proposed project aspects with the potential to impact on resources identified*	
Planning & Design -	
Construction -	
Operation -	
Legislation – *identify any applicable permits, codes or other regulatory requirements*	
☐ Applicable legislation	[insert]
☐ Identified permits, codes	[Insert]

[2] Identify what other activities the project may be involved in, that trigger permit or compliance requirements.

or other requirements	

* Refer to Procedure: Environmental Scoping Report for the environmental risk assessment process

3 SUMMARY OF POTENTIAL LEGISLATIVE REQUIREMENTS

The following legal requirements have been identified as potentially being required -

LEGISLATIVE TRIGGER	REQUIREMENTS	*RISK
Approvals *(Location / Activity)*		
Aboriginal Cultural Heritage Act 2003	Under the *Aboriginal Cultural Heritage Act 2003* a specialist review of the 'duty of care guidelines' requirements will be required. Based on this desktop review a determination is unable to be made as to whether the land is sufficiently disturbed in order to meet the current Category 4 (Areas previously subject to Significant Ground Disturbance) 'duty of care guidelines' requirements. The 'duty of care guidelines' are currently under review and this includes how activities are categorised. It is expected the Project will require further assessment under the updated guidelines. It is envisaged that cultural heritage clearance will be sought with the relevant Aboriginal parties. If an Environmental Impact Statement is required under the EPBC Act then a Cultural Heritage Management Plan (CHMP) may be required.	High
Coastal Protection and Management Act 1995 Operational works for prescribed tdal works or work within a coastal management district	Prescribed tidal work is tidal work that is completely or partly within a local government tidal area and includes integral parts of the structure that extends onto land above high water mark (or highest astronomical tide HAT)). The Project is anticipated to require Operational works for prescribed tidal works or work within a coastal management district as it traverses two tidal waterways.	Medium
Coastal Protection and Management Act 1995 Operational work on State coastal Land (SCL) above high-water mark (being mean high water springs (MHWS)) that involves interfering with quarry material	Operational work on State coastal Land (SCL) above high-water mark (being mean high water springs (MHWS)) that involves interfering with quarry material is assessable development under Schedule 3, Table 4, item 5(b)(i) of the *Sustainable Planning Regulation 2009*. SCL is defined under the CPM Act as • Unallocated State land • Reserve • Road	Medium

	in a CMD and excludes: • Freehold land (FH) • Land that is in a watercourse or lake as defined under the *Water Act 2000* (s17(a)(c)) • Land that is subject to a lease or license issued by the State (s17(1)(d)) If works are required in the two reserve lots adjacent the rail corridor, Lota Creek or Tingalpa Creek then operational work for interfering with quarry material on SCL will be required.	
Coastal Protection and Management Act 1995 Quarry material allocation	It is envisaged that the project may remove material from land under tidal water for sale, reclamation or fill above the high water mark, or for land-based disposal. Should this be the case, an allocation of quarry material (allocation notice) will be required.	Low
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Referral and approval	EPBC Act referral is required when a Project will, or is likely to have a significant impact upon Matters of National Environmental Significance (MNES) under the EPBC Act. The EPBC Protected Matters Report identified: • A threatened ecological community 'Lowland Rainforest of Subtropical Australia' and 'Subtropical and Temperate Coastal Saltmarsh' as potentially occurring within 1 km of the rail corridor • Moreton Bay declared Ramsar wetland of international importance in and adjacent the rail corridor A number of flora and fauna species potentially occurring or potential for habitat to occur within 2 km of the rail corridor A self-assessment using The Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE 2013) should be undertaken to identify whether referral is likely to be required. This may identify requirements for surveys to be undertaken. The EPBC Act referral guidelines for the vulnerable koala (DotE, 2014) will need to be addressed when undertaking the self-assessment and potential referral. If referral is required the project could be deemed by the minister not a controlled action (requiring no further assessment) or a controlled action. If the Project is deemed a controlled action then referral proceeds to the next stage – environmental assessment and approval. The EPBC Act provides for five different levels of assessment.	High
Environmental Protection Act 1994 Disposal permit for removal of	If affected lots are found to be listed on the EMR or CLR and spoil is to be removed for treatment or disposal from these lots	High

spoil from a lot listed on the Environmental Management Register (EMR) or Contaminated Land Register (CLR)	then a disposal permit will be required (unless spoil is tested and demonstrated not to be contaminated).	
Environmental Protection Act 1994 Environmental authority (EA) for prescribed environmentally relevant activities (ERA)	Carrying out an ERA defined in Schedule 2 of the Environmental Protection Regulation 2008 requires an EA. Potential ERA16 Extractive and screening activities (Dredging greater than 1000 tonnes of material in a year) for the removal of material may be triggered by the Project. TMR is exempt from requiring approval for aspects of ERA16, insofar as the works are carried out in accordance with the approved eligibility criteria for ERAs detailed in schedule 3B of the *Environmental Protection Regulation 2008* and the code of environmental compliance ERA16 extractive and screening activities,(EHP, Nove 2012, v7). The code does not apply to dredging or works within 100 m of a watercourse.	Low
Environmental Offsets Act 2014 Offsets	Offsets will be required for impacts in accordance with the Queensland Environmental Offsets Policy. The Environmental Offsets Regulation 2014 schedule 2 outlines the prescribed environmental matters – matters of State environmental significance. Those potentially relevant to the project include: • Regulated vegetation • Connectivity areas • Wetlands and watercourses • Protected wildlife habitat (endangered wildlife or vulnerable wildlife) • Waterway providing for fish passage (waterway barrier works limiting the passage of fish) • Marine plants (see below) • Koala Activities that are prescribed include: • Environmentally Relevant Activity • Taking a protected plant (EVNT) • Development, which requires an offset as part of the State Development Assessment Provisions. If there is a prescribed activity that is likely to have a significant residual impact on a prescribed matter then it may be determined that an offset is a suitable outcome. A determination of whether there is a significant residual impact to MSES needs to be made in accordance with the	High

	Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the *Sustainable Planning Act 2009* (DSDIP, Dec 2014). A self-assessment using The Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE 2013) should be undertaken to determine the potential for significant residual impact to MNES.	
Fisheries Act 1994 Operational work for waterway barrier works	The Project is anticipated to involve the construction of waterway barrier works (for example bridges or culverts) within the seven mapped watercourses. Therefore development permits for the crossings may be required if self-assessable codes cannot be met. Construction activities may require the construction of a temporary waterway barrier and if the construction work cannot be conducted in accordance with the self-assessable code development approval will be required.	High
Fisheries Act 1994 Operational work that is the removal, destruction or damage of a marine plant	Section 8 of the Fisheries Act 1994 defines a 'marine plant' as native species that usually grows on or adjacent to tidal land. It is likely that marine plants will be disturbed, triggering the requirement for an Operational work that is the removal, destruction or damage of a marine plant development approval. This will be verified by a marine plants survey, to determine the disturbance extent.	High
Land Act 1994 Road closure	Roads may be required to be closed permanently or temporarily. A permanent road closure changes the status from 'road' to 'unallocated state land'. The area of road may be incorporated into the applicant's adjoining freehold or leasehold land or included in an existing reserve or set apart as a new reserve. Once an application is submitted its review will include an assessment of whether native title issues need to be addressed.	Medium
Native Title Act 1993 (Queensland) Notification required for works over unallocated State land (USL).	The waterways crossed by the alignment including Tingalpa Creek and Lota Creek are USL and will require native title notification.	High
Nature Conservation Act 1992 Species Management Program (SMP)	Tampering with animal breeding places of native fauna species will trigger the requirement for an approved SMP. TMR has an approved SMP – TMR's Species Management Plan (low risk impacts) 29 June 2016 (expiry 1 July 2019) – which can be used for low risk impacts. In the event that any other species listed as special least concern, least concern colonial breeder, near threatened, vulnerable, endangered and extinct in the wild (EVNT species) are located within the project footprint, an application for a high	High

	risk SMP is required prior to the commencement of works. The assessment must include a desktop analysis and a field survey undertaken by a suitably qualified and experienced person. All projects operating under the SMP process are required to keep a register of animal breeding places tampered with.	
Nature Conservation Act 1992 Protected plant clearing permit – Endangered, Vulnerable, Near Threatened (EVNT) plants	A flora survey (in accordance with the Flora Survey Guidelines) will be required to verify the presence of protected flora species within the flora survey trigger area where vegetation clearing is required. A protected plant clearing permit may be required if endangered, vulnerable or near-threatened plants are identified. If they are not identified, an Exempt clearing notification (protected plants) will be required.	High
Queensland Heritage Act 1992 Development application or exemption certificate	The *Queensland Heritage Act 1992* requires that an owner of a listed heritage place who intends to demolish, subdivide, renovate, alter, add to, change the use of, or substantially modify the appearance of that place must seek approval from EHP. Development application or exemption certificate is not required, as no properties listed on the Queensland Heritage Register will be directly impacted.	Low
Sustainable Planning Act 2009 (being replaced in July 2017 by the Planning Act 2016)	The Project is exempt development in accordance with s.232(2) of the Sustainable Planning Act 2009 and Schedule 4, Table 5 of the Sustainable Planning Regulation 2009.	Low
Sustainable Planning Act 2009 (being replaced in July 2017 by the Planning Act 2016) *Vegetation Management Act 1999* Operational works for clearing native vegetation	The Project is not assessable development for clearing of native vegetation (defined under the *Vegetation Management Act 1999)* under Schedule 24, Part 1, Item 1 (11) of the Sustainable Planning Regulation 2009 – clearing for the construction of community infrastructure (rail transport infrastructure) that is government supported transport infrastructure. The Project therefore does not require vegetation clearing development approval.	Low
Transport Infrastructure Act 1994 Road corridor permit	Applicants wishing to undertake an activity, works or erect a structure within the road corridor must apply for a Road Corridor Permit from TMR.	High
Water Act 2000 Development Approval for Operational Works to take or interfere with water within a watercourse. Water licence.	It is not anticipated that the Project will involve any watercourse diversion works or interference with the flow of water.	Low
General Obligations *(incl. Self-assessable codes / Authorities etc.)*		

Biosecurity Act 2014 and *Biosecurity Regulation 2016*	Compliance will be required during the construction phase to prevent spread of existing pest species and the introduction of new declared pest species. Prohibited invasive plants and restricted invasive plants must be controlled within the area of works.	Low
Environmental Protection Act 1994 Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009	A determination of whether there is a significant residual impact on the MSES wetland needs to be made in accordance with the Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the Sustainable Planning Act 2009 (DSDIP, Dec 2014).	High
Fisheries Act 1994 Self-assessable waterway barrier works	Permanent bridge or culvert work across a waterway may not trigger a waterway barrier work development approval provided they are: • Undertaken in accordance with the self-assessable code WWBW01–P3; Construction and maintenance of culverts. This code does not apply to construction of new waterway barriers on purple or grey (tidal) waterways. • Designed to meet the definition for a single or multi-span bridge that is not a waterway barrier. If the construction work involves a temporary waterway barrier, and can be conducted in accordance with the self-assessable code WWBW02; Temporary waterway barrier works, a waterway barrier work development approval will not be required for construction.	Medium
Fisheries Act 1994 Operational work that is the removal, destruction or damage of a marine plant	Geotechnical investigations and other early site investigations may be able to impact marine plants if meeting the requirements of the self-assessable code MP05: Works for educational, research or monitoring purposes in a declared fish habitat area or involving the removal, destruction or damage of marine plants. Additionally, some maintenance works associated with the Project may be able to impact marine plants if compliant with the self-assessable code MP02: Maintenance works on existing lawful structures (other than powerlines and on-farm drains) in a declared fish habitat area or involving the removal, destruction or damage of marine plants	Medium
EHP and TMR Memorandum of Agreement for government supported transport infrastructure within the South East Queensland Koala Protection Area	It is envisaged that a self-assessment would be undertaken against the SPRP and MOA and measures from Table 4 of the Koala Conservation SPRP incorporated into design and CEMP. Offsets will be required.	Medium
Queensland Acid Sulfate Soil Technical Manual (2014), Soil Management Guidelines v4.0	Installation of piles, excavation and cut works have a high potential to disturb ASS material and an ASS management plan will be required to be developed, consistent with the	High

	Queensland Acid Sulfate Soil Technical Manual (2014), Soil Management Guidelines v4.0.	
Water Act 2000 Riverine Protection Permit (RPP)	There are five watercourses under the *Water Act* 2000 that intersect the alignment. Under the *Water Act 2000* (s814) a RPP is not required if the excavation or placing of fill is permitted under a development permit for prescribed assessable development or for a self-assessable development. TMR is an approved entity for the purpose of the *Riverine protection permit exemption requirements WSS/2013/726 Version 1.02* (DNRM, 2016) and therefore is not required to get a RPP for works in a watercourse.	Low
Report / Record Requirements		
Environmental Protection Act 1994 General Environmental Duty of Care	Duty of care requirements to avoid, minimise or mitigate environmental harm and prevent contamination will be addressed in the following plans: • Environmental Management Plan (Planning) • Environmental Management Plan (Construction) • Environmental Management Plan (Operation)	Medium
Environmental Protection Act 1994	EMR and CLR searches are required or, if available, access to TMR register of listed lots. Where there is potential to disturb ASS material, an investigation will be required, consistent with the Queensland Acid Sulfate Soil Technical Manual (2014), Soil Management Guidelines v4.0.	Medium
Environment Protection and Biodiversity Conservation Act 1999	A self-assessment using The Matters of National Environmental Significance – Significant impact guidelines 1.1 (DoE 2013) should be undertaken to determine the potential for significant residual impact to MNES. This assessment will determine whether referral under the EPBC Act is required. The EPBC Act referral guidelines for the vulnerable koala (2014) will need to be addressed when undertaking the self-assessment and potential referral.	High
Fisheries Act 1994	Marine plants will need to be surveyed so that approvals can be sought and significant residual impact can be calculated for offsets.	High
National Greenhouse and Energy Reporting Act 2007	TMR will need to consider all operations across the State to determine if a threshold is met triggering reporting requirements under the National Pollutant Inventory and/or National Greenhouse Energy and Reporting Act 2007.	Low
Nature Conservation Act 1992	A flora survey (in accordance with the Flora Survey Guidelines) will be required to verify the presence of protected	High

	flora species within the flora survey trigger area where vegetation clearing is required. Koala habitat tree counts will be required for offset calculations.	

* Refer to Procedure: Environmental Scoping Report for the environmental risk assessment process

4 OPTIONS ANALYSIS

As part of the environmental scoping for the project, an Options Analysis ~~was /~~ was not undertaken.

5 COMPONENT CLASSIFICATION & DECISION

5.1 Component Classification

Based on the identified risks associated with works proposed by the project, and taking into consideration resultant environmental assessment requirements, the component classification* is-

[~~LOW /~~ MEDIUM ~~/~~ HIGH]

Ongoing identification and management of environmental issues shall follow the corresponding process detailed within the Environmental Processes Manual. Actions to be undertaken in accordance with this table are detailed in Future Actions & Cost.

Recommendations to manage the specific issues identified within this ESR during future phases of the project are outlined within the Summary.

* Refer to Procedure: Environmental Scoping Report for the environmental component classification process

6 FUTURE ACTIONS & COSTS

A breakdown of further work and actions to be completed as part of the environmental component project is included in Appendix A Future Actions and Costs. The Appendix also includes work items that are recommended to managed / mitigate environmental impacts identified in the Environmental Scoping Report.

7 REFERENCES

Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines (Department of Aboriginal and Torres Strait Islander Partnerships, 2004)

Australian heritage database, Queensland Heritage Register, Brisbane City Council and Redland Shire Council Planning Scheme heritage overlay mapping

Aerial photography

Brisbane City Council Online Mapping Services

Department of Environment and Heritage Protection Protected Plants Flora Survey trigger mapping (EHP, 2016)

Department of Infrastructure, Local Government and Planning Development Assessment (DA) Mapping

DILGP State Planning Policy (SPP) interactive mapping system

Department of Natural Resources and Mines (DNRM) Regulated Vegetation Management Mapping version 8.0 (DNRM, 2016)

Department of Science, Information Technology and Innovation's Wildlife Online Database (DSITI, 2016)

DNRM Essential Habitat data, version 4.7 (DNRM, 2016)

DNRM Regulated Vegetation Management Mapping (DNRM 2017)

Flora Survey Guidelines – Protected Plants (EHP, Dec 2016)

Matters of State Environmental Significance Mapping (MSES)

Memorandum of Agreement for government supported transport infrastructure within the South East Queensland Koala Protection Area Queensland Globe (TMR and EHP)

MP05: Works for educational, research or monitoring purposes in a declared fish habitat area or involving the removal, destruction or damage of marine plants (DEEDI, 2011)

MP02: Maintenance works on existing lawful structures (other than powerlines and on-farm drains) in a declared fish habitat area or involving the removal, destruction or damage of marine plants (DAF, 2013)

Queensland Environmental Offsets Policy v 1.1 (EHP, 2014)

Queensland Herbarium Regional Ecosystem (RE) Description Database (Queensland Herbarium, 2016)

Queensland Waterways Waterway Barrier Works Stream order (DAFF 2016)

Redlands City Council Planning Scheme

Redlands Council Online Mapping Services (e.g. Acid Sulfate Soils Overlay Map)

Riverine protection permit exemption requirements WSS/2013/726 Version 1.02, (DNRM, 2016)

Significant Residual Impact Guideline For matters of state environmental significance and prescribed activities assessable under the *Sustainable Planning Act 2009* (DSDIP, 2014)

South East Queensland Koala Conservation State Planning Regulatory Provisions (2010)

State Planning Policy (2016)

The Department of Aboriginal and Torres Strait Islander Partnership - Aboriginal cultural heritage search

The Department of the Environment and Energy's (DEE) EPBC Act Protected Matters Search Tool

The EPBC Act referral guidelines for the vulnerable koala (DotE, 2014)

The Matters of National Environmental Significance – Significant impact guidelines 1.1 (DotE, 2013)

WWBW01–P3; Construction and maintenance of culverts. This code does not apply to construction of new waterway barriers on purple or grey (tidal) waterways (DAF, 2013)

WWBW02; Temporary waterway barrier works; a waterway barrier work development approval will not be required for construction (DAF, 2013)

APPENDIX A - FUTURE ACTIONS & COST

Administrative

The following Outputs and Actions have been identified as being required during future phases of the project [delete those not required]. They shall be included within the project's Primavera Schedule.

OUTPUT	ACTIONS / SUB-TASKS	ESTIMATE	
		DURATION	COST
CONCEPT			
Review of Environmental Factors (Internal / External)	Undertake a detailed desktop assessment building on information in the Environmental Scoping Report and using the concept design (including the footprint and any available construction methodology).	TBA	TBA
Environmental Management Plan (Planning) (Internal / External)	Utilise the information from the REF to address environmental constraints in the preliminary design stage.	TBA	TBA
Cultural Heritage Risk Assessment	Under the *Aboriginal Cultural Heritage Act 2003* a specialist review of the 'duty of care guidelines' requirements will be required. Note that the Duty of Care Guidelines are currently under revision and will be released for final comment in July 2017 prior to gazettal. It is likely that cultural heritage clearance will be sought with the relevant Aboriginal parties. Should an Environmental Impact Statement is required under the EPBC Act then a CHMP will be required.	TBA	TBA
Other, please specify			
DEVELOPMENT			
Preliminary Design			
Environmental Management Plan (Site Investigations)	Undertake site investigations for the preliminary design phase.	TBA	TBA
Environmental Assessment Report (Internal / External)	Complete an EAR	TBA	TBA
Factor-specific assessment (Internal / External) [please specify]	TBD	TBA	TBA
Landscape Design (Internal / External)	Preliminary landscape design to be completed as part of the preliminary design phase.	TBA	TBA

Environmental Design Report (Preliminary Design)	Complete EDR for the preliminary design phase.	TBA	TBA
Other, please specify			
Detailed Design			
Prepare and submit applications for Licences / Permits / Agreements including notifications for relevant Self Assessable Codes [please specify]	Permits and licenses requirements to be confirmed and submitted.	TBA	TBA
Develop a Construction Environmental Management Plan (CEMP)	CEMP to include ASS Management Plan, Erosion and Sediment Control Plan and other relevant measures to mitigate environmental impact during construction.	TBA	TBA
Develop Construction Contract (Environmental)	Environmental Design Report to include recommendations for contract documentation.	TBA	TBA
Develop Administration Contract (Environmental)	Required for when an external Contractor Administrator is employed by Principal.	TBA	TBA
Environmental Design Report (Detailed Design)	EDR completed as part of tender design to be updated as part of detailed design.	TBA	TBA
Other, please specify			
IMPLEMENTATION			
Administer Construction Contract (Environmental)	N/A	TBA	TBA
Administer Administration Contract (Environmental)	N/A	TBA	TBA
Other, please specify			
FINALISATION			
Surrender and finalise relevant licences / Permits / Agreements including sending post-works notifications for relevant Self Assessable Codes [please specify]	Any on-going rehabilitation / monitoring conditioned by a regulator to be included in on-maintenance budget.	TBA	TBA
Post Implementation Review / Handover Report (Environment)	Final project environmental compliance will be closed out as part of the practical completion audit / inspection process.	TBA	TBA
Other, please specify			

Total Cost Estimate	**$** TBA

Project Work Items

A review of Main Roads Specifications and Technical Standards has been undertaken, including Environmental Management (MRS51), Landscaping (MRS16A-E) and Earthworks (MRS04). The following Standard Work Item Numbers have been identified as potentially requiring inclusion into Tender Documentation – [use Guideline: Project Work Items – Environmental Management to assist in populating the table]

STANDARD ITEM NUMBER	DESCRIPTION	UNIT OF MEASUREMENT
MRS04 Earthworks		
MRS16A-E Landscape & Revegetation Works		
MRS28 Contractors Site Camp and Facilities		
MRS51 Environmental Management		
Other, please specify		

Please note estimation of quantities and costs is not required for construction activities. Items have been identified for costing by the Project Estimator.

Australian Government
Department of the Environment and Energy

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.

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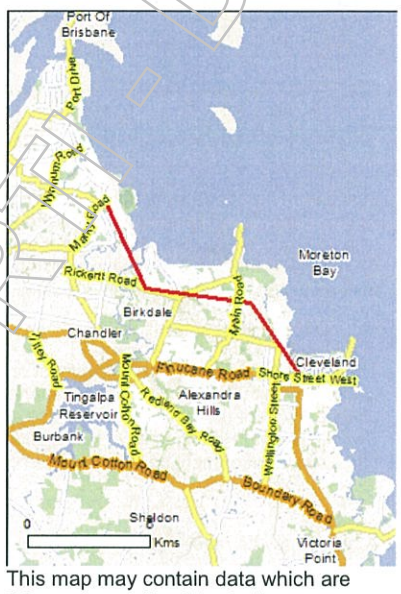

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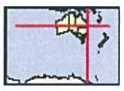

Summary

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:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	64
Listed Migratory Species:	72

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. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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:	111
Whales and Other Cetaceans:	14
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.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	43
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Moreton bay	Within Ramsar site

Listed Threatened Ecological Communities		[Resource Information]
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.		
Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Baloghia marmorata Marbled Balogia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat may occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat likely to occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat may occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Saiphos reticulatus Three-toed Snake-tooth Skink [88328]	Vulnerable	Species or species habitat may occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may 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		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known 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

Name	Threatened	Type of Presence
		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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area

Name	Threatened	Type of Presence
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known 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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Species or species habitat may occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat may occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	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 known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Aipysurus laevis Olive Seasnake [1120]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area

Name	Status	Type of Presence
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella brevirostris		
Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata		
Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus		
Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str.		
Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Moreton Bay Boys College	QLD
Tingalpa Creek	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
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata		
Nutmeg Mannikin [399]		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
Streptopelia chinensis Spotted Turtle-Dove [780]		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		
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
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat may occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern,		Species or species

Name	Status	Type of Presence
Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] Asparagus africanus		habitat likely to occur within area
Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Cabomba caroliniana		
Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera		Species or species habitat likely to occur within area
Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata		
Bitou Bush [16332]		Species or species habitat likely to occur within area
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913] Dolichandra unguis-cati		Species or species habitat likely to occur within area
Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes		
Water Hyacinth, Water Orchid, Nile Lily [13466]		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] Opuntia spp.		Species or species habitat likely to occur within area
Prickly Pears [82753]		Species or species habitat likely to occur within area
Parthenium hysterophorus		
Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp.		
Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Protasparagus densiflorus		
Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla		
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar		Species or species

Name	Status	Type of Presence
Groundsel [2624]		habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Moreton Bay	QLD

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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.

Coordinates

-27.45675 153.18034,-27.49047 153.1982,-27.496 153.24472,-27.52443 153.26648

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:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian 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, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-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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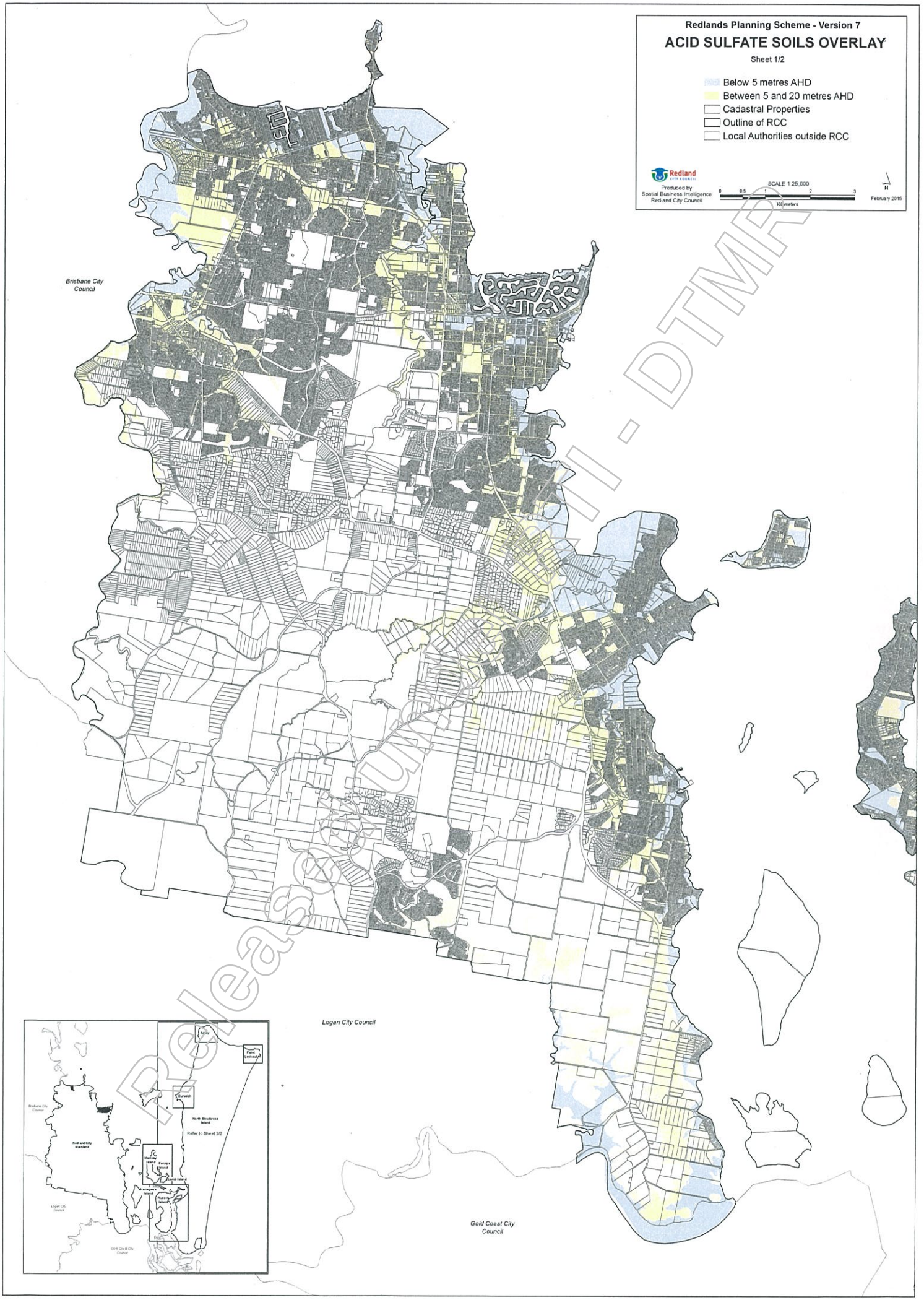
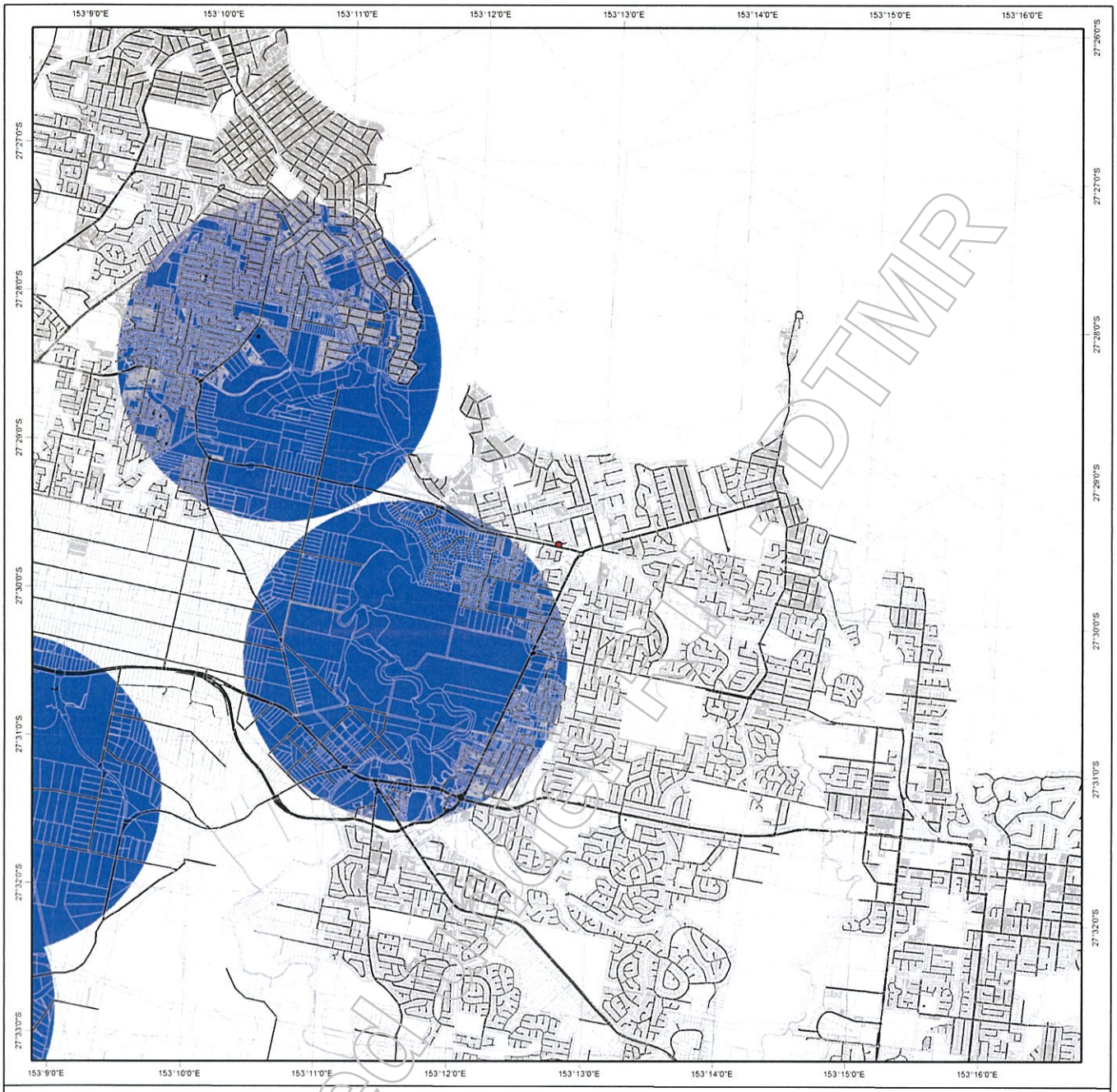




Protected Plants Flora Survey Trigger Map

Legend

- Coordinates
- High risk area
- Cadastral line
  Property boundaries shown are provided as a locational aid only
- Freeways / motorways / highways
- Secondary roads / streets

N

0 490 980 1,470 1,960 2,450 m

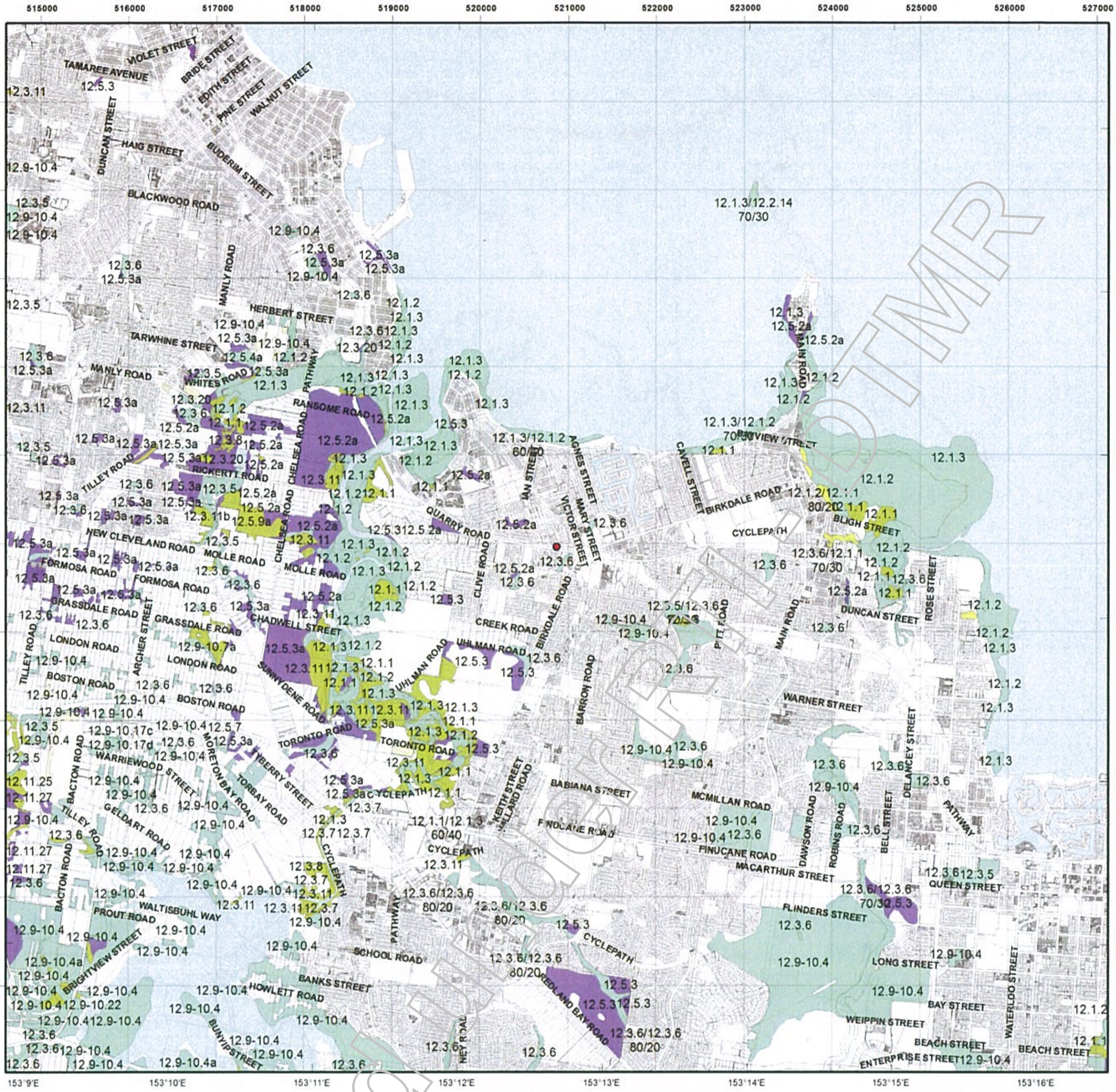
This product is projected into:
GDA 1994 Queensland Albers

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

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

For further information or assistance with interpretation of this product, please contact the Department of Environment and Heritage Protection at palm@ehp.qld.gov.au

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.



Remnant 2015 Regional Ecosystems

Biodiversity Status

- Coordinates
- Endangered - Dominant vegetation
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant vegetation, cultivated or built environment
- Plantation
- Water
- Cadastral Boundaries

N

0 0.75 1.5 2.25 3 km

This product is projected into GDA 1994 MGA Zone 56

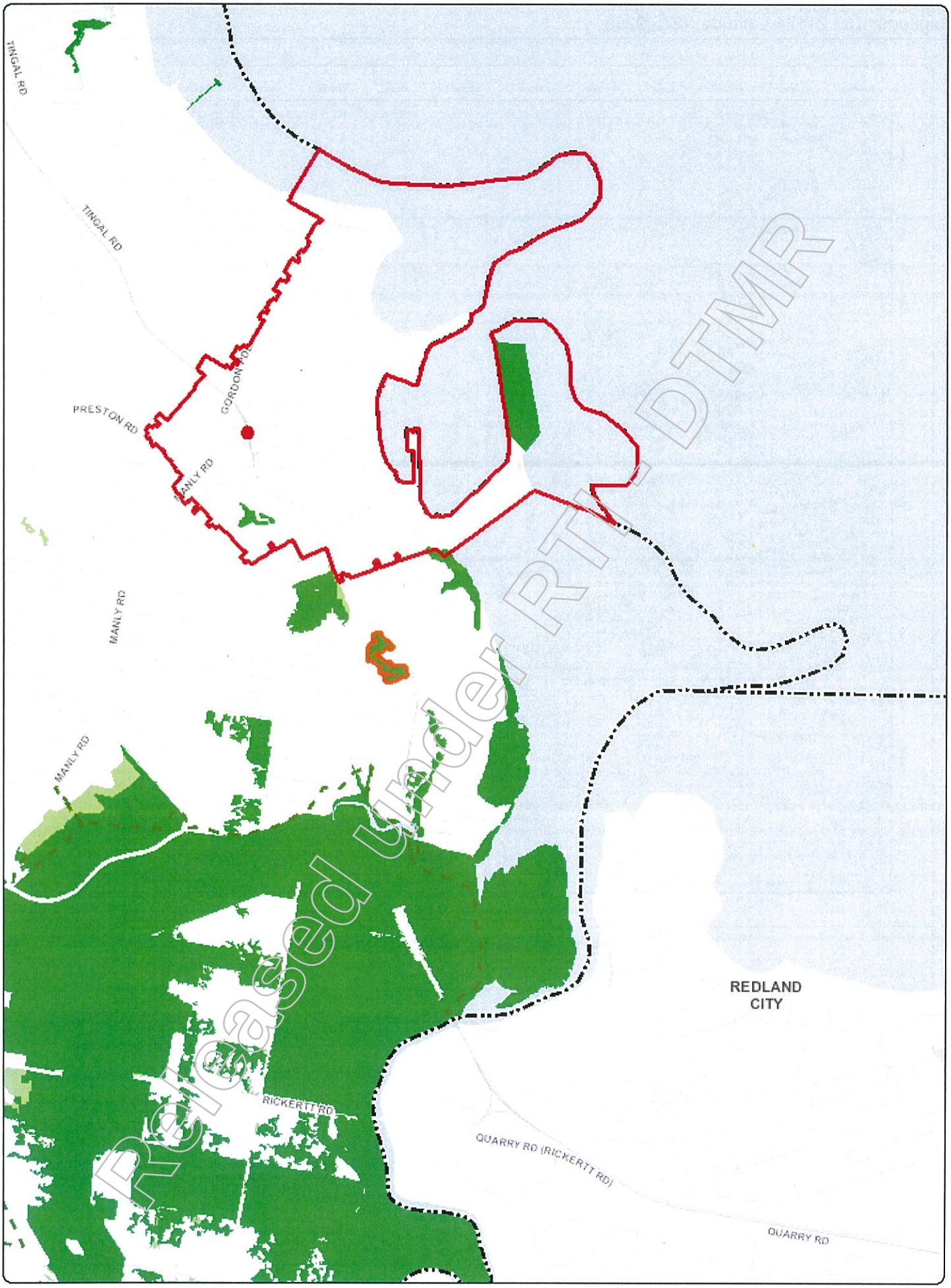
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.

Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. The polygons are labelled by regional ecosystem (RE); where more than one RE occurs, the percentage of each is labelled. The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".

Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Remnant woody vegetation is defined as vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.

Non-remnant vegetation includes regrowth and disturbed native vegetation.



Brisbane City Plan 2014

BRISBANE CITY Planning Scheme

NOTES

This map is notional only and should not be used for interpreting City Plan provisions relating to specific sites. To properly interpret the maps, the planning scheme must be referred to. The Digital Cadastre Database (supplied by State of Queensland - Department of Natural Resources and Mines) will be updated from time to time.

Mapping adopted by Council [illegible]

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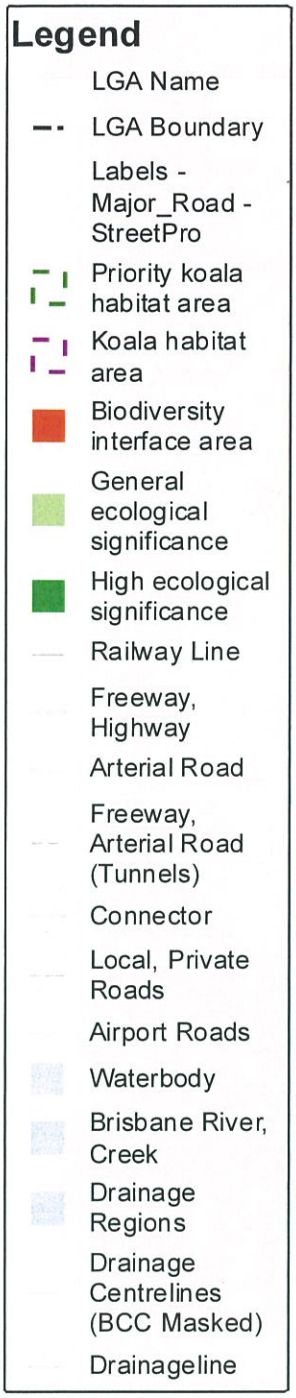
Projection: Map Grid of Australia, Zone 56
Horizontal Datum: Geocentric Datum of Australia 1994

Approximate Scale @ A4 1:25,000

0 940

Metres

Date: 6/06/2017



Brisbane City Plan 2014

BRISBANE CITY Planning Scheme

NOTES
This map is notional only and should not be used for interpreting City Plan provisions relating to specific sites. To properly interpret the maps, the planning scheme must be referred to. The Digital Cadastre Database (supplied by State of Queensland - Department of Natural Resources and Mines) will be updated from time to time.

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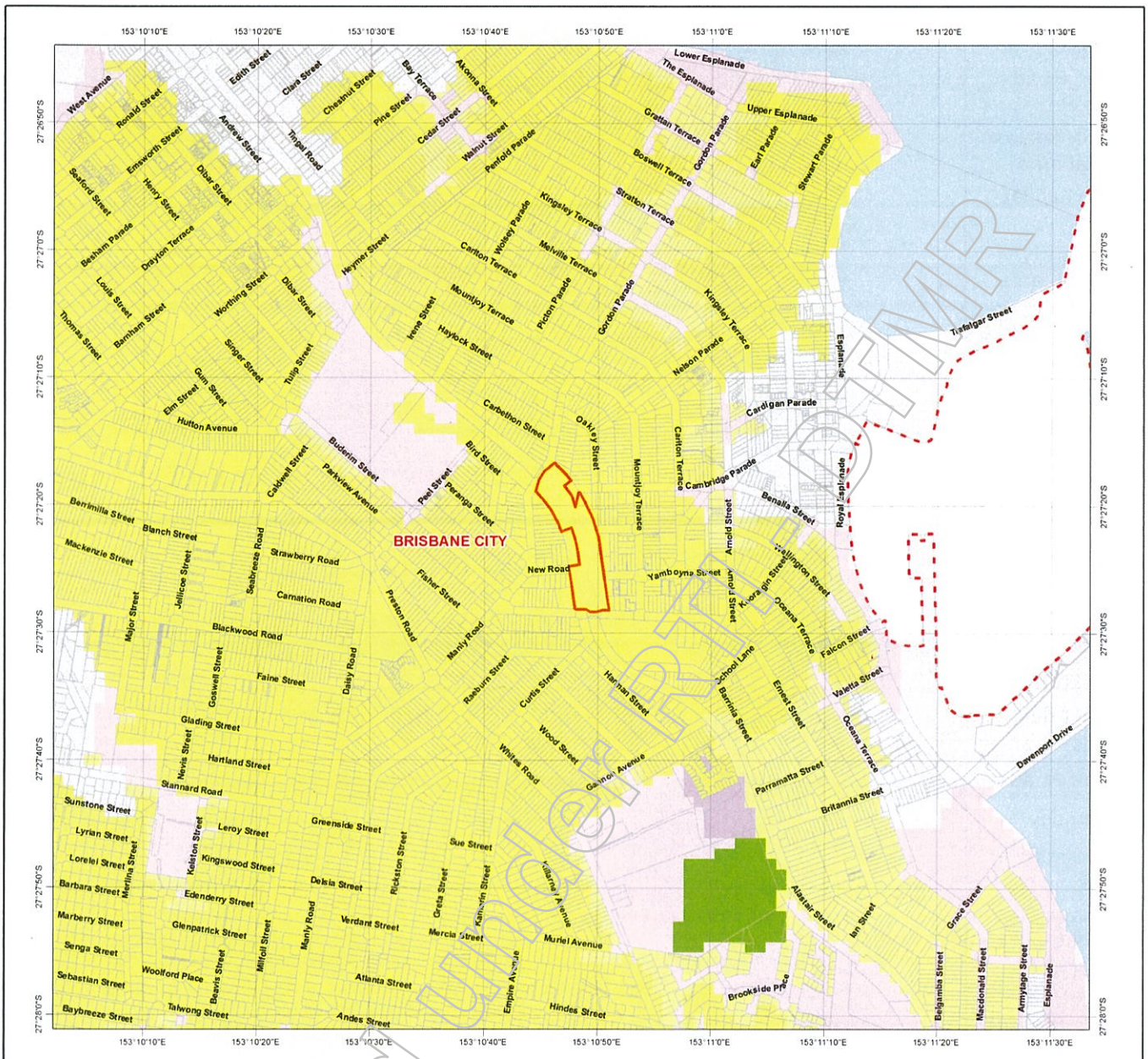

Koala Habitat in South East Queensland

Lot and Plan

Koala SPP - Habitat Values

Bushland Habitat
- High Value Bushland
- Medium Value Bushland
- Low Value Bushland

Suitable for Rehabilitation
- High Value Rehabilitation
- Medium Value Rehabilitation
- Low Value Rehabilitation

Other Areas of Value
- High Value Other
- Medium Value Other
- Low Value Other
- Generally not suitable
- Water

South East Queensland Koala Habitat Values western SEQ
- Bushland Habitat
- Suitable for rehabilitation
- Other areas of value
- Generally not suitable
- Water
- Cadastral Boundaries
- Local Government Boundaries

LOCALITY DIAGRAM

N

0 130 260 390 520 650 m

This product is projected into GDA 1994 MGA Zone 56

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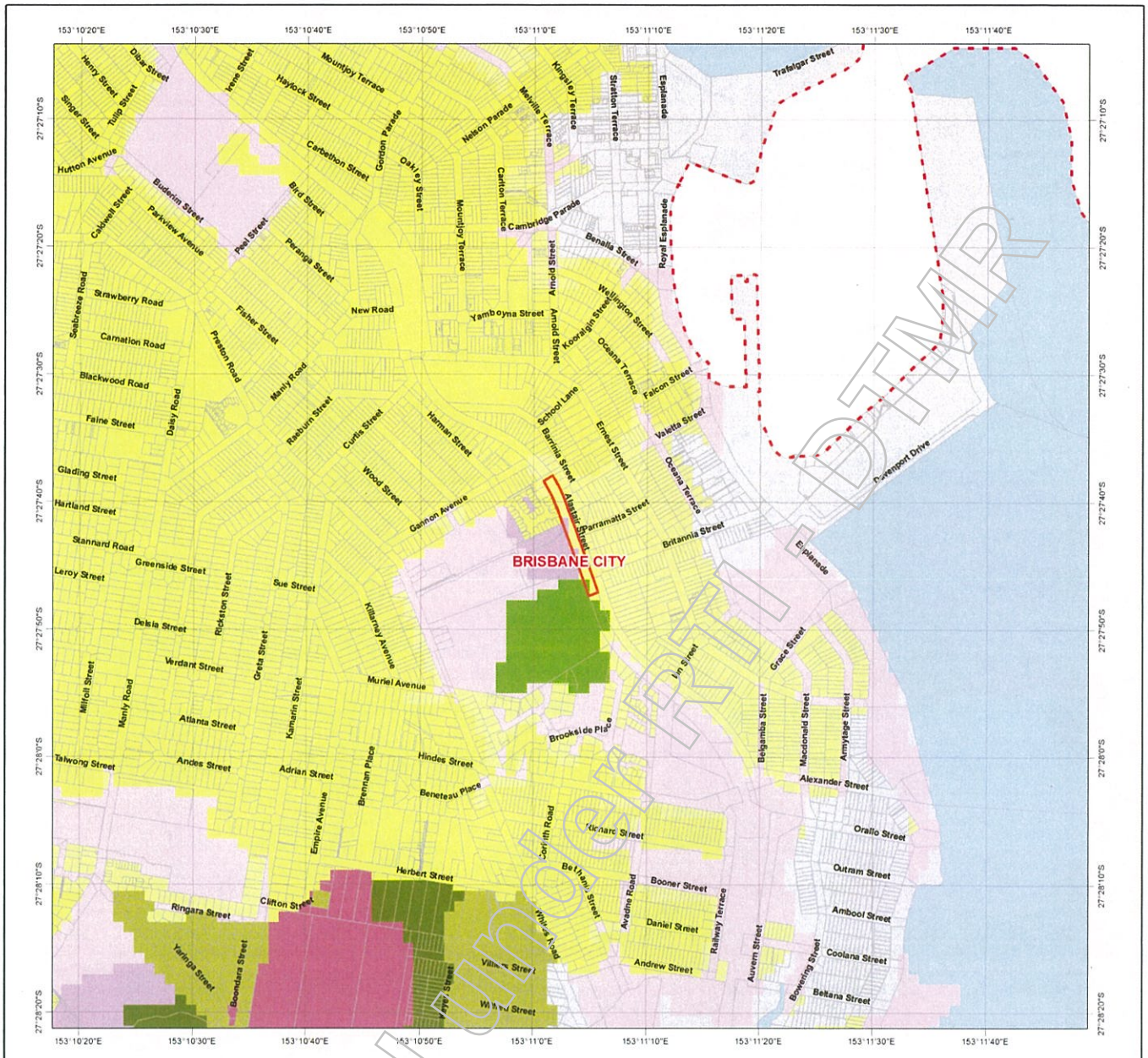

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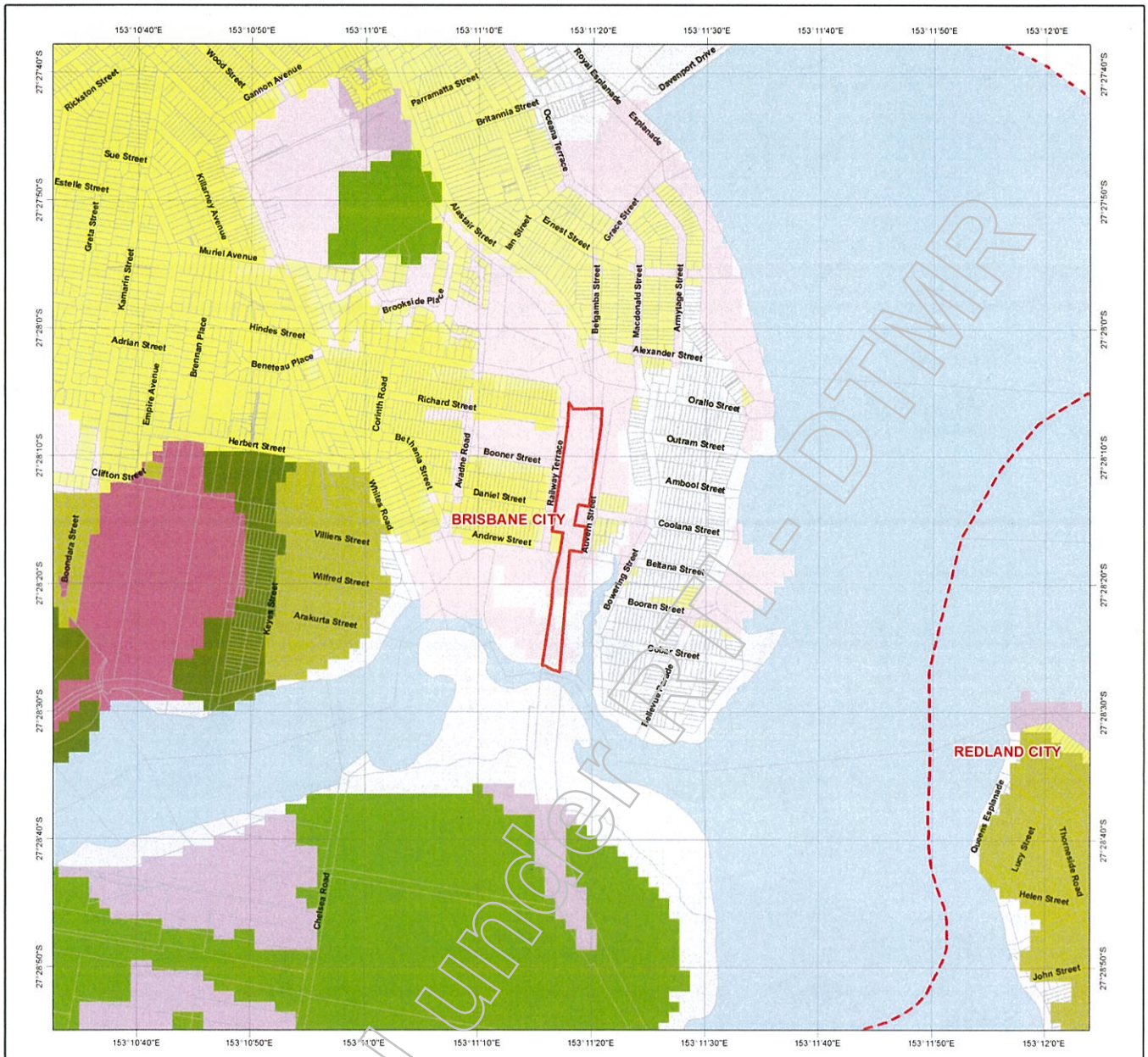

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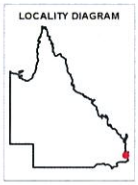

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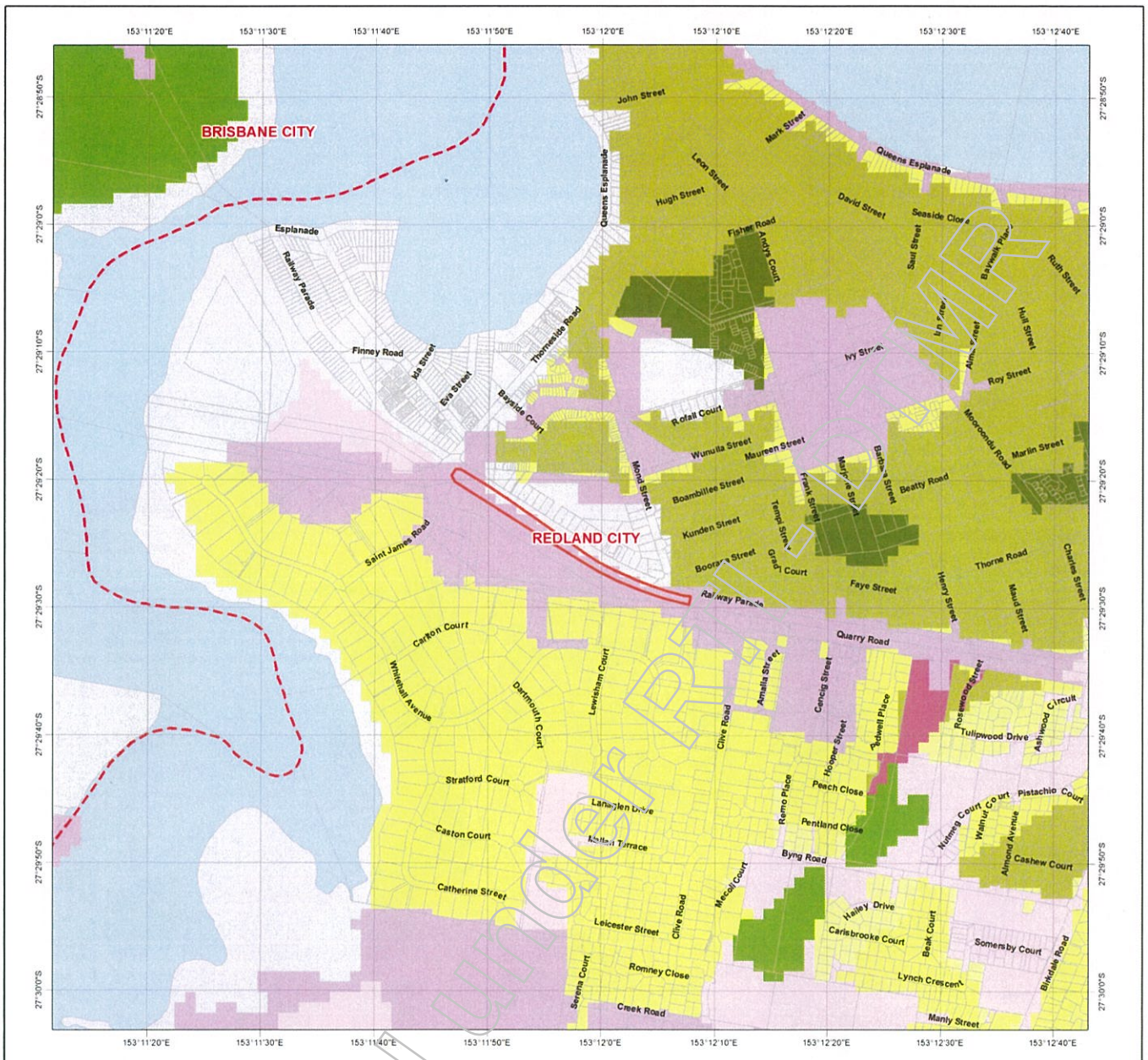

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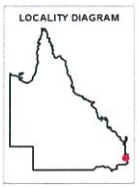

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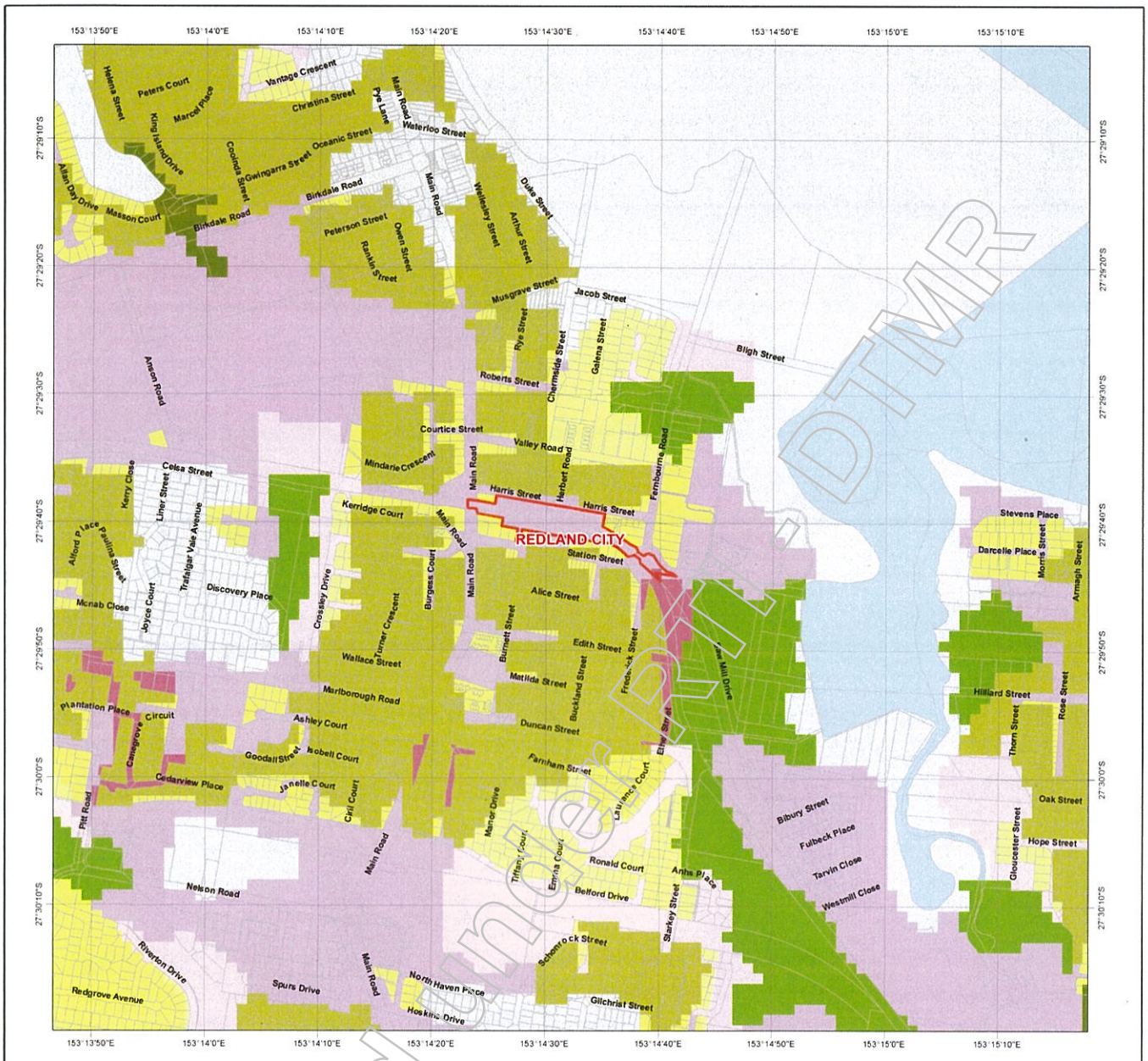

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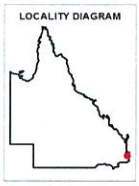

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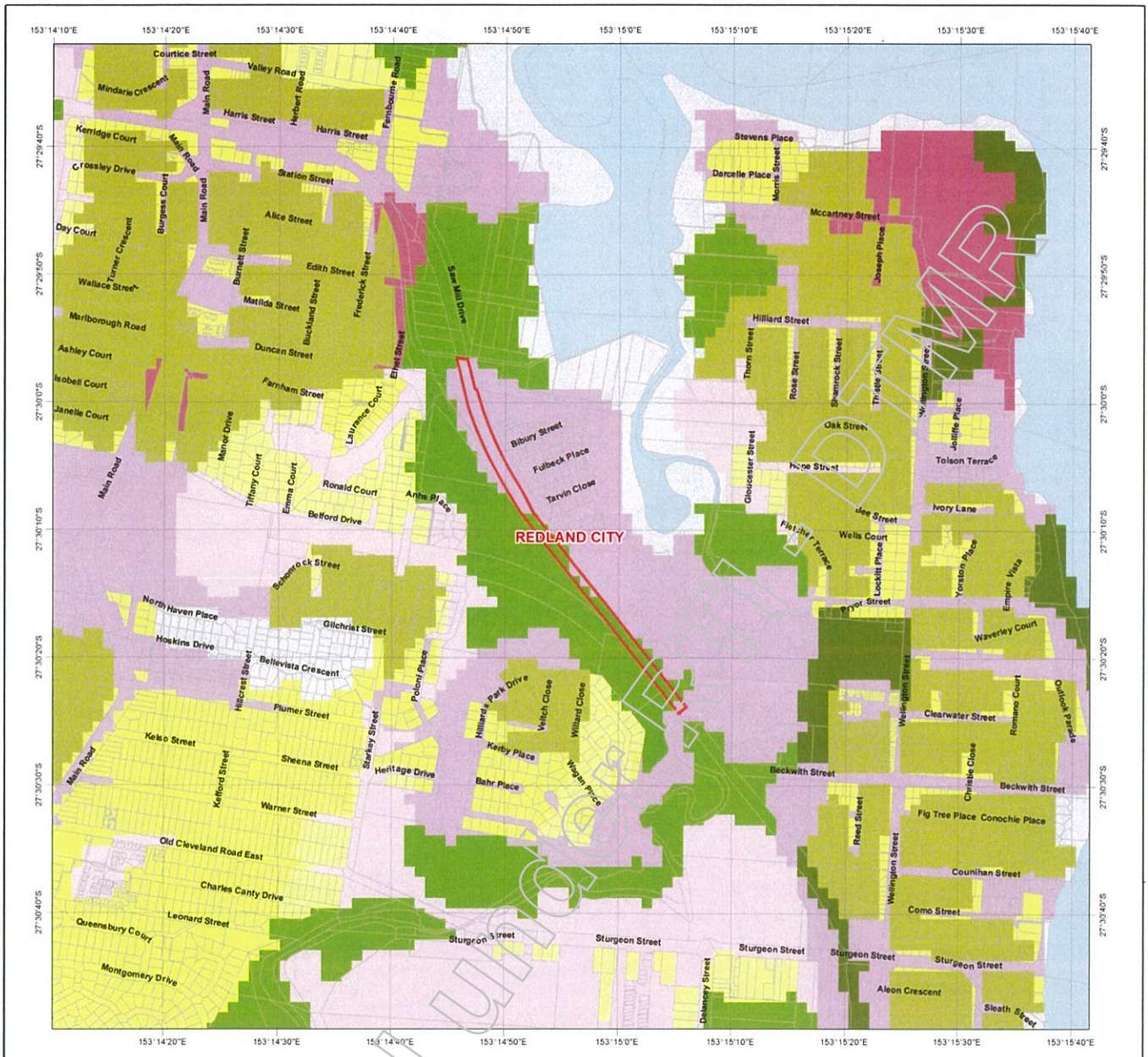

Koala Habitat in South East Queensland

Lot and Plan

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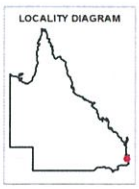

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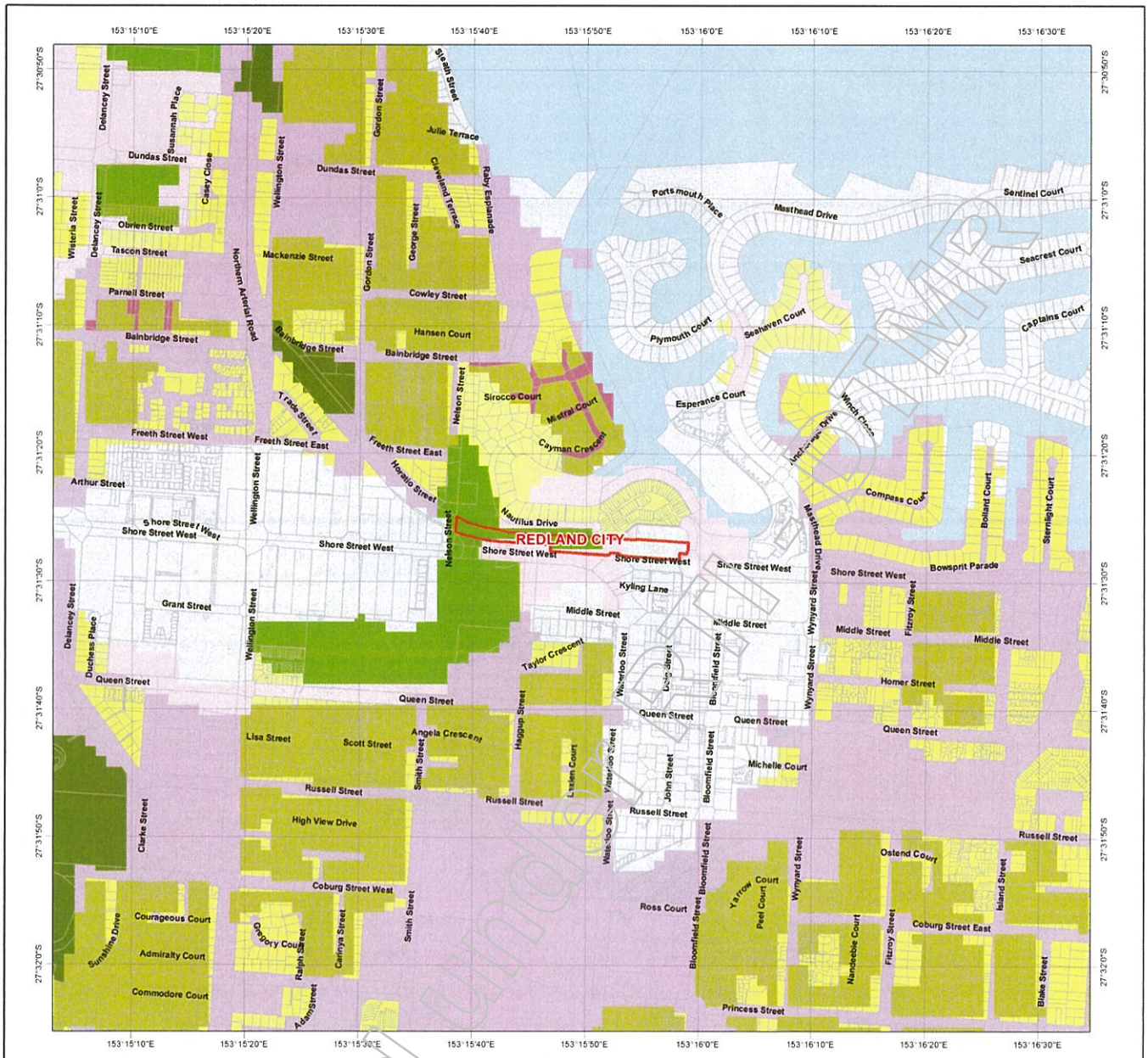

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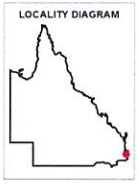

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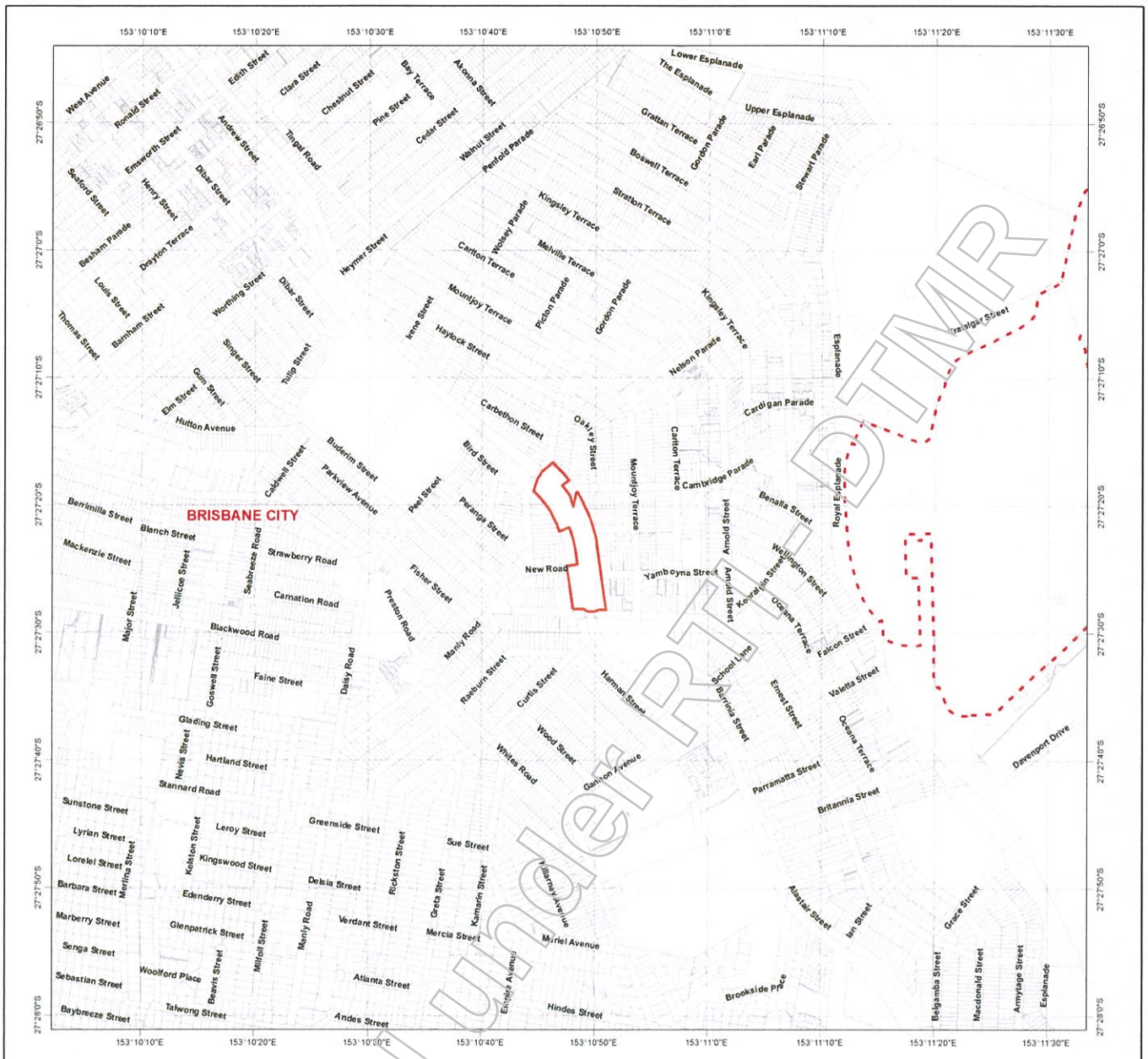

Koala Conservation in South East Queensland State Planning Regulatory Provisions

- Lot and Plan
- Priority Koala Assessable Development Areas
- Koala Assessable Development Areas
- Outside SPRP Koala Assessable Development Areas

Koala SPRP - Identified Broad-Hectare Areas

- Koala SPRP - Identified Broad-Hectare Areas

Koala SPRP - Habitat Values

Bushland Habitat

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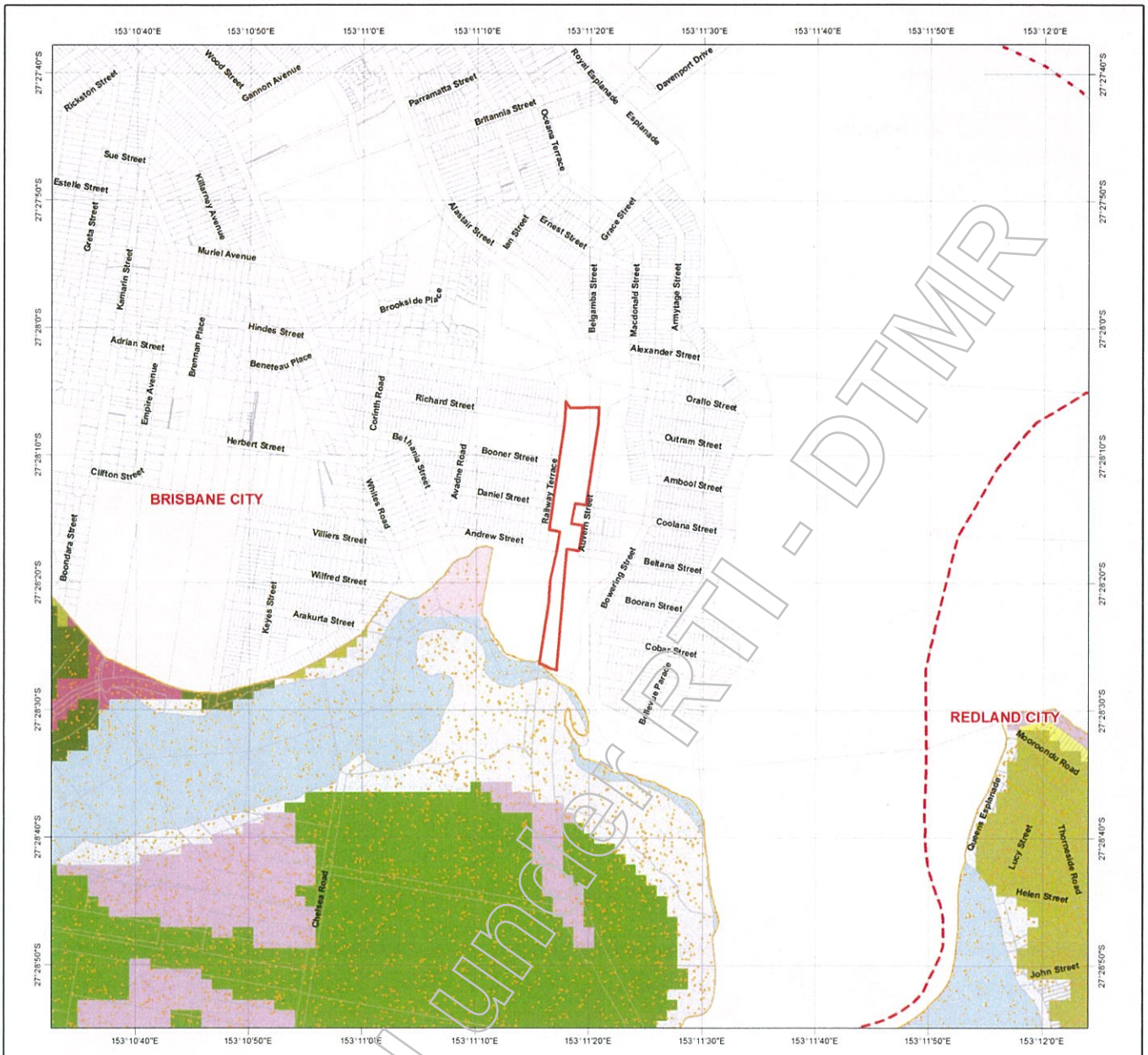

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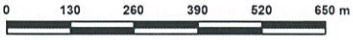

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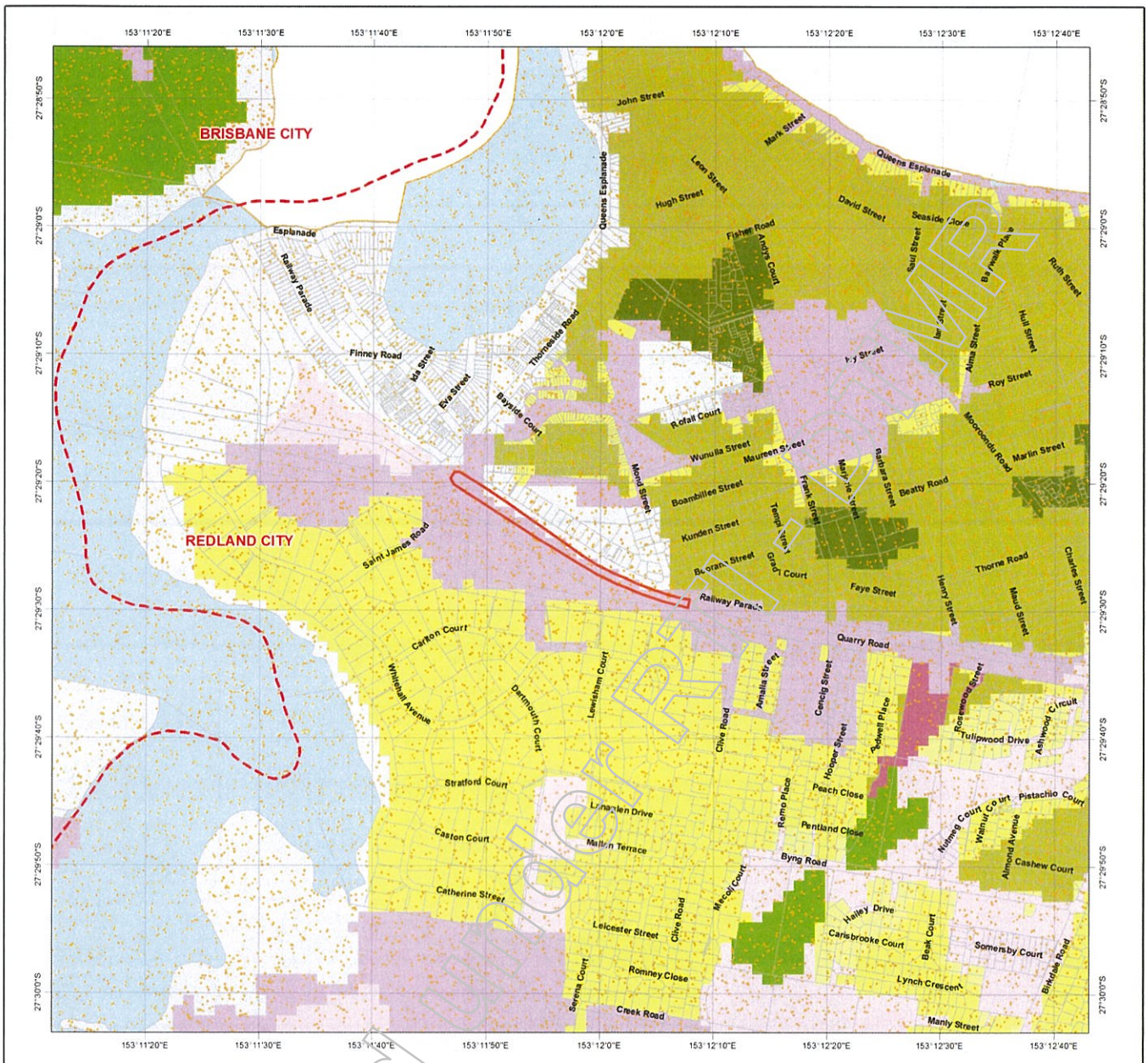

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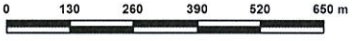

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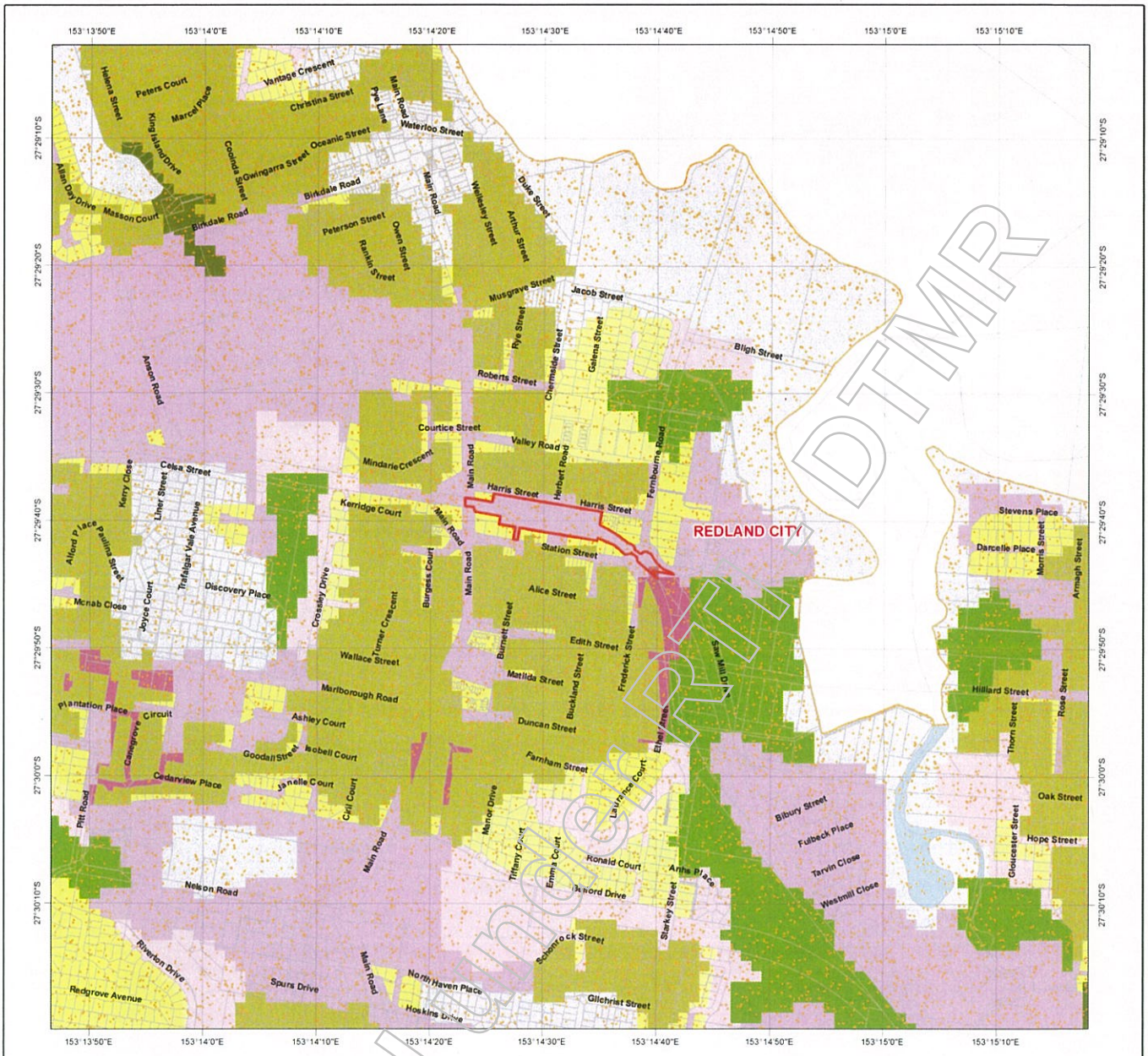

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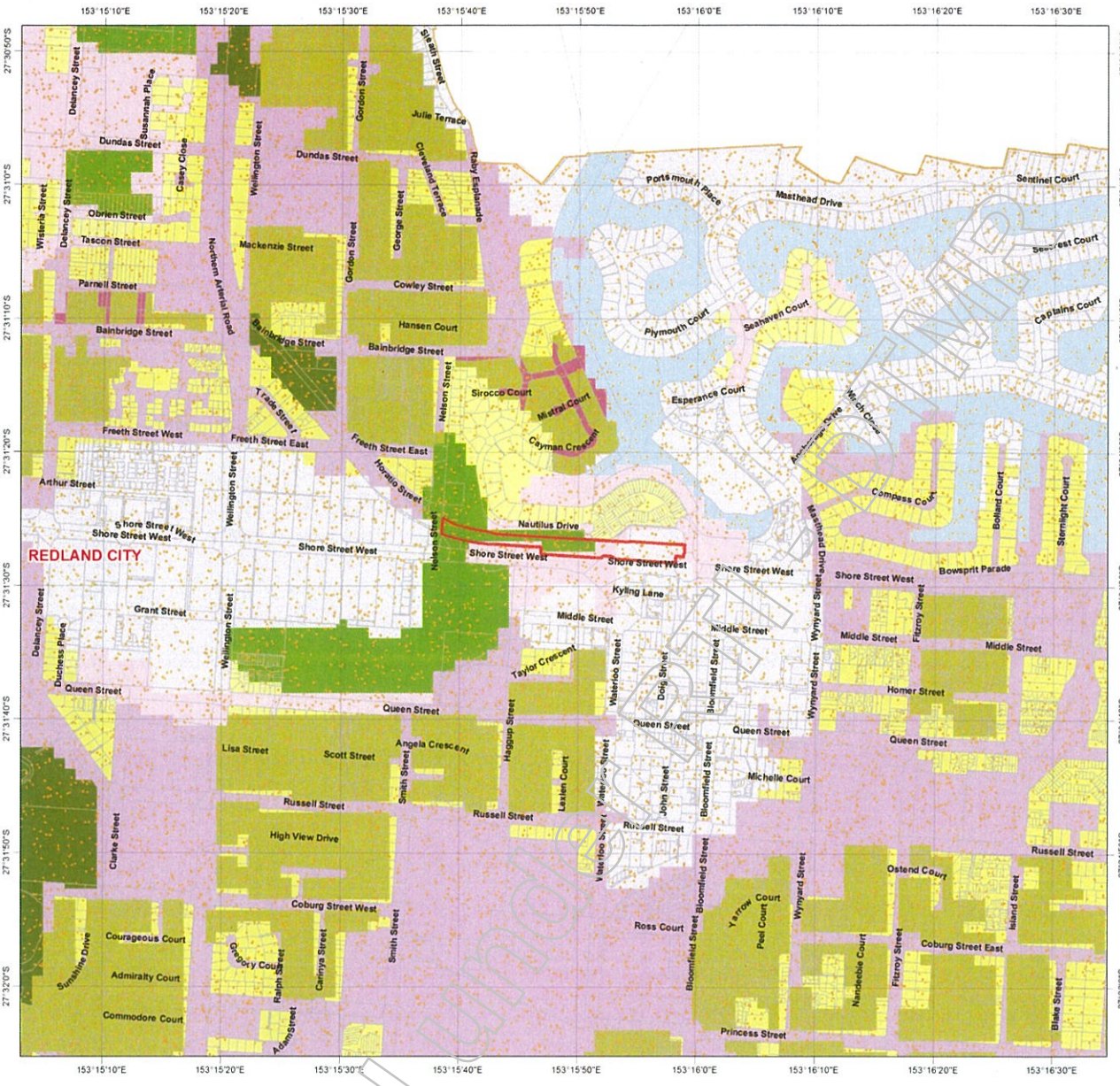
Note - These maps are not regulatory. Regulatory maps and requirements can be downloaded from the EHP website. Further information in relation to regulatory requirements for development and planning activities should be sought from the relevant Local Government Authority or the Department of Environment and Heritage Protection.



Koala Conservation in South East Queensland State Planning Regulatory Provisions

- Lot and Plan
- Priority Koala Assessable Development Areas
- Koala Assessable Development Areas
- Outside SPRP Koala Assessable Development Areas

Koala SPRP - Identified Broad-Hectare Areas

- Koala SPRP - Identified Broad-Hectare Areas

Koala SPRP - Habitat Values

Bushland Habitat

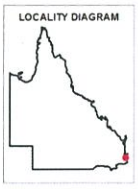
- High Value Bushland
- Medium Value Bushland
- Low Value Bushland

Suitable for Rehabilitation

- High Value Rehabilitation
- Medium Value Rehabilitation
- Low Value Rehabilitation

Other Areas of Value

- High Value Other
- Medium Value Other
- Low Value Other
- Generally not suitable
- Water
- Cadastral Boundaries
- Local Government Boundaries



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0 130 260 390 520 650 m

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Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -27.4738
Longitude: 153.1896
Distance: 2
Email: sarah.ross@ghd.com
Date submitted: Monday 05 Jun 2017 17:58:23
Date extracted: Monday 05 Jun 2017 18:00:03

The number of records retrieved = 316

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.

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			12
animals	amphibians	Hylidae	*Litoria peronii*	emerald spotted treefrog		C		1
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		1
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		10
animals	amphibians	Hylidae	*Litoria gracilenta*	graceful treefrog		C		6
animals	amphibians	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog		C		1
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		10
animals	amphibians	Hylidae	*Litoria nasuta*	striped rocketfrog		C		2
animals	amphibians	Limnodynastidae	*Adelotus brevis*	tusked frog		V		1
animals	amphibians	Limnodynastidae	*Limnodynastes peronii*	striped marshfrog		C		10
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		5
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		2
animals	amphibians	Myobatrachidae	*Crinia signifera*	clicking froglet		C		4
animals	amphibians	Myobatrachidae	*Pseudophryne major*	great brown broodfrog		C		4
animals	amphibians	Myobatrachidae	*Crinia parinsignifera*	beeping froglet		C		4
animals	birds	Acanthizidae	*Chthonicola sagittata*	speckled warbler		C		1
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Acanthizidae	*Gerygone levigaster*	mangrove gerygone		C		21
animals	birds	Acanthizidae	*Gerygone mouki*	brown gerygone		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		10
animals	birds	Accipitridae	*Haliastur indus*	brahminy kite		C		47
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		4
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		2
animals	birds	Accipitridae	*Accipiter novaehollandiae*	grey goshawk		C		4
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		11
animals	birds	Accipitridae	*Pandion cristatus*	eastern osprey		SL		39
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		6
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		2
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		18
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		16
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		C		2
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		2
animals	birds	Alcedinidae	*Ceyx azureus*	azure kingfisher		C		1
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		1
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		12
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		11
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		5
animals	birds	Anatidae	*Anas castanea*	chestnut teal		C		11
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		4
animals	birds	Anseranatidae	*Anseranas semipalmata*	magpie goose		C		1
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		SL		1
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		13
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		78
animals	birds	Ardeidae	*Butorides striata*	striated heron		C		28
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		1
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		215

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		6
animals	birds	Ardeidae	*Egretta sacra*	eastern reef egret		C		3
animals	birds	Ardeidae	*Bubulcus ibis*	cattle egret		C		10
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		69
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		1
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		1
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		2
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		36
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		27
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		57
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		1
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		34
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		5
animals	birds	Cacatuidae	*Cacatua tenuirostris*	long-billed corella	Y	C		2
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		1
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		42
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		54
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		1
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		1
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		1
animals	birds	Charadriidae	*Charadrius mongolus*	lesser sand plover		E	E	58
animals	birds	Charadriidae	*Charadrius bicinctus*	double-banded plover		SL		20
animals	birds	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel		C		1
animals	birds	Charadriidae	*Pluvialis squatarola*	grey plover		SL		2
animals	birds	Charadriidae	*Charadrius ruficapillus*	red-capped plover		C		82
animals	birds	Charadriidae	*Charadrius leschenaultii*	greater sand plover		V	V	56
animals	birds	Charadriidae	*Charadrius veredus*	oriental plover		SL		4
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		109
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		225
animals	birds	Charadriidae	*Pluvialis fulva*	Pacific golden plover		SL		99
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		1
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		22
animals	birds	Climacteridae	*Cormobates leucophaea metastasis*	white-throated treecreeper (southern)		C		3
animals	birds	Climacteridae	*Cormobates leucophaea*	white-throated treecreeper		C		2
animals	birds	Columbidae	*Streptopelia chinensis*	spotted dove	Y			53
animals	birds	Columbidae	*Columba livia*	rock dove	Y			18
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		1
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		2
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		31
animals	birds	Columbidae	*Ptilinopus regina*	rose-crowned fruit-dove		C		1
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		11
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		18
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		64
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		1
animals	birds	Cuculidae	*Cacomantis variolosus*	brush cuckoo		C		1
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		15

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		12
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		5
animals	birds	Cuculidae	*Cuculus optatus*	oriental cuckoo		SL		2
animals	birds	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		C		2
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		36
animals	birds	Estrildidae	*Lonchura punctulata*	nutmeg mannikin	Y			4
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		8
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		4
animals	birds	Estrildidae	*Neochmia temporalis*	red-browed finch		C		8
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		2
animals	birds	Falconidae	*Falco subniger*	black falcon		C		1
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		2
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		2
animals	birds	Falconidae	*Falco peregrinus*	peregrine falcon		C		1
animals	birds	Haematopodidae	*Haematopus longirostris*	Australian pied oystercatcher		C		126
animals	birds	Haematopodidae	*Haematopus fuliginosus*	sooty oystercatcher		C		3
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		19
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		7
animals	birds	Halcyonidae	*Todiramphus sordidus*	Torresian kingfisher		C		32
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		40
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		5
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		42
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		11
animals	birds	Laridae	*Sterna hirundo*	common tern		SL		5
animals	birds	Laridae	*Thalasseus bergii*	crested tern		SL		36
animals	birds	Laridae	*Hydroprogne caspia*	Caspian tern		SL		98
animals	birds	Laridae	*Chroicocephalus novaehollandiae*	silver gull		C		141
animals	birds	Laridae	*Gelochelidon nilotica*	gull-billed tern		SL		89
animals	birds	Laridae	*Chlidonias leucopterus*	white-winged black tern		SL		1
animals	birds	Laridae	*Thalasseus bengalensis*	lesser crested tern		C		16
animals	birds	Laridae	*Sternula albifrons*	little tern		SL		35
animals	birds	Maluridae	*Malurus cyaneus*	superb fairy-wren		C		1
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		14
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		11
animals	birds	Megaluridae	*Megalurus timoriensis*	tawny grassbird		C		4
animals	birds	Megaluridae	*Megalurus gramineus*	little grassbird		C		1
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		48
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		22
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		3
animals	birds	Meliphagidae	*Anthochaera chrysoptera*	little wattlebird		C		3
animals	birds	Meliphagidae	*Gavicalis fasciogularis*	mangrove honeyeater		C		24
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		11
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		6
animals	birds	Meliphagidae	*Acanthorhynchus tenuirostris*	eastern spinebill		C		1
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		25
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		43

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		6
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		7
animals	birds	Meliphagidae	*Ptilotula fusca*	fuscous honeyeater		C		1
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		2
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		14
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		58
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		1
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		3
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		5
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		9
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		1
animals	birds	Oceanitidae	*Fregetta tropica*	black-bellied storm-petrel		C		2
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		23/1
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		7
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		18
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		1
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		19
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		3
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		31
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		4
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			22
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		53
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		4
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		48
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		13
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		10
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		4
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		4
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		72
animals	birds	Psittacidae	*Parvipsitta pusilla*	little lorikeet		C		1
animals	birds	Psittacidae	*Platycercus elegans*	crimson rosella		C		1
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		46
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		19
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		2
animals	birds	Rallidae	*Lewinia pectoralis*	Lewin's rail		C		2
animals	birds	Rallidae	*Gallirallus philippensis*	buff-banded rail		C		2
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		174
animals	birds	Recurvirostridae	*Cladorhynchus leucocephalus*	banded stilt		C		1
animals	birds	Recurvirostridae	*Recurvirostra novaehollandiae*	red-necked avocet		C		15
animals	birds	Rhipiduridae	*Rhipidura rufifrons*	rufous fantail		SL		2
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		29
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		48
animals	birds	Scolopacidae	*Limosa limosa*	black-tailed godwit		SL		21
animals	birds	Scolopacidae	*Tringa incana*	wandering tattler		SL		2
animals	birds	Scolopacidae	*Numenius madagascariensis*	eastern curlew		E	CE	244

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Scolopacidae	*Limnodromus semipalmatus*	Asian dowitcher		SL		20
animals	birds	Scolopacidae	*Limosa lapponica baueri*	Western Alaskan bar-tailed godwit		V	V	301
animals	birds	Scolopacidae	*Xenus cinereus*	terek sandpiper		SL		101
animals	birds	Scolopacidae	*Tringa brevipes*	grey-tailed tattler		SL		154
animals	birds	Scolopacidae	*Calidris canutus*	red knot		E	E	59
animals	birds	Scolopacidae	*Numenius minutus*	little curlew		SL		2
animals	birds	Scolopacidae	*Tringa nebularia*	common greenshank		SL		127
animals	birds	Scolopacidae	*Numenius phaeopus*	whimbrel		SL		305
animals	birds	Scolopacidae	*Actitis hypoleucos*	common sandpiper		SL		2
animals	birds	Scolopacidae	*Arenaria interpres*	ruddy turnstone		SL		102
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		73
animals	birds	Scolopacidae	*Philomachus pugnax*	ruff		SL		1
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		4
animals	birds	Scolopacidae	*Calidris ferruginea*	curlew sandpiper		E	CE	136
animals	birds	Scolopacidae	*Calidris ruficollis*	red-necked stint		SL		97
animals	birds	Scolopacidae	*Limicola falcinellus*	broad-billed sandpiper		SL		9
animals	birds	Scolopacidae	*Calidris tenuirostris*	great knot		E	CE	142
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		10
animals	birds	Sturnidae	*Sturnus vulgaris*	common starling	Y			13
animals	birds	Sturnidae	*Acridotheres tristis*	common myna	Y			11
animals	birds	Sulidae	*Morus serrator*	Australasian gannet		C		1
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		2
animals	birds	Threskiornithidae	*Plegadis falcinellus*	glossy ibis		SL		2
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		227
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		20
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		30
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		33
animals	insects	Nymphalidae	*Vanessa kershawi*	Australian painted lady				2
animals	insects	Nymphalidae	*Euploea core corinna*	common crow				1
animals	insects	Nymphalidae	*Junonia villida calybe*	meadow argus				1
animals	insects	Nymphalidae	*Danaus plexippus plexippus*	monarch				2
animals	insects	Papilionidae	*Papilio aegeus aegeus*	orchard swallowtail (Australian subspecies)				1
animals	insects	Pieridae	*Pieris rapae*	cabbage white				2
animals	insects	Pieridae	*Delias nigrina*	black jezebel				1
animals	mammals	Canidae	*Vulpes vulpes*	red fox	Y			6
animals	mammals	Leporidae	*Lepus europaeus*	European brown hare	Y			2
animals	mammals	Miniopteridae	*Miniopterus schreibersii oceanensis*	eastern bent-wing bat		C		1
animals	mammals	Molossidae	*Tadarida australis*	white-striped freetail bat		C		1
animals	mammals	Molossidae	*Mormopterus sp.*					1
animals	mammals	Muridae	*Rattus norvegicus*	brown rat	Y			1
animals	mammals	Muridae	*Rattus lutreolus*	swamp rat		C		1
animals	mammals	Muridae	*Rattus rattus*	black rat	Y			2
animals	mammals	Muridae	*Hydromys chrysogaster*	water rat		C		1
animals	mammals	Peramelidae	*Isoodon macrourus*	northern brown bandicoot		C		1
animals	mammals	Petauridae	*Petaurus norfolcensis*	squirrel glider		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		3
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	674
animals	mammals	Pseudocheiridae	*Pseudocheirus peregrinus*	common ringtail possum		C		9
animals	mammals	Pteropodidae	*Pteropus alecto*	black flying-fox		C		33
animals	mammals	Pteropodidae	*Pteropus poliocephalus*	grey-headed flying-fox		C	V	19
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		1
animals	mammals	Pteropodidae	*Pteropus sp.*					1
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		16
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		6
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		1
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		1
animals	reptiles	Colubridae	*Dendrelaphis punctulatus*	green tree snake		C		13
animals	reptiles	Elapidae	*Pseudechis porphyriacus*	red-bellied black snake		C		4
animals	reptiles	Elapidae	*Tropidechis carinatus*	rough-scaled snake		C		1
animals	reptiles	Elapidae	*Pseudonaja textilis*	eastern brown snake		C		2
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whipsnake		C		4
animals	reptiles	Elapidae	*Cacophis harriettae*	white-crowned snake		C		3
animals	reptiles	Elapidae	*Pseudechis australis*	king brown snake		C		1
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		3
animals	reptiles	Scincidae	*Lampropholis delicata*	dark-flecked garden sunskink		C		3
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		2
animals	reptiles	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard		C		11
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		5
animals	reptiles	Scincidae	*Anomalopus verreauxii*	three-clawed worm-skink		C		6
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending		C		27
fungi	club fungi	Basidiomycota	*Limacella*			C		1/1
fungi	club fungi	Basidiomycota	*Leucoagaricus fimetarius*			C		4/4
fungi	club fungi	Basidiomycota	*Chlorophyllum molybdites*	green-spored parasol		C		2/2
fungi	club fungi	Basidiomycota	*Amanita*			C		1/1
fungi	club fungi	Basidiomycota	*Boletus*			C		4/4
fungi	club fungi	Basidiomycota	*Inocybe*			C		2/2
fungi	club fungi	Basidiomycota	*Lepiota*			C		2/2
fungi	club fungi	Basidiomycota	*Agaricus*			C		10/10
fungi	club fungi	Basidiomycota	*Agrocybe*			C		1/1
fungi	club fungi	Basidiomycota	*Calvatia*			C		1/1
fungi	club fungi	Basidiomycota	*Collybia*			C		1/1
fungi	club fungi	Basidiomycota	*Conocybe*			C		2/2
fungi	club fungi	Basidiomycota	*Coprinus*			C		1/1
fungi	club fungi	Basidiomycota	*Geastrum*			C		1/1
fungi	club fungi	Basidiomycota	*Laccaria*			C		1/1
fungi	club fungi	Basidiomycota	*Gyroporus*			C		1/1
fungi	club fungi	Basidiomycota	*Lactarius*			C		6/6
fungi	club fungi	Basidiomycota	*Leucocoprinus birnbaumii*			C		2/2
fungi	club fungi	Basidiomycota	*Marasmius*			C		1/1
fungi	club fungi	Basidiomycota	*Panaeolus*			C		2/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
fungi	club fungi	Basidiomycota	*Phellinus*			C		1/1
fungi	club fungi	Basidiomycota	*Tylopilus*			C		2/2
fungi	club fungi	Basidiomycota	*Lycoperdon*			C		2/2
fungi	club fungi	Basidiomycota	*Nematoloma*			C		2/2
fungi	club fungi	Basidiomycota	*Pisolithus*			C		1/1
fungi	club fungi	Basidiomycota	*Rhodophyllus*			C		1/1
fungi	club fungi	Basidiomycota	*Leucoagaricus*			C		1/1
fungi	club fungi	Basidiomycota	*Leucocoprinus*			C		3/3
fungi	club fungi	Basidiomycota	*Clitocybe tortipes*			C		1/1
fungi	club fungi	Basidiomycota	*Lepista sublilacina*			C		1/1
fungi	club fungi	Basidiomycota	*Panaeolus sphinctrinus*			C		2/2
fungi	club fungi	Basidiomycota	*Macrolepiota dolichaula*			C		1/1
fungi	sac fungi	Cladiaceae	*Cladia muelleri*			C		1/1
fungi	sac fungi	Cladoniaceae	*Cladonia rigida var. rigida*			C		1/1
fungi	sac fungi	Ramalinaceae	*Ramalina inflata subsp. perpusilla*			C		2/2
plants	higher dicots	Chenopodiaceae	*Chenopodium album*	fat-hen	Y			1/1
plants	higher dicots	Fabaceae	*Pultenaea retusa*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia bellidifolia subsp. argentea*			C		1/1
plants	higher dicots	Molluginaceae	*Mollugo verticillata*		Y			1/1
plants	higher dicots	Myrsinaceae	*Ardisia elliptica*		Y			1/1
plants	higher dicots	Myrsinaceae	*Myrsine howittiana*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus siderophloia*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus seeana*	narrow-leaved red gum		C		1/1
plants	higher dicots	Myrtaceae	*Melaleuca nodosa*			C		2/2
plants	higher dicots	Plantaginaceae	*Plantago myosuros subsp. myosuros*		Y			1/1
plants	higher dicots	Sapindaceae	*Dodonaea triquetra*	large-leaved hop bush		C		1/1
plants	lower dicots	Papaveraceae	*Fumaria officinalis subsp. officinalis*		Y			1/1
plants	monocots	Commelinaceae	*Commelina lanceolata*			C		1/1
plants	monocots	Cymodoceaceae	*Halodule uninervis*			C		1/1
plants	monocots	Cyperaceae	*Gahnia aspera*			C		1/1
plants	monocots	Hydrocharitaceae	*Halophila ovalis*			C		2/2
plants	monocots	Hydrocharitaceae	*Halophila spinulosa*			C		2/2
plants	monocots	Orchidaceae	*Phaius australis*			E	E	2/1
plants	monocots	Poaceae	*Ehrharta erecta var. erecta*		Y			1/1
plants	monocots	Poaceae	*Tripsacum dactyloides*		Y			1/1
plants	monocots	Poaceae	*Dichanthium annulatum*	sheda grass	Y			1/1
plants	monocots	Poaceae	*Eragrostis minor*	smaller stinkgrass	Y			1/1
plants	monocots	Poaceae	*Lolium multiflorum*	italian ryegrass	Y			1/1
plants	monocots	Zosteraceae	*Zostera capricorni*	eelgrass		C		3/3
protists	brown algae	Phaeophyceae	*Dictyota*			C		1/1
protists	red algae	Rhodophyceae	*Laurencia papillosa*			C		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.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -27.5097
Longitude: 153.2521
Distance: 2
Email: sarah.ross@ghd.com
Date submitted: Monday 05 Jun 2017 17:59:17
Date extracted: Monday 05 Jun 2017 18:00:13

The number of records retrieved = 242

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.

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			1
animals	amphibians	Hylidae	*Litoria peronii*	emerald spotted treefrog		C		1
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		2
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		1
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		1
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		18
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		5
animals	birds	Acanthizidae	*Gerygone levigaster*	mangrove gerygone		C		6
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		2
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		2
animals	birds	Acanthizidae	*Chthonicola sagittata*	speckled warbler		C		1
animals	birds	Accipitridae	*Haliastur indus*	brahminy kite		C		47
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		1
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		2
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		3
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		32
animals	birds	Accipitridae	*Pandion cristatus*	eastern osprey		SL		30
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		1
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		16
animals	birds	Alcedinidae	*Ceyx azureus*	azure kingfisher		C		2
animals	birds	Anatidae	*Anas platyrhynchos*	northern mallard	Y			1
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		5
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		11
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		3
animals	birds	Anatidae	*Anas castanea*	chestnut teal		C		40
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		4
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		4
animals	birds	Anseranatidae	*Anseranas semipalmata*	magpie goose		C		2
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		SL		1
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		53
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		3
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		166
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		64
animals	birds	Ardeidae	*Egretta sacra*	eastern reef egret		C		1
animals	birds	Ardeidae	*Butorides striata*	striated heron		C		7
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		11
animals	birds	Ardeidae	*Bubulcus ibis*	cattle egret		C		5
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		27
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		7
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		14
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		3
animals	birds	Burhinidae	*Esacus magnirostris*	beach stone-curlew		V		2
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		1
animals	birds	Cacatuidae	*Cacatua tenuirostris*	long-billed corella	Y	C		1
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		1
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		20

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		11
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		27
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		3
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		2
animals	birds	Charadriidae	*Charadrius mongolus*	lesser sand plover		E	E	19
animals	birds	Charadriidae	*Charadrius ruficapillus*	red-capped plover		C		168
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		11
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		81
animals	birds	Charadriidae	*Pluvialis fulva*	Pacific golden plover		SL		47
animals	birds	Charadriidae	*Charadrius leschenaultii*	greater sand plover		V	V	9
animals	birds	Charadriidae	*Charadrius bicinctus*	double-banded plover		SL		50
animals	birds	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel		C		2
animals	birds	Charadriidae	*Vanellus miles miles*	masked lapwing (northern subspecies)		C		1
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		2
animals	birds	Climacteridae	*Cormobates leucophaea metastasis*	white-throated treecreeper (southern)		C		5
animals	birds	Columbidae	*Chalcophaps indica*	emerald dove		C		1
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		12
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		3
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		8
animals	birds	Columbidae	*Leucosarcia melanoleuca*	wonga pigeon		C		1
animals	birds	Columbidae	*Streptopelia chinensis*	spotted dove	Y			23
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		4
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		35
animals	birds	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		C		1
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		11
animals	birds	Cuculidae	*Cacomantis variolosus*	brush cuckoo		C		5
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		10
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		7
animals	birds	Cuculidae	*Chalcites minutillus barnardi*	little bronze-cuckoo		C		2
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		12
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		1
animals	birds	Estrildidae	*Neochmia temporalis*	red-browed finch		C		5
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		14
animals	birds	Estrildidae	*Lonchura punctulata*	nutmeg mannikin	Y			1
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		1/1
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		2
animals	birds	Falconidae	*Falco peregrinus*	peregrine falcon		C		2
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		2
animals	birds	Haematopodidae	*Haematopus longirostris*	Australian pied oystercatcher		C		45
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		6
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		5
animals	birds	Halcyonidae	*Todiramphus sordidus*	Torresian kingfisher		C		6
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		21
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		1
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		17
animals	birds	Laridae	*Hydroprogne caspia*	Caspian tern		SL		62
animals	birds	Laridae	*Thalasseus bergii*	crested tern		SL		2
animals	birds	Laridae	*Sternula albifrons*	little tern		SL		3
animals	birds	Laridae	*Gelochelidon nilotica*	gull-billed tern		SL		52
animals	birds	Laridae	*Chroicocephalus novaehollandiae*	silver gull		C		13
animals	birds	Laridae	*Onychoprion fuscatus*	sooty tern		C		1
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		4
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		22
animals	birds	Maluridae	*Malurus cyaneus*	superb fairy-wren		C		1
animals	birds	Megaluridae	*Megalurus timoriensis*	tawny grassbird		C		1
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		9
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		7
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		4
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		3
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		4
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		4
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		1
animals	birds	Meliphagidae	*Gavicalis fasciogularis*	mangrove honeyeater		C		25
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		18
animals	birds	Meliphagidae	*Acanthorhynchus tenuirostris*	eastern spinebill		C		1
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		28
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		2
animals	birds	Monarchidae	*Carterornis leucotis*	white-eared monarch		C		2
animals	birds	Monarchidae	*Monarcha melanopsis*	black-faced monarch		SL		1
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		30
animals	birds	Monarchidae	*Myiagra cyanoleuca*	satin flycatcher		SL		1
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		9
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		1
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		4
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		1
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		20/1
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		9
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		23
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		1
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		15
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		15
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		3
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			23
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		28
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		16
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		13
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		13
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		12

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		2
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		1
animals	birds	Psittacidae	*Parvipsitta pusilla*	little lorikeet		C		1
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		2
animals	birds	Psittacidae	*Platycercus adscitus palliceps*	pale-headed rosella (southern form)		C		1
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		31
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		28
animals	birds	Psophodidae	*Psophodes olivaceus*	eastern whipbird		C		3
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		5
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		5
animals	birds	Rallidae	*Gallirallus philippensis*	buff-banded rail		C		1
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		33
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		27
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		14
animals	birds	Rhipiduridae	*Rhipidura rufifrons*	rufous fantail		SL		1
animals	birds	Scolopacidae	*Numenius madagascariensis*	eastern curlew		E	CE	182
animals	birds	Scolopacidae	*Limosa lapponica baueri*	Western Alaskan bar-tailed godwit		V	V	108
animals	birds	Scolopacidae	*Calidris tenuirostris*	great knot		E	CE	18
animals	birds	Scolopacidae	*Limicola falcinellus*	broad-billed sandpiper		SL		1
animals	birds	Scolopacidae	*Calidris ruficollis*	red-necked stint		SL		120
animals	birds	Scolopacidae	*Calidris ferruginea*	curlew sandpiper		E	CE	14
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		2
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		44
animals	birds	Scolopacidae	*Arenaria interpres*	ruddy turnstone		SL		34
animals	birds	Scolopacidae	*Actitis hypoleucos*	common sandpiper		SL		2
animals	birds	Scolopacidae	*Limosa limosa*	black-tailed godwit		SL		1
animals	birds	Scolopacidae	*Tringa nebularia*	common greenshank		SL		22
animals	birds	Scolopacidae	*Numenius phaeopus*	whimbrel		SL		116
animals	birds	Scolopacidae	*Xenus cinereus*	terek sandpiper		SL		19
animals	birds	Scolopacidae	*Tringa brevipes*	grey-tailed tattler		SL		32
animals	birds	Scolopacidae	*Calidris canutus*	red knot		E	E	5
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		2
animals	birds	Sturnidae	*Sturnus vulgaris*	common starling	Y			11
animals	birds	Sturnidae	*Acridotheres tristis*	common myna	Y			2
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		23
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		199
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		17
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		29
animals	insects	Nymphalidae	*Danaus plexippus plexippus*	monarch				1
animals	mammals	Petauridae	*Petaurus norfolcensis*	squirrel glider		C		1
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		2
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	2468
animals	mammals	Pseudocheiridae	*Pseudocheirus peregrinus*	common ringtail possum		C		1
animals	mammals	Pteropodidae	*Pteropus scapulatus*	little red flying-fox		C		3
animals	mammals	Pteropodidae	*Pteropus alecto*	black flying-fox		C		60
animals	mammals	Pteropodidae	*Pteropus sp.*					1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	mammals	Pteropodidae	*Pteropus poliocephalus*	grey-headed flying-fox		C	V	47
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		SL		1
animals	ray-finned fishes	Anguillidae	*Anguilla australis*	southern shortfin eel				12
animals	ray-finned fishes	Anguillidae	*Anguilla reinhardtii*	longfin eel				26
animals	ray-finned fishes	Atherinidae	*Craterocephalus marjoriae*	silverstreak hardyhead				2
animals	ray-finned fishes	Atherinidae	*Craterocephalus stercusmuscarum*	flyspecked hardyhead				18
animals	ray-finned fishes	Cichlidae	*Oreochromis mossambicus*	Mozambique mouthbrooder	Y			6
animals	ray-finned fishes	Eleotridae	*Hypseleotris klunzingeri*	western carp gudgeon				16
animals	ray-finned fishes	Eleotridae	*Hypseleotris compressa*	empire gudgeon				24
animals	ray-finned fishes	Eleotridae	*Hypseleotris galii*	firetail gudgeon				9
animals	ray-finned fishes	Eleotridae	*Gobiomorphus australis*	striped gudgeon				15
animals	ray-finned fishes	Kuhliidae	*Kuhlia rupestris*	jungle perch				1
animals	ray-finned fishes	Melanotaeniidae	*Melanotaenia duboulayi*	crimsonspotted rainbowfish				26
animals	ray-finned fishes	Mugilidae	*Mugil cephalus*	sea mullet				13
animals	ray-finned fishes	Plotosidae	*Tandanus tandanus*	freshwater catfish				26
animals	ray-finned fishes	Poeciliidae	*Gambusia holbrooki*	mosquitofish	Y			25
animals	ray-finned fishes	Poeciliidae	*Xiphophorus hellerii*	swordtail	Y			26
animals	ray-finned fishes	Poeciliidae	*Xiphophorus maculatus*	platy	Y			3
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		1
animals	reptiles	Agamidae	*Intellagama lesueurii*	eastern water dragon		C		2
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		23
animals	reptiles	Chelidae	*Emydura macquarii macquarii*	Murray turtle		C		1
animals	reptiles	Chelidae	*Chelodina expansa*	broad-shelled river turtle		C		2
animals	reptiles	Colubridae	*Dendrelaphis punctulatus*	green tree snake		C		5
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		2
animals	reptiles	Elapidae	*Cacophis harriettae*	white-crowned snake		C		1
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending		C		8
fungi	club fungi	Basidiomycota	*Cyathus stercoreus*			C		1/1
fungi	club fungi	Basidiomycota	*Suillus granulatus*			C		1/1
fungi	sac fungi	Collemataceae	*Physma*			C		1/1
plants	ferns	Salviniaceae	*Salvinia molesta*	salvinia	Y			1/1
plants	higher dicots	Anacardiaceae	*Schinus terebinthifolius*		Y			1/1
plants	higher dicots	Asteraceae	*Sphagneticola trilobata*		Y			1/1
plants	higher dicots	Asteraceae	*Ageratina adenophora*	crofton weed	Y			1/1
plants	higher dicots	Balsaminaceae	*Impatiens walleriana*	balsam	Y			1/1
plants	higher dicots	Caesalpiniaceae	*Delonix regia*	poinciana	Y			1
plants	higher dicots	Caesalpiniaceae	*Senna pendula var. glabrata*	Easter cassia	Y			1/1
plants	higher dicots	Convolvulaceae	*Cuscuta campestris*	dodder	Y			1/1
plants	higher dicots	Convolvulaceae	*Ipomoea alba*	moon flower	Y			1/1
plants	higher dicots	Convolvulaceae	*Ipomoea indica*	blue morning-glory	Y			1/1
plants	higher dicots	Myrtaceae	*Corymbia citriodora*	spotted gum		C		1
plants	higher dicots	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		1
plants	higher dicots	Myrtaceae	*Lophostemon confertus*	brush box		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus tereticornis*			C		1
plants	higher dicots	Myrtaceae	*Melaleuca quinquenervia*	swamp paperbark		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus saligna subsp. saligna*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Myrtaceae	*Eucalyptus seeana*	narrow-leaved red gum		C		1
plants	higher dicots	Polygonaceae	*Persicaria barbata*			C		1/1
plants	higher dicots	Rosaceae	*Rhaphiolepis indica*	Indian hawthorn	Y			1/1
plants	monocots	Arecaceae	*Syagrus romanzoffiana*	Queen palm	Y			1/1
plants	monocots	Cannaceae	*Canna indica*	Indian shot	Y			1/1
plants	monocots	Commelinaceae	*Callisia repens*		Y			1/1
plants	monocots	Cyperaceae	*Cyperus aromaticus*		Y			1/1
plants	monocots	Poaceae	*Sporobolus fertilis*	giant Parramatta grass	Y			1/1
plants	monocots	Poaceae	*Paspalum urvillei*	vasey grass	Y			1/1
plants	monocots	Potamogetonaceae	*Potamogeton ochreatus*	blunt pondweed		C		1/1
protists	brown algae	Phaeophyceae	*Dictyota furcellata*			C		1/1
protists	red algae	Rhodophyceae	*Acanthophora spicifera*			C		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.

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: Since 1980
Latitude: -27.4932
Longitude: 153.2191
Distance: 2
Email: sarah.ross@ghd.com
Date submitted: Monday 05 Jun 2017 17:58:51
Date extracted: Monday 05 Jun 2017 18:00:19

The number of records retrieved = 253

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.

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			2
animals	amphibians	Hylidae	*Litoria nasuta*	striped rocketfrog		C		1
animals	amphibians	Hylidae	*Litoria dentata*	bleating treefrog		C		1
animals	amphibians	Hylidae	*Litoria peronii*	emerald spotted treefrog		C		2
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		1
animals	amphibians	Hylidae	*Litoria gracilenta*	graceful treefrog		C		1
animals	amphibians	Hylidae	*Litoria latopalmata*	broad palmed rocketfrog		C		1
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		2
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		3
animals	amphibians	Limnodynastidae	*Limnodynastes peronii*	striped marshfrog		C		1
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		1
animals	amphibians	Myobatrachidae	*Crinia parinsignifera*	beeping froglet		C		3
animals	birds	Acanthizidae	*Acanthiza pusilla*	brown thornbill		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		13
animals	birds	Acanthizidae	*Gerygone levigaster*	mangrove gerygone		C		3
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		1
animals	birds	Acanthizidae	*Chthonicola sagittata*	speckled warbler		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		1
animals	birds	Accipitridae	*Haliastur indus*	brahminy kite		C		11
animals	birds	Accipitridae	*Pandion cristatus*	eastern osprey		SL		10
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		2
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		4
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		3
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		1
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		C		1
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		1
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		10
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		5
animals	birds	Anatidae	*Anas castanea*	chestnut teal		C		1
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		5
animals	birds	Anseranatidae	*Anseranas semipalmata*	magpie goose		C		1
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		SL		1
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		64
animals	birds	Ardeidae	*Butorides striata*	striated heron		C		12
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		2
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		85
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		5
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		1
animals	birds	Ardeidae	*Bubulcus ibis*	cattle egret		C		10
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		40
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		4
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		14
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		9
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		25
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Cacatua sanguinea*	little corella		C		6
animals	birds	Cacatuidae	*Cacatua tenuirostris*	long-billed corella	Y	C		2
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		17
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		1
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		12
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		4
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		20
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		2
animals	birds	Charadriidae	*Pluvialis squatarola*	grey plover		SL		2
animals	birds	Charadriidae	*Pluvialis fulva*	Pacific golden plover		SL		38
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		150
animals	birds	Charadriidae	*Charadrius bicinctus*	double-banded plover		SL		2
animals	birds	Charadriidae	*Charadrius ruficapillus*	red-capped plover		C		19
animals	birds	Charadriidae	*Charadrius mongolus*	lesser sand plover		E	E	5
animals	birds	Charadriidae	*Vanellus miles novaehollandiae*	masked lapwing (southern subspecies)		C		12
animals	birds	Charadriidae	*Charadrius leschenaultii*	greater sand plover		V	V	7
animals	birds	Climacteridae	*Cormobates leucophaea metastasis*	white-throated treecreeper (southern)		C		4
animals	birds	Columbidae	*Streptopelia chinensis*	spotted dove	Y			18
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		4
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		17
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		2
animals	birds	Columbidae	*Columba livia*	rock dove	Y			2
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		10
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		22
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		2
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		3
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		5
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		5
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		10
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		1
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		1
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		2
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		1
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		1
animals	birds	Haematopodidae	*Haematopus longirostris*	Australian pied oystercatcher		C		137
animals	birds	Halcyonidae	*Todiramphus sordidus*	Torresian kingfisher		C		4
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		16
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		10
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		1
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		16
animals	birds	Laridae	*Thalasseus bergii*	crested tern		SL		5
animals	birds	Laridae	*Hydroprogne caspia*	Caspian tern		SL		76
animals	birds	Laridae	*Chroicocephalus novaehollandiae*	silver gull		C		57
animals	birds	Laridae	*Gelochelidon nilotica*	gull-billed tern		SL		51
animals	birds	Laridae	*Sternula albifrons*	little tern		SL		7
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		8

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		8
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		11
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		5
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		18
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		8
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		1
animals	birds	Meliphagidae	*Anthochaera chrysoptera*	little wattlebird		C		1
animals	birds	Meliphagidae	*Gavicalis fasciogularis*	mangrove honeyeater		C		5
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		8
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		3
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		7
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		4
animals	birds	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater		C		3
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		9
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		7
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		25
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		4
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		2
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		10
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		3
animals	birds	Pachycephalidae	*Pachycephala pectoralis*	golden whistler		C		2
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		13
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		9
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		1
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		12
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			3
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		12
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		4
animals	birds	Petroicidae	*Petroica rosea*	rose robin		C		2
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		3
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		4
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		20
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		1
animals	birds	Pittidae	*Pitta versicolor*	noisy pitta		C		1
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		5
animals	birds	Psittacidae	*Platycercus adscitus palliceps*	pale-headed rosella (southern form)		C		2
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		7
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		13
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		26
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		2
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		3
animals	birds	Recurvirostridae	*Himantopus himantopus*	black-winged stilt		C		94
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		9
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		17
animals	birds	Scolopacidae	*Limosa limosa*	black-tailed godwit		SL		6

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Scolopacidae	*Xenus cinereus*	terek sandpiper		SL		50
animals	birds	Scolopacidae	*Tringa brevipes*	grey-tailed tattler		SL		122
animals	birds	Scolopacidae	*Calidris canutus*	red knot		E	E	21
animals	birds	Scolopacidae	*Tringa nebularia*	common greenshank		SL		67
animals	birds	Scolopacidae	*Numenius phaeopus*	whimbrel		SL		200
animals	birds	Scolopacidae	*Actitis hypoleucos*	common sandpiper		SL		1
animals	birds	Scolopacidae	*Arenaria interpres*	ruddy turnstone		SL		13
animals	birds	Scolopacidae	*Calidris acuminata*	sharp-tailed sandpiper		SL		23
animals	birds	Scolopacidae	*Philomachus pugnax*	ruff		SL		1
animals	birds	Scolopacidae	*Tringa stagnatilis*	marsh sandpiper		SL		2
animals	birds	Scolopacidae	*Calidris ferruginea*	curlew sandpiper		E	CE	45
animals	birds	Scolopacidae	*Calidris ruficollis*	red-necked stint		SL		23
animals	birds	Scolopacidae	*Limicola falcinellus*	broad-billed sandpiper		SL		8
animals	birds	Scolopacidae	*Calidris tenuirostris*	great knot		E	CE	119
animals	birds	Scolopacidae	*Limosa lapponica baueri*	Western Alaskan bar-tailed godwit		V	V	243
animals	birds	Scolopacidae	*Limnodromus semipalmatus*	Asian dowitcher		SL		15
animals	birds	Scolopacidae	*Numenius madagascariensis*	eastern curlew		E	CE	131
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		2
animals	birds	Sturnidae	*Sturnus vulgaris*	common starling	Y			2
animals	birds	Sturnidae	*Acridotheres tristis*	common myna	Y			4
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		6
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		4
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		112
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		12
animals	mammals	Canidae	*Vulpes vulpes*	red fox	Y			2
animals	mammals	Dugongidae	*Dugong dugon*	dugong		V		1
animals	mammals	Leporidae	*Lepus europaeus*	European brown hare	Y			1
animals	mammals	Molossidae	*Tadarida australis*	white-striped freetail bat		C		2
animals	mammals	Peramelidae	*Isoodon macrourus*	northern brown bandicoot		C		1
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		4
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	1945
animals	mammals	Pseudocheiridae	*Pseudocheirus peregrinus*	common ringtail possum		C		4
animals	mammals	Pteropodidae	*Pteropus alecto*	black flying-fox		C		56
animals	mammals	Pteropodidae	*Pteropus poliocephalus*	grey-headed flying-fox		C	V	4
animals	ray-finned fishes	Anguillidae	*Anguilla reinhardtii*	longfin eel				6
animals	ray-finned fishes	Anguillidae	*Anguilla australis*	southern shortfin eel				1
animals	ray-finned fishes	Eleotridae	*Mogurnda adspersa*	southern purplespotted gudgeon				2
animals	ray-finned fishes	Eleotridae	*Hypseleotris galii*	firetail gudgeon				4
animals	ray-finned fishes	Poeciliidae	*Xiphophorus hellerii*	swordtail	Y			6
animals	ray-finned fishes	Poeciliidae	*Xiphophorus maculatus*	platy	Y			3
animals	ray-finned fishes	Poeciliidae	*Gambusia holbrooki*	mosquitofish	Y			6
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		1
animals	reptiles	Agamidae	*Intellagama lesueurii*	eastern water dragon		C		2
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		7
animals	reptiles	Colubridae	*Dendrelaphis punctulatus*	green tree snake		C		6
animals	reptiles	Elapidae	*Cacophis harriettae*	white-crowned snake		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whipsnake		C		3
animals	reptiles	Gekkonidae	*Hemidactylus frenatus*	house gecko	Y			1
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		2
animals	reptiles	Scincidae	*Calyptotis scutirostrum*	scute-snouted calyptotis		C		2
animals	reptiles	Scincidae	*Lampropholis delicata*	dark-flecked garden sunskink		C		2
animals	reptiles	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard		C		3
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		1
animals	reptiles	Scincidae	*Ctenotus spaldingi*	straight-browed ctenotus		C		1
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		1
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending		C		25
plants	higher dicots	Amaranthaceae	*Alternanthera pungens*	khaki weed	Y			1
plants	higher dicots	Amaranthaceae	*Gomphrena celosioides*	gomphrena weed	Y			1
plants	higher dicots	Apocynaceae	*Parsonsia straminea*	monkey rope		C		1
plants	higher dicots	Asteraceae	*Praxelis clematidea*		Y			1
plants	higher dicots	Asteraceae	*Bidens pilosa*		Y			1
plants	higher dicots	Asteraceae	*Emilia sonchifolia*		Y			1
plants	higher dicots	Asteraceae	*Sphagneticola trilobata*		Y			1
plants	higher dicots	Caesalpiniaceae	*Senna pendula var. glabrata*	Easter cassia	Y			1
plants	higher dicots	Casuarinaceae	*Casuarina glauca*	swamp she-oak		C		1
plants	higher dicots	Casuarinaceae	*Allocasuarina littoralis*			C		1
plants	higher dicots	Euphorbiaceae	*Euphorbia prostrata*		Y			1
plants	higher dicots	Euphorbiaceae	*Macaranga tanarius*	macaranga		C		1
plants	higher dicots	Malvaceae	*Hibiscus tiliaceus*	cotton tree		C		1
plants	higher dicots	Mimosaceae	*Acacia fimbriata*	Brisbane golden wattle		C		2
plants	higher dicots	Mimosaceae	*Vachellia nilotica*	prickly acacia	Y			1/1
plants	higher dicots	Mimosaceae	*Acacia leiocalyx*			C		1
plants	higher dicots	Mimosaceae	*Acacia disparrima subsp. disparrima*			C		1
plants	higher dicots	Moraceae	*Ficus*			C		1
plants	higher dicots	Moraceae	*Maclura cochinchinensis*	cockspur thorn		C		1
plants	higher dicots	Moraceae	*Ficus coronata*	creek sandpaper fig		C		1
plants	higher dicots	Myrsinaceae	*Lysimachia arvensis*		Y			1
plants	higher dicots	Myrtaceae	*Eucalyptus racemosa subsp. racemosa*	scribbly gum		C		1
plants	higher dicots	Myrtaceae	*Angophora leiocarpa*	rusty gum		C		1
plants	higher dicots	Myrtaceae	*Corymbia intermedia*	pink bloodwood		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus propinqua*	small-fruited grey gum		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus tindaliae*	Queensland white stringybark		C		1
plants	higher dicots	Myrtaceae	*Angophora subvelutina*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus microcorys*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus resinifera*	red mahogany		C		1
plants	higher dicots	Myrtaceae	*Lophostemon suaveolens*	swamp box		C		3/1
plants	higher dicots	Myrtaceae	*Eucalyptus siderophloia*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus tereticornis*			C		2
plants	higher dicots	Myrtaceae	*Melaleuca quinquenervia*	swamp paperbark		C		2
plants	higher dicots	Myrtaceae	*Syzygium*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus seeana*	narrow-leaved red gum		C		1
plants	higher dicots	Myrtaceae	*Corymbia gummifera*	red bloodwood		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Phyllanthaceae	*Glochidion sumatranum*	umbrella cheese tree		C		1
plants	higher dicots	Phyllanthaceae	*Glochidion ferdinandi*			C		1
plants	higher dicots	Polygonaceae	*Persicaria*			C		1
plants	higher dicots	Proteaceae	*Banksia integrifolia*			C		1
plants	higher dicots	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		2
plants	higher dicots	Sapindaceae	*Cupaniopsis anacardioides*	tuckeroo		C		2
plants	higher dicots	Solanaceae	*Solanum nigrum*		Y			1
plants	higher dicots	Solanaceae	*Solanum seaforthianum*	Brazilian nightshade	Y			1
plants	higher dicots	Ulmaceae	*Celtis sinensis*	Chinese elm	Y			1
plants	lower dicots	Lauraceae	*Cinnamomum camphora*	camphor laurel	Y			1
plants	lower dicots	Papaveraceae	*Fumaria officinalis subsp. officinalis*		Y			1/1
plants	monocots	Arecaceae	*Syagrus romanzoffiana*	Queen palm	Y			1
plants	monocots	Commelinaceae	*Commelina diffusa*	wandering jew		C		1
plants	monocots	Hemerocallidaceae	*Dianella caerulea*			C		1
plants	monocots	Hydrocharitaceae	*Limnobium laevigatum*		Y			2/2
plants	monocots	Najadaceae	*Najas tenuifolia*	water nymph		C		1/1
plants	monocots	Poaceae	*Cynodon dactylon var. dactylon*		Y			1
plants	monocots	Poaceae	*Paspalum notatum*	bahia grass	Y			1
plants	monocots	Poaceae	*Tripsacum dactyloides*		Y			1/1
plants	monocots	Poaceae	*Phragmites australis*	common reed		C		1
plants	monocots	Poaceae	*Megathyrsus maximus*		Y			1
plants	monocots	Pontederiaceae	*Heteranthera reniformis*		Y			1/1
plants	monocots	Zosteraceae	*Zostera*			C		1/1

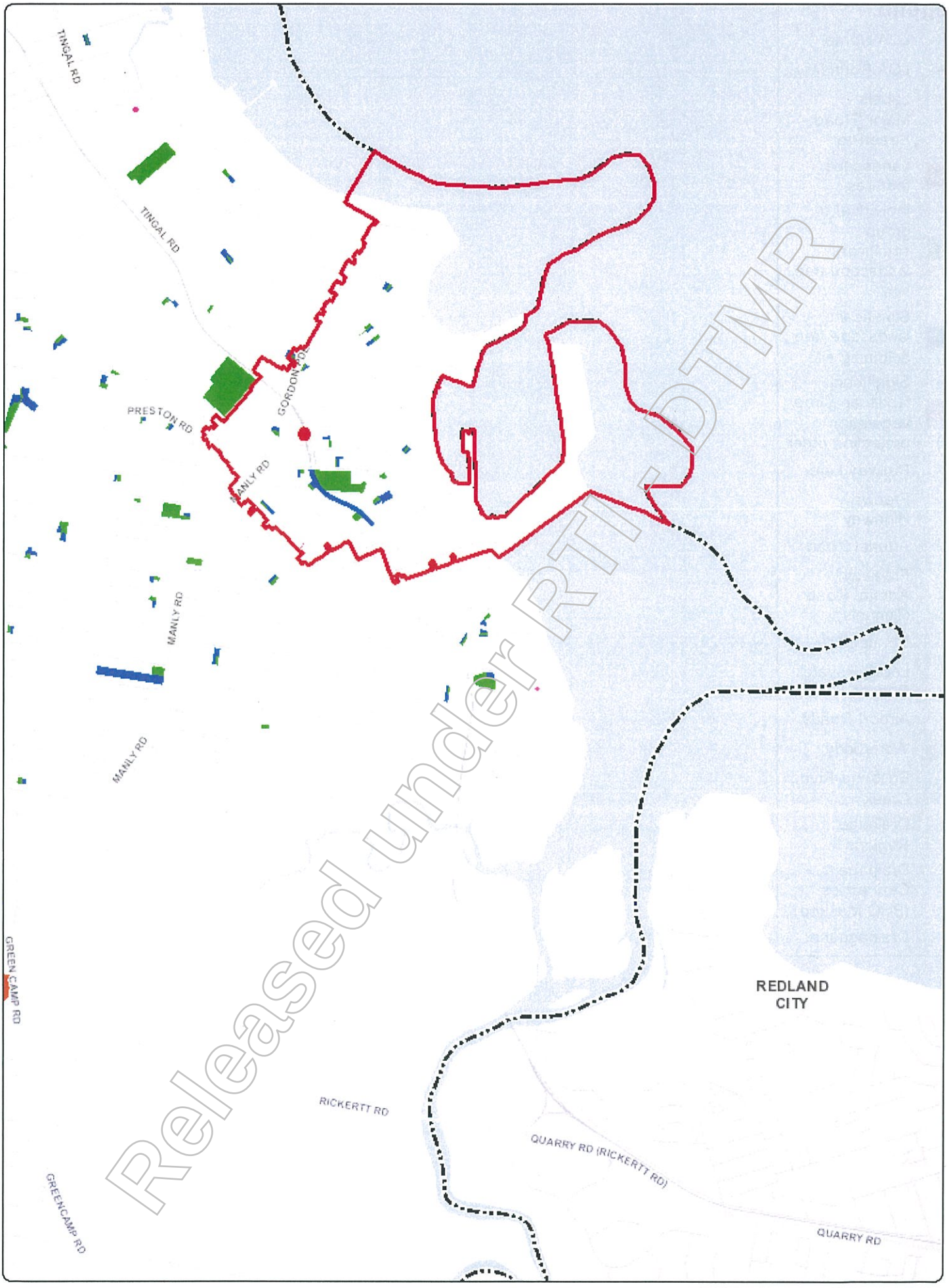
CODES

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.



Brisbane City Plan 2014

BRISBANE CITY Planning Scheme

NOTES

This map is notional only and should not be used for interpreting City Plan provisions relating to specific sites. To properly interpret the maps, the planning scheme must be referred to. The Digital Cadastre Database (supplied by State of Queensland - Department of Natural Resources and Mines) will be updated from time to time.

Mapping adopted by Council, effective 18 September 2015

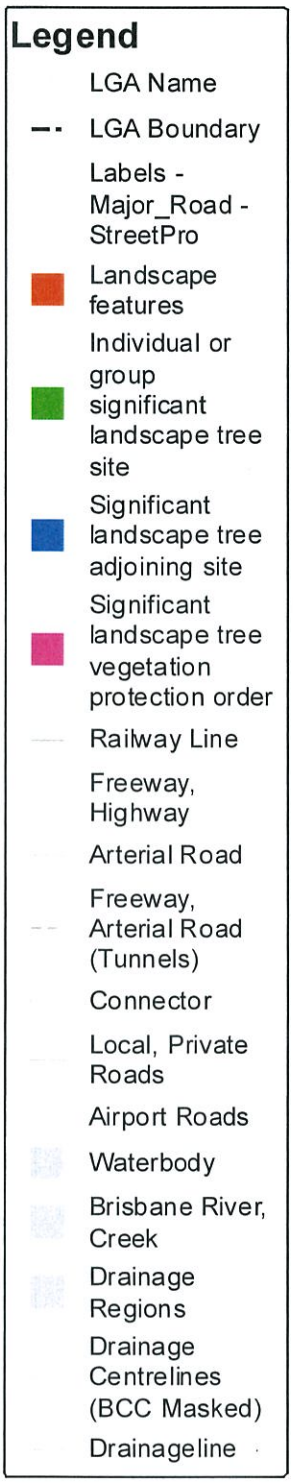
Projection: Map Grid of Australia, Zone 56
Horizontal Datum: Geocentric Datum of Australia 1994

Approximate Scale @ A4 1:25,000

0 940

Metres

Date: 6/06/2017



Brisbane City Plan 2014

BRISBANE CITY Planning Scheme

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Mapping adopted by Council [illegible]

Council and the copyright owners permit the use of the data on this map, but the Council and copyright owners give no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage), relating to any use of the data.

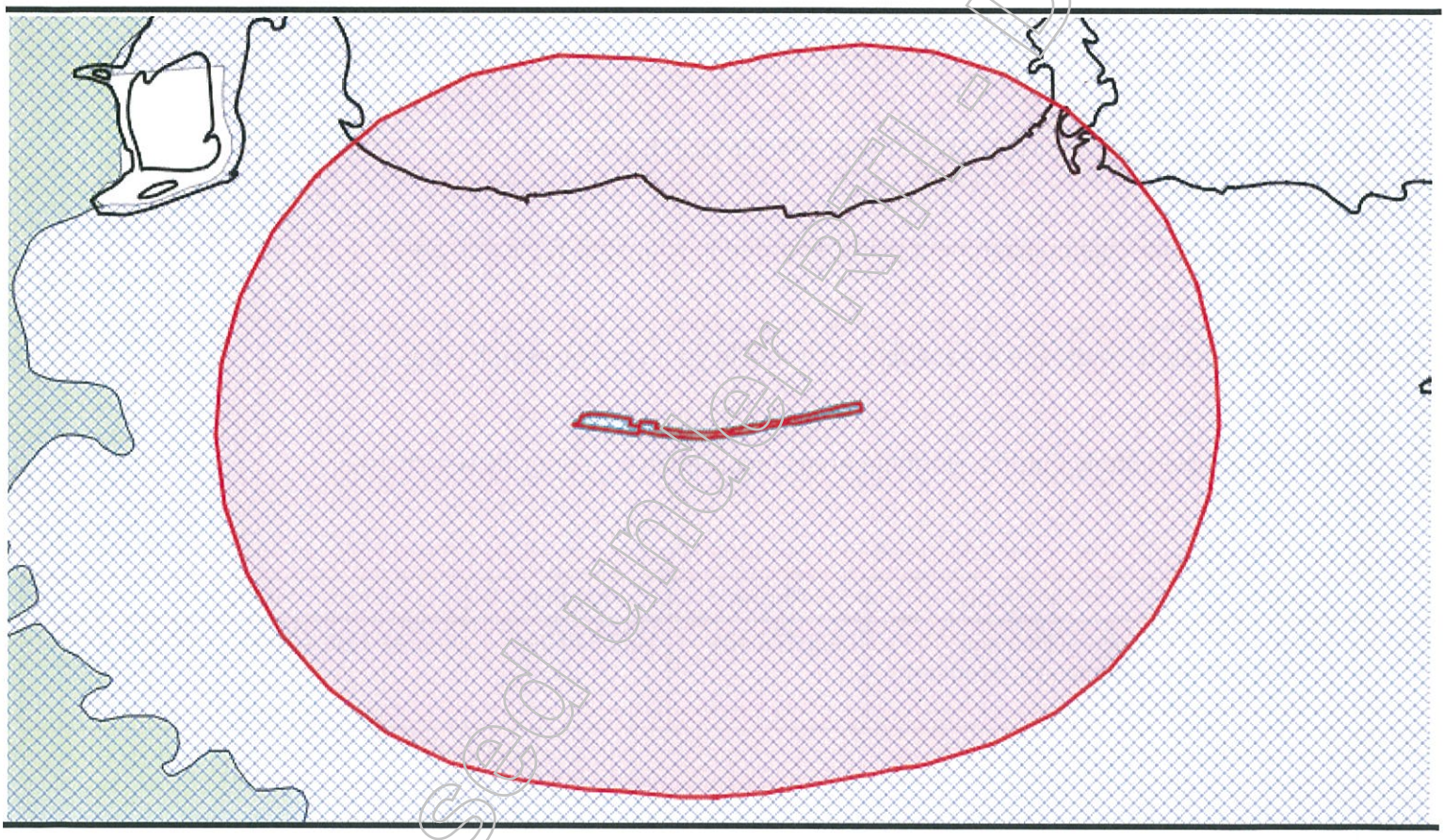
Projection: Map Grid of Australia, Zone 56
Horizontal Datum: Geocentric Datum of Australia 1994

Date: 6/06/2017

Queensland Government
Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

Reference Number:	22373
Lot:	152
Plan:	CP827240
LGA:	Redland City
Buffer Distance:	2000 metres



There are no Aboriginal cultural heritage site points recorded in your specific search area.

There are no Aboriginal cultural heritage site polygons recorded in your specific search area.

Jun 2, 2017, 2:37 PM

Queensland Government
Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

Cultural heritage party for the area is:

QC Ref Number	QUD Ref Number	Party Name	Contact Details
QC2017/004	QUD126/2017	Quandamooka Coast Claim	Wati Qalotaki Deputy Principal Legal Officer Queensland South Native Title Services Limited Level 10, 307 Queen Street BRISBANE QLD 4000 Phone: (07) 3224 1200 Fax: (07) 3229 9880

There is no cultural heritage body recorded in your specific search area.

There are no cultural heritage management plans recorded in your specific search area.

There are no Designated Landscape Areas (DLA) recorded in your specific search area.

There are no Registered Study Cultural Heritage Areas recorded in your specific search area.

Regional Coordinator:

Name	Position	Phone	Mobile	Email
Andrew Rutch	Cultural Heritage Coordinator Southern Region	1300 378 401	Not Relevant	Andrew.Rutch@datsip.qld.gov.au

Jun 2, 2017, 2:37 PM

Queensland Government

Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

I refer to your application in which you requested advice on Aboriginal cultural heritage places recorded on the above location.

The Cultural Heritage Database and Register search has been completed and I would like to advise that no Aboriginal cultural heritage is currently recorded in your specific search area, from the data provided by you. However, it is probable that the absence of recorded Aboriginal cultural heritage places reflects a lack of previous cultural heritage surveys of the area. Therefore, our records are not likely to reflect a true picture of the Aboriginal cultural heritage values of the area.

I note that, pursuant to the Cultural Heritage Duty of Care Guidelines, you have advised that the proposed activity is a 'Category 5 activity'. As such, I take this opportunity to remind you that in accordance with those Guidelines:-

Where an activity is proposed under category 5 there is generally a high risk that it could harm Aboriginal cultural heritage. In these circumstances, the activity should not proceed without cultural heritage assessment.

Where an activity is proposed under category 5, it is necessary to notify the Aboriginal Party and seek:

(a) Advice as to whether the feature constitutes Aboriginal cultural heritage; and

(b) If it does, agreement as to how best the activity may be managed to avoid or minimise harm to any Aboriginal cultural heritage.

I remind you also that the extent to which the person has complied with Cultural Heritage Duty of Care Guidelines and the extent to which the person consulted with Aboriginal parties about the carrying out of the activity, and the results of the consultation are factors a court may consider when determining if a party has complied with the duty of care.

Please refer to our website www.datsip.qld.gov.au/people-communities/aboriginal-and-torres-strait-islander-cultural-heritage for a copy of the gazetted Cultural Heritage duty of care guidelines, which set out reasonable and practical measures for meeting the duty of care.

Should you have any further queries, please do not hesitate to contact the approval officer on 1300 378 401.

Kind regards

The Director
Cultural Heritage | Community Participation | Department of Aboriginal and Torres Strait Islander Partnerships

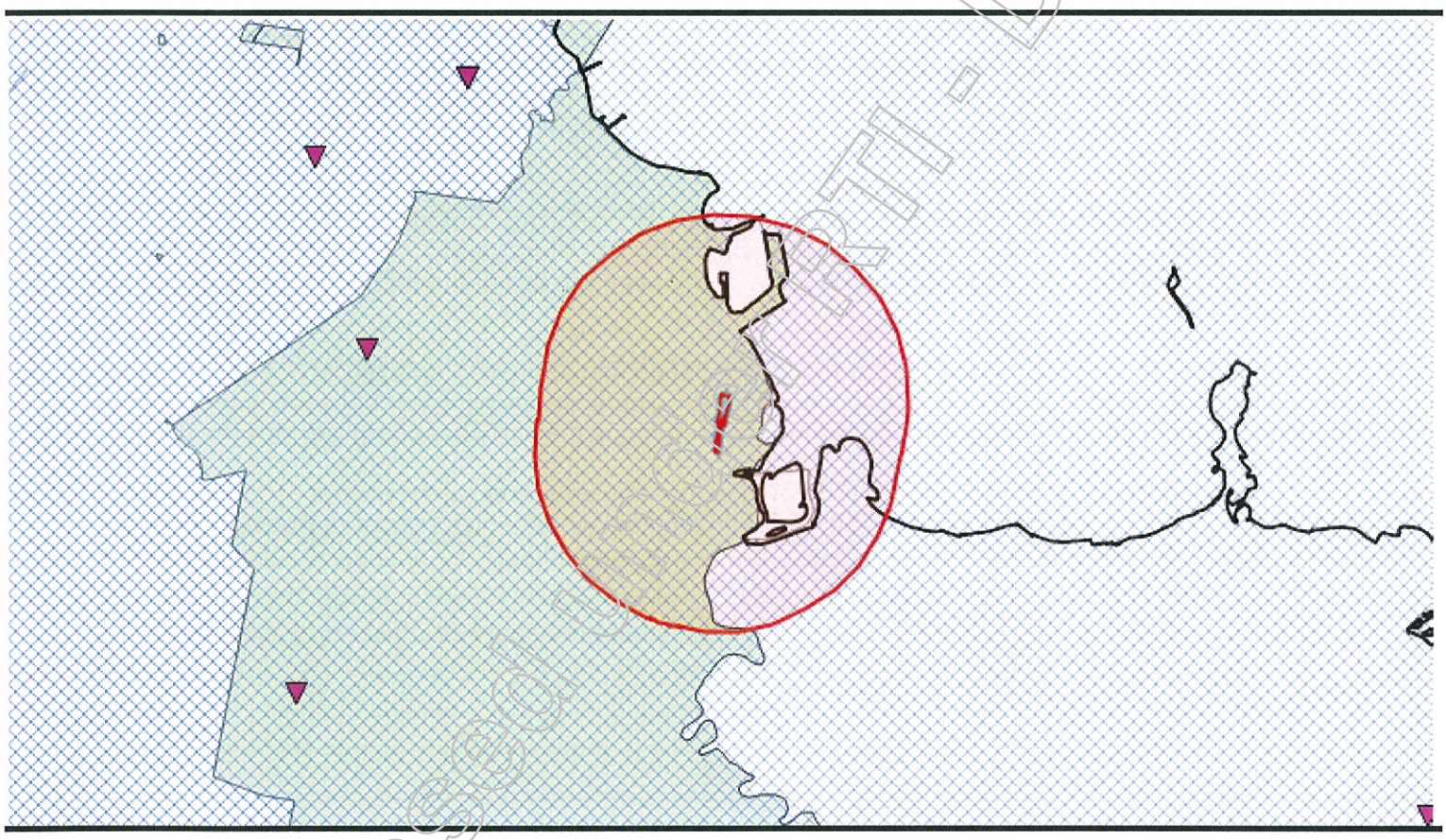
Jun 2, 2017, 2:37 PM

Queensland Government

Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

Reference Number:	22373
Lot:	39
Plan:	SP133477
LGA:	Brisbane City
Buffer Distance:	2000 metres



There are no Aboriginal cultural heritage site points recorded in your specific search area.

There are no Aboriginal cultural heritage site polygons recorded in your specific search area.

Jun 2, 2017, 2:34 PM

Queensland Government
Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

Cultural heritage party for the area is:

QC Ref Number	QUD Ref Number	Party Name	Contact Details
QC1998/026 PRC	QUD6196/98	Turrbal People	Turrbal Association Inc c/- Mr Ade Kukoyi PO Box 3261 SOUTH BRISBANE QLD 4101 Phone: (07) 54323699 Fax: (07) 3889 4822 Mobile Not Relevant Email: turrbal@dakibudtcha.com.au
QC2017/004	QUD126/2017	Quandamooka Coast Claim	Wati Qalotaki Deputy Principal Legal Officer Queensland South Native Title Services Limited Level 10, 307 Queen Street BRISBANE QLD 4000 Phone: (07) 3224 1200 Fax: (07) 3229 9880

Cultural heritage body for the area is:

Body Name	Contact Details
Turrbal Association Inc	Mr Ade Kukoyi Principal Advisor PO Box 3261 South Brisbane QLD 4101 Phone: (07) 54323699 Fax: (07) 3889 4822 Mobile Not Relevant Email: turrbal@dakibudtcha.com.au

There are no cultural heritage management plans recorded in your specific search area.

There are no Designated Landscape Areas (DLA) recorded in your specific search area.

There are no Registered Study Cultural Heritage Areas recorded in your specific search area.

Jun 2, 2017, 2:34 PM

Lot on Plan Search

Regional Coordinator:

Name	Position	Phone	Mobile	Email
Andrew Rutch	Cultural Heritage Coordinator Southern Region	1300 378 401	Not Relevant	Andrew.Rutch@datsip.qld.gov.au

Jun 2, 2017, 2:34 PM

Queensland Government
Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

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Kind regards

The Director
Cultural Heritage | Community Participation | Department of Aboriginal and Torres Strait Islander Partnerships

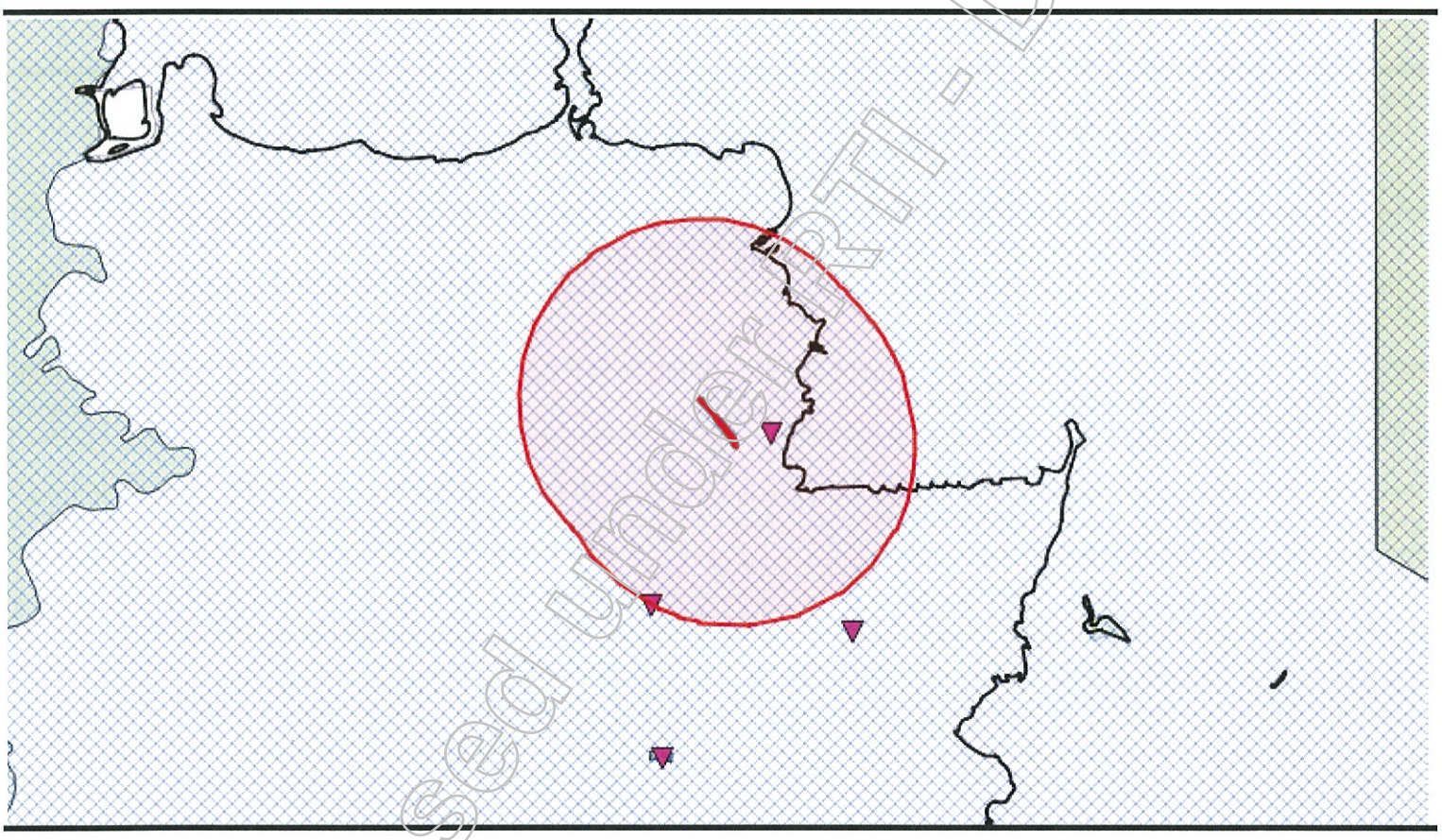
Jun 2, 2017, 2:34 PM

Queensland Government

Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

Reference Number:	22373
Lot:	61
Plan:	CP827245
LGA:	Redland City
Buffer Distance:	2000 metres



Cultural heritage site points for the area are:

Site ID	Latitude	Longitude	Record Date	Attribute	Aboriginal Party
LB:A42	-27.510554	153.259257	Jan 1, 1984	Earthern Arrangement(s)	Quandamooka Coast Claim
LB:F33	-27.527729	153.247146	Nov 9, 1992	Scarred/Carved Tree	Quandamooka Coast Claim

There are no Aboriginal cultural heritage site polygons recorded in your specific search area.

Jun 2, 2017, 3:28 PM

Queensland Government
Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

Cultural heritage party for the area is:

QC Ref Number	QUD Ref Number	Party Name	Contact Details
QC2017/004	QUD126/2017	Quandamooka Coast Claim	Wati Qalotaki Deputy Principal Legal Officer Queensland South Native Title Services Limited Level 10, 307 Queen Street BRISBANE QLD 4000 Phone: (07) 3224 1200 Fax: (07) 3229 9880

There is no cultural heritage body recorded in your specific search area.

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There are no Designated Landscape Areas (DLA) recorded in your specific search area.

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Regional Coordinator:

Name	Position	Phone	Mobile	Email
Andrew Rutch	Cultural Heritage Coordinator Southern Region	1300 378 401	Not Relevant	Andrew.Rutch@datsip.qld.gov.au

Jun 2, 2017, 3:28 PM

Queensland Government

Department of Aboriginal and Torres Strait Islander Partnerships

Lot on Plan Search

I refer to your application in which you requested advice on Aboriginal cultural heritage places recorded on the above location.

I wish to advise that the search has been performed on the inventory of recorded Aboriginal sites as per your description. Attached is a list which highlights the identified Aboriginal cultural heritage sites, as recorded for the search area. However, it is not possible to conclusively guarantee the accuracy of these recordings (in particular, the longitude and latitude location description for each site) and extra diligence is required when operating in these locations.

See Attached Report

All significant Aboriginal cultural heritage in Queensland is protected under the Aboriginal Cultural Heritage Act 2003, and penalty provisions apply for any unauthorized harm. Under the legislation a person carrying out an activity must take all reasonable and practical measures to ensure the activity does not harm Aboriginal Cultural Heritage. This applies whether or not such places are recorded in an official register and whether or not they are located in, on or under private land.

Aboriginal cultural heritage, which may occur on the subject property, is protected under the terms of the Aboriginal Cultural Heritage Act 2003 even if the Department of Aboriginal and Torres Strait Islander Partnerships has no records relating to it.

Please refer to our website www.datsip.qld.gov.au/people-communities/aboriginal-and-torres-strait-islander-cultural-heritage for a copy of the gazetted Cultural Heritage duty of care guidelines, which set out reasonable and practical measures for meeting the duty of care. In order to meet your duty of care, any land use activity within the vicinity of the recorded cultural heritage, should not proceed without the agreement of the Aboriginal Party for the area or a Cultural Heritage Management Plan undertaken pursuant to Part 7 of the Aboriginal Cultural Heritage Act 2003.

Should you have any further queries, please do not hesitate to contact the approval officer on 1300 378 401.

Kind regards

The Director
Cultural Heritage | Community Participation | Department of Aboriginal and Torres Strait Islander Partnerships

Jun 2, 2017, 3:28 PM

Appendix C Geological mapping

Paper Size A4

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

LEGEND

- Chainage (Indicative)
- Localities
- Contour (5m)
- Property Boundary
- Railway
- Ipswich Coal Measures (Ri)
- Petrie Formation (Tp)
- Petrie Formation/b (Tpb)
- Qhc-SEQ (Qhc)
- Qhct-9543 (Qhct)
- Qhe-QLD (Qhe)
- Qhmd-9543 (Qhmd)
- Qhmp-9543 (Qhmp)
- Qhms-9543 (Qhms)
- Td-SEQ>Petrie Formation (Td>Tp)
- Td-SEQ>Petrie Formation/b (Td>Tpb)
- Woogaroo Subgroup (RJbw)

Department of Transport and Main Roads
Park Road to Cleveland Rail Upgrade

Job Number 41-30842
Revision D
Date 08 Jun 2017

Surface Geology

Figure C-1

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145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Paper Size A4

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

LEGEND

- Chainage (Indicative)
- Localities
- Contour (5m)
- Property Boundary
- Railway
- Petrie Formation (Tp)
- Petrie Formation/b (Tpb)
- Qha-QLD (Qha)
- Qhc-SEQ (Qhc)
- Qhct-9543 (Qhct)
- Qhe-QLD (Qhe)
- Qhmd-9543 (Qhmd)
- Qhms-9543 (Qhms)
- Qr-9543 (Qr)
- Td-SEQ>Petrie Formation (Td>Tp)
- Td-SEQ>Petrie Formation/b (Td>Tpb)
- Woogaroo Subgroup (RJbw)

Department of Transport and Main Roads
Park Road to Cleveland Rail Upgrade

Job Number 41-30842
Revision D
Date 08 Jun 2017

Surface Geology

Figure C-2

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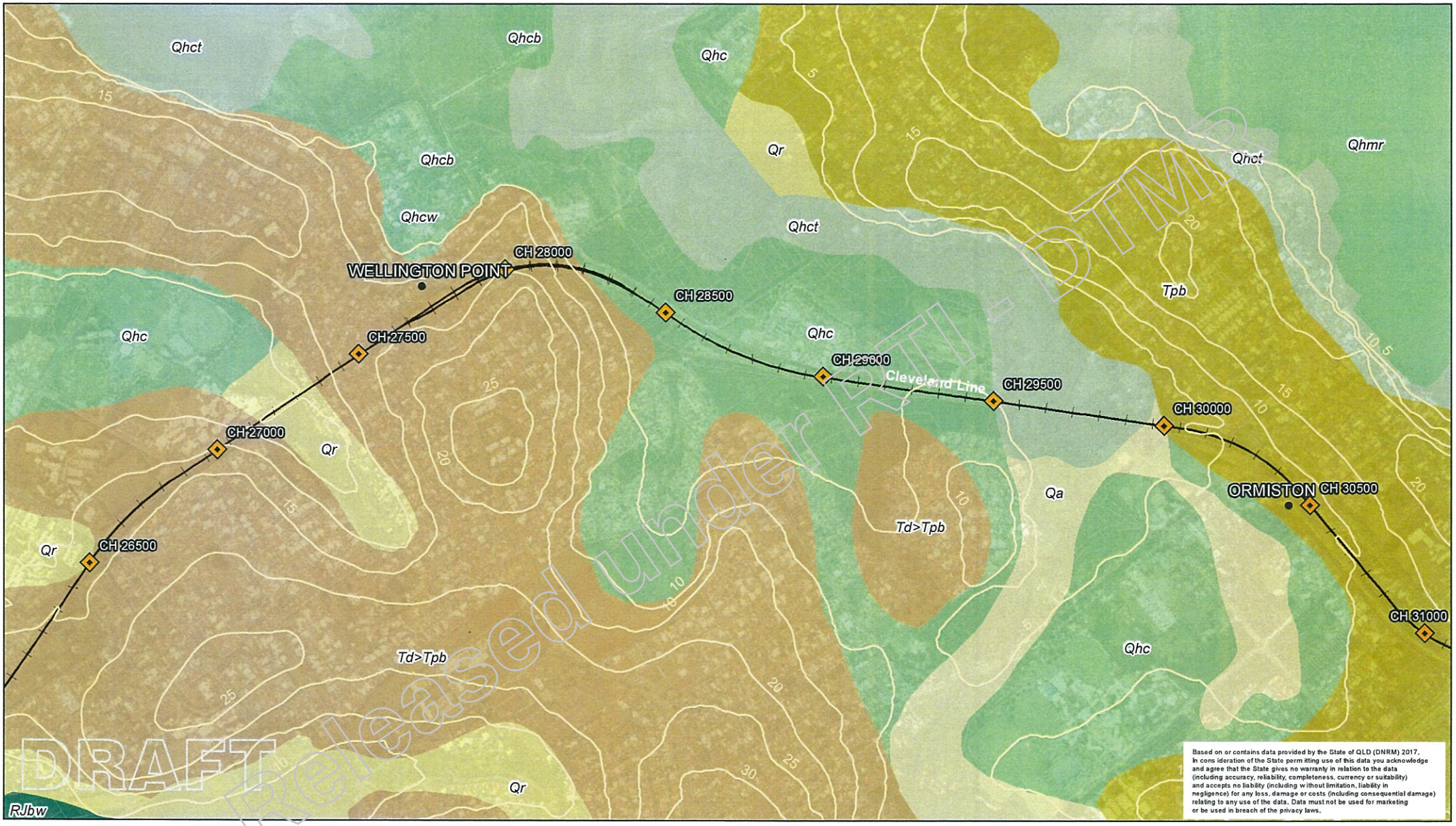

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

LEGEND

- Chainage (Indicative)
- Localities
- Contour (5m)
- Property Boundary
- Railway
- Petrie Formation/b (Tpb)
- Qa-QLD (Qa)
- Qhc-SEQ (Qhc)
- Qhcb-QLD (Qhcb)
- Qhct-9543 (Qhct)
- Qhcw-9543 (Qhcw)
- Qhmr-9543 (Qhmr)
- Qr-9543 (Qr)
- Td-SEQ>Petrie Formation/b (Td>Tpb)
- Woogaroo Subgroup (RJbw)

Department of Transport and Main Roads
Park Road to Cleveland Rail Upgrade

Job Number 41-30842
Revision D
Date 08 Jun 2017

Surface Geology

Figure C-3

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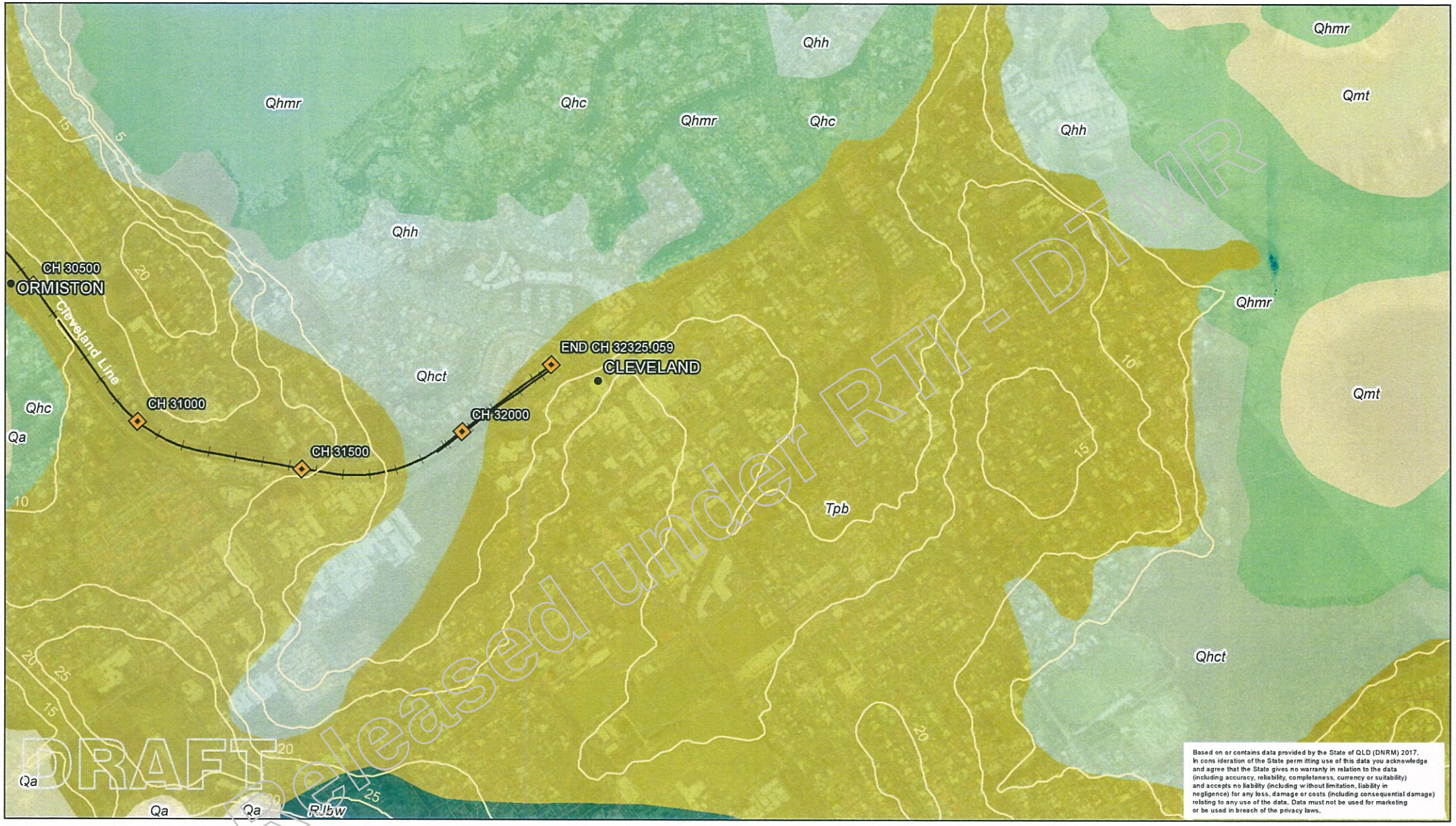

Paper Size A4

0 50 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

LEGEND

- Chainage (Indicative)
- Localities
- Contour (5m)
- Property Boundary
- Railway
- Petrie Formation/b (Tpb)
- Qa-QLD (Qa)
- Qhc-SEQ (Qhc)
- Qhct-9543 (Qhct)
- Qhh-SEQ (Qhh)
- Qhmr-9543 (Qhmr)
- Qmt-9543 (Qmt)
- Woogaroo Subgroup (RJbw)

Department of Transport and Main Roads
Park Road to Cleveland Rail Upgrade

Job Number 41-30842
Revision D
Date 08 Jun 2017

Surface Geology

Figure C-4

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Appendix D Structures schedule

Structures			Investigation								Duplication methodology			
Bridge No.	Location	Superior Functional Location	Type	No. Spans	Total Span (m)/ Culvert Arrangement	Girders	Width (m)	Lane Arrangement	No. Tracks under bridge	Comment	Maintenance Acess	Upgrade required?	Constraints	Comment
B1	Manly Station		Footbridge to platform	2	35	Concrete	2.5	N/A	2			No - two tracks already under bridge		
B2	Ernest St	QR01-N-SE-C152-COO-MNY-CB002	Road over Rail	1	15.2	Concrete	13.3	F+L+L+F	1		- Access from north to remain - access from Manly station (175m away) - Access from west - unsure if there is access	Yes - two tracks may not fit under bridge in existing arrangement - bridge will need to be extended/replaced	- Masts to the west of the tracks - Mast at the base of the spillthrough on the eastern side - Intersection immediately to the west of the bridge	- Could divert traffic to Gordon Pde, Oakley St, Cambridge Pde, Mountjoy Tce, Ernest St (3min) - Spillthrough appears to consist of grouted rock 1-2m below the headstock, then cut rock to the track level. - At track level, there appears to be about 3-3.5 track widths between the spillthroughs
B3	Hindes St	QR01-N-SE-C152-COO-120-CB001	Rail over Road	5	75	2 Conc box girders	3.5	1 track	N/A			Yes - new bridge parallel to existing (western side)	- Masts to the east of tracks (switch to west side of tracks 300m north of the bridge) - Services 20m to the west of the bridge - Lota station 180m to the south of the bridge - Old timber piles 8m to the west and abutment to the west of the existing bridge. - Little retaining wall on the north eastern side of the bridge	
B4	Lota Station		Footbridge to platform	2	25	Timber	2	N/A	2			No - two tracks already under bridge		- Timber footbridge to platform - Appears to be in decent condition (not falling apart)
B5	Lota Creek	QR01-N-SE-C152-COO-125-CB001	Rail over Creek	5	75	3 x I Girders	3.2	1 track	N/A	4 orientated dolphin piles per pier	Some access appears to be provided to both abutments	Yes - new bridge parallel to existing (western side)	- Masts on western side of tracks would need to be relocated - Two tracks start and finish merging 170m and 80m north of the bridge - Soccer fields 21m to the west	Looks like the western tracks merge to the eastern tracks - provide new bridge to the west (this required mast relocation)
B6	Tingalpa Creek	QR01-N-SE-C152-COO-125-CB002	Rail over Creek	6	120	I girders	4	1 track	N/A	2 and 3 dolphin piles per pier	Appears appears to be present to the northern abutment	Yes - new bridge parallel to existing (western side)	- Masts on western side of tracks would need to be relocated - Two tracks join 110m south of bridge to Thorneside Station - Thorneside Station 260m south of bridge	
B7	Thorneside Rd	QR01-N-SE-C152-COO-TNS-CB001	Rail over Road	4	60	3 x I Girder	3.2	1 track	N/A			Yes - new bridge parallel to existing (southern side)	- Western side of bridge - masts on north and south of tracks - Eastern side of bridge - masts on nothern side of tracks - Two tracks start and finish merging 110m and 50m west of the bridge - Signalised intersection 40m to the south - Minor intersection 10m to the north - Lightpoles 13m south and 6.5m north of bridge - Pit 1.5m to the north - Billboard 7m from existing bridge on southern side of the eastern abutment	
B8	Charles St	QR01-N-SE-C152-COO-130-CB001	Rail over Road	2	30	3 x I Girder	3.2	1 track	N/A			Yes - new bridge parallel to existing (southern side)	- Masts on northern side of tracks - Lightpoles 11m south of the bridge - Electricty poles 16m north of the bridge - Service hole 15m south - Intersetion 20m south of the bridge - Wingwalls from abutment may have to be altered with addition of new bridge - Footpath wraps aroudn the wingwalls and may impact on the bridge location (relocation of footpath) - Billboard 8m from existing bridge on southern side of the western abutment	
B9	Birkdale Rd	QR01-N-SE-C152-COO-130-CB002	Rail over Road	7	180	3 x I Girder	4	1 track	N/A	QR Schedule bridge length reported as 105m. The actual length is more like 180m		Yes - new bridge parallel to existing (southern side)	- Masts on northern side of tracks - Existing bridge 28m from roundabout (perpendicular distance from kerb) - Light poles present 7.5m to the north and south of the bridge - 4 cell RCBC culvert (16m wide) 20m to the south of the bridge - Water way (at culverts) about 22m wide in direction of bridge (affects span length) - Viaduct over major road - Billboard adjacent to existing bridge on southern side of the eastern abutment	- 1.6m tall retaining wall on the northern side of the embankment, on the eastern approach
B10	Tarradarrapin Creek	QR01-N-SE-C152-COO-130-CB003	Rail over Creek	2	30	3 x I Girder	3.2	1 track	N/A			Yes - new bridge parallel to existing (southern side)	- Masts on the northern side of the tracks - Properties 8.5m to the north of the tracks - Footpath 6.5m to the north of the tracks	- Footpath behind houses
B11	Hardy Rd/Badgen Rd	QR01-N-SE-C152-COO-130-CB004	Rail over Road	2	30	3 x I Girder	3.2	1 track	N/A			Yes - new bridge parallel to existing (southern side)	- Masts to the north of the tracks - Cable pit on 13m to the south - Lightpoles 19m to the south, 15m to the north of the bridge	
B12	Main Rd	QR01-N-SE-C152-COO-130-CB006	Road over Rail	3	18.3	Girders - transversely stressed	13.6	F+L+L+F	1		- Access from east stops at the bridge from Wellingotn Point station. - Access from west unknown if it exists	Yes - two tracks may not fit under bridge in existing arrangement - bridge will need to be extended/replaced	- Wellington Point station 112m to the east of the bridge - Tracks complete merge 15m east of the bridge	- Pedestrian culvert under road 20m north of the tracks - Could divert traffic to Station Rd, Fernbourne Rd, Harris St, Herbert Rd, Valley Rd to Main Rd (3 min) - Footpath of bridge appears to be a steel structure

Structures			Investigation								Duplication methodology			
Bridge No.	Location	Superior Functional Location	Type	No. Spans	Total Span (m)/ Culvert Arrangement	Girders	Width (m)	Lane Arrangement	No. Tracks under bridge	Comment	Maintenance Acess	Upgrade required?	Constraints	Comment
B13	Fernbourne Rd/ Station St	QR01-N-SE-C152-COO-WPT-CB001	Road over Rail	1	11	Concrete	11.5	F+L+L	2		No change required: - Access from east appears to exist parallel to tracks. - Access from west appears to be from Wellington point Stations (115m away).	No - two tracks already under bridge		- Two tracks go through the two spans. - Wellington Point Station 150m to the west, no other track required. - Retaining wall for wingwalls and spillthroughs - Structure appears to look newer than other bridges
B14	Hilliards Creek	QR01-N-SE-C152-COO-135-CB001	Rail over Creek	4	60	Concrete	3.8	1 track	N/A			Yes - new bridge parallel to existing (western side)	- Masts to the east of the tracks - Property 8m to the east	- Couldn't access the site
B15	Sturgeon St	QR01-N-SE-C152-COO-135-CB002	Rail over Road	4	60	3 x I Girder	2.5	1 track	N/A			Yes - new bridge parallel to existing (western side)	- Masts to the east of the tracks - roundabout 16m to the west - Lightpole and man hole 20m east of the bridge - Lightpole 5.5m to the west of the bridge	
B16	Wellington St	QR01-N-SE-C152-COO-135-CB003	Road over Rail	2	11.6	Large Concrete Culvert	17.5	F+L+L+L+F	1		Probably won't fit under bridge. Access from Ormiston Station 490 to the north. Access from south is through second span - this will change	No - tracks can probably be accomodated in the second span of the bridge	- Unsignalised intersections either side of the bridge - 12m to centre of eastern intersection, 24m to centre of western intersection (measured from abutment)	
B17	Gordon St	QR01-N-SE-C152-COO-135-CB004	Road over Rail	2	11.2	Large Concrete Culvert	20	F+L+L+L+F	1		Probably won't fit under bridge. Access from south possible 275m south from Nelson St. Access from north is through second span - this will change	No - tracks can probably be accomodated in the second span of the bridge	- Unsignalised intersection immediately north of the bridge	
C1	CUL C152 19.000 Pipe RCP 1/600	QR01-N-SE-C152-COO-MNY-CC001	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						No - assumed location is at Manly Station		
C2	CUL C152 19.350 Box CBC 1/900X500	QR01-N-SE-C152-COO-120-CC001	Culvert - CONCRETE - BOX	1	1/900X500	CONCRETE						Yes - extend under tracks		
C3	CUL C152 19.470 Box CBC 1/900X500	QR01-N-SE-C152-COO-120-CC002	Culvert - CONCRETE - BOX	1	1/900X500	CONCRETE						Yes - extend under tracks	Second culvert 5-6m to the south, may need special attnetion to tie into this culvert	
C4	CUL C152 19.740 ARCH UNK 1/900	QR01-N-SE-C152-COO-120-CC003	Culvert - UNKNOWN - ARCH	1	1/900	UNKNOWN						Yes - extend under tracks		Could not locate on google Earth
C5	CUL C152 19.880 Box CBC 1/900X600	QR01-N-SE-C152-COO-120-CC004	Culvert - CONCRETE - BOX	1	1/900X600	CONCRETE						Yes - extend under tracks	Tie into drain to the west	
C6	CUL C152 20.170 Pipe RCP 1/600	QR01-N-SE-C152-COO-120-CC005	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						Yes - extend under tracks		Could not locate on google Earth
C7	CUL C152 20.270 Pipe EAR 1/400	QR01-N-SE-C152-COO-120-CC006	Culvert - EARTHENWARE - PIPE	1	1/400	EARTHENWARE						Yes - extend under tracks		Could not locate on google Earth
C8	CUL C152 20.360 Pipe RCP 1/600	QR01-N-SE-C152-COO-120-CC007	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						Yes - extend under tracks		Could not locate on google Earth
C9	CUL C152 20.520 Pipe RCP 1/600	QR01-N-SE-C152-COO-120-CC008	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						No - Culvert appears to be under bridge		Could not locate on google Earth
C10	CUL C152 21.050 Pipe RCP 1/600	QR01-N-SE-C152-COO-LOT-CC001	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						Maybe - location assumed to be where two tracks merge		Not sure on its position
C11	CUL C152 22.720 Box RCBC 1/1200X900	QR01-N-SE-C152-COO-TNS-CC001	Culvert - PRE-CAST REINFORCED CONCRETE BOX	1	1/1200X900	CONCRETE						No - assumed location of culvert to be at Thorneside Station		
C12	CUL C152 22.870 Box RCBC 1/1200X900	QR01-N-SE-C152-COO-TNS-CC002	Culvert - PRE-CAST REINFORCED CONCRETE BOX	1	1/1200X900	CONCRETE						No - assumed location of culvert to be under two tracks		Could not locate on google Earth
C13	CUL C152 22.970 Pipe RCP 1/600	QR01-N-SE-C152-COO-TNS-CC003	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						No - assumed location of culvert to be under two tracks		Could not locate on google Earth
C14	CUL C152 23.100 Pipe RCP 2/1800	QR01-N-SE-C152-COO-TNS-CC004	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	2	2/1800	CONCRETE						Yes - extend under tracks		RCBC 2 cell 2.5m wide?
C15	CUL C152 25.180 Pipe RCP 3/2000	QR01-N-SE-C152-COO-130-CC001	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	3	3/2000	CONCRETE						Yes - extend under tracks		Could not locate on google Earth
C16	CUL C152 26.400 Pipe RCP 3/1000	QR01-N-SE-C152-COO-130-CC002	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	3	3/1000	CONCRETE						Yes - extend under tracks		Could not locate on google Earth
C17	CUL C152 27.250 Pipe RCP 3/1000	QR01-N-SE-C152-COO-130-CC003	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	3	3/1000	CONCRETE						Yes - extend under tracks	Water body either side of tracks	
C18	F/Opening 27.29km (310m West Main Rd)	QR01-N-SE-C152-COO-130-CB005	RCBC	1	2.4	Steel		1 track	N/A			Yes - extend under tracks	Access to culvert may be difficult	QR register says this structure is steel
C19	CUL C152 28.350 Pipe RCP 1/600	QR01-N-SE-C152-COO-WPT-CC001	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/600	CONCRETE						Yes - may need to be slightly lengthened (currently assumed under two tracks that merge)		Could not locate on google Earth?
C20	CUL C152 28.540 Box RCBC 4/1400X3000	QR01-N-SE-C152-COO-135-CC001	Culvert - PRE-CAST REINFORCED CONCRETE BOX	4	4/1400X3000	CONCRETE	15m		N/A			Yes - extend under tracks	- Tracks finish merging 100m north of culvert - Water body to the west	Culvert at Saw Mill Dr
C21	CUL C152 30.000 Pipe RCP 3/1800	QR01-N-SE-C152-COO-135-CC002	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	3	3/1800	CONCRETE						Yes - extend under tracks		Could not locate on google Earth?
C22	CUL C152 30.450 Pipe RCP 1/1200	QR01-N-SE-C152-COO-135-CC003	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/1200	CONCRETE						Yes - extend under tracks		Could not locate on google Earth?
C23	CUL C152 30.710 Pipe RCP 1/900	QR01-N-SE-C152-COO-135-CC004	Culvert - PRE-CAST REINFORCED CONCRETE PIPE	1	1/900	CONCRETE						Yes - extend under tracks		Could not locate on google Earth?
C24	CUL C152 31.900 Box RCBC 2/2400X1600	QR01-N-SE-C152-COO-135-CC005	Culvert - PRE-CAST REINFORCED CONCRETE BOX	2	2/2400X1600	CONCRETE						Maybe - location assumed to be where second track from Cleveland terminates		Could not locate on google Earth
R1	CD RET-WALL 19.610 LHS	QR01-N-SE-C152-COO-120	Retaining Wall									No - retaining wall is on the LHS side (duplication is on south/west side of track)		
R2	CD RET-WALL 28.000 LHS/RHS	QR01-N-SE-C152-COO-WPT-CM001	Retaining Wall									No - already 2 tracks in this location		

Dimensions have been taken from the QR Structura Schedule or estimated

Appendix E Safety in Design Hazard Log

Design Ref	Design Life Cycle Stage (Select from Drop Down Box)	Hazards What could cause injury or ill health, damage to property or damage to the environment	Risk What could go wrong and what might happen as a result	Existing Control Measures	Initial Risk Rating C	L	RR	Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	By When
	Setup, Construction and Commissioning	Operations/Interactions	Working adjacent to live railway increase risk of injury and therefore requires closures and impact existing operations	Design track centres at 6m to allow for working adjacent to live track whilst maintaining safe working zone				To be confirmed at detailed design	Designer	
	Setup, Construction and Commissioning	Overhead/Underground Services	Construction impacts existing services	DBYD search undertaken and existing services identified. Avoid where possible				Next stage to undertake utilities and service assessment and engage with PUP on potential impacts and diversion / protection requirements	Designer	
	Maintenance	Access/egress, access ways, entrances/gates	Duplication impacts on existing maintenance access	Maintenance access will be maintained to existing levels or bettered where feasible. A single RMAR will be provided wherever possible, land take impacts permitting.				As existing	Designer	
	Investigation and Design	Noise	Increase in noise to adjacent residential properties	Noise fencing				Noise assessment and provision for relocated and/or additional noise fencing as required	Designer	
	Investigation and Design	Operations/Interactions	Fall from RMAR on embankment	where embankment height is greater than 2m provision for safety barrier in typical cross section will be made i.e. additional 1m clearance.				Maintainer to direct where required	Designer	
	Setup, Construction and Commissioning	Materials of construction	Insufficient space for layover and material handling areas	Sites to be identified within existing corridor as part of constructability review				Contractor to identify final construction methodology	Contractor	
	Setup, Construction and Commissioning	Construction method	Construction access	potential access to be identified as part of constructability review				Contractor to identify final construction methodology	Contractor	
	Setup, Construction and Commissioning	Community/public interaction/access	Interface between construction traffic and public highway traffic can cause injury	Stabling site access provided at a location with good visibility				Site access layout to be developed at preliminary design and agreed with local road authority. Alternative dedicated pedestrian diversions walkway to be provided for general public on extents of the site. TM plans to be agreed with LA prior to construction commencing	Designer	
	Setup, Construction and Commissioning	Construction interfaces	Mobile plant interface with personnel onsite	Construction handling areas identified				Contractor to provide sufficient clearance for construction traffic movements and dedicated pedestrian walkways	Contractor	
	Setup, Construction and Commissioning	Ground conditions	Workers or ecology being exposed to contaminates	Environmental and geological desktop assessment to identify any areas of likely contamination				GI to identify actual contamination present on site and EMP to be agreed prior to construction.	Contractor	
	Setup, Construction and Commissioning	Excavation	Falls into deep excavations	Minimise excavations within design				To be confirmed at detailed design	Designer	
	Setup, Construction and Commissioning	Working at heights	Workers at height fall and injury themselves	Use of pre-cast standard bridge elements units that minimise working at height				To be confirmed at detailed design	Designer	
	Operation	Operations/Interactions	electrocution from OLE	Design track centres at 6m to allow for working adjacent to live track whilst maintaining safe working zone				To be confirmed at detailed design	Designer	
	Setup, Construction and Commissioning	Electrical	Electrocution from upgrading OLE and traction power system	Consider OLE upgrades within constructability assessment. Rail System impact assessment considered issues and determined minimum requirements for duplications				To be confirmed at detailed design	Designer	
	Operation	Flood	Over land flow flash flooding or fluvial flooding. Damage to property, injury or drowning	Initial assessment to identify key flood immunity issues and identification of existing drainage structures and impact from duplication. Duplication levels generally match existing track levels. Stabling will also nominally be set at existing mainline track levels.				Detailed design to undertake flood assessment and determine drainage, attenuation, mitigation and flood immunity requirements.	Designer	
	Investigation and Design	Operations/Interactions	Crew change interface with trains at stabling	Provide QR desirable minimum clearances including designated walkways				To be confirmed at detailed design	Designer	

Design Ref	Design Life Cycle Stage (Select from Drop Down Box)	Hazards What could cause injury or ill health, damage to property or damage to the environment	Risk What could go wrong and what might happen as a result	Existing Control Measures	Initial Risk Rating C	L	RR	Potential Control Measures (Consider Hierarchy of Control - Elimination, Substitution, Isolation, Engineering Controls, Administrative Controls, PPE)	Responsibility	By When
	Operation	Access/egress, access ways, entrances/gates	Passenger access at stations to cross corridor connections to platforms	Provision for lift and stairs access, platform width considers DDA compliance including TSGI's safety clearance and wheel chair access.				To be confirmed at detailed design	Designer	
	Maintenance	Access/egress, access ways, entrances/gates	Maintenance access along corridor adjacent to live rail. Risk of collision	Provide QR desirable minimum clearances for RMARs				To be confirmed at detailed design	Designer	
	Investigation and Design	Slips/Trips/Falls	Fall from pedestrian over bridge or road bridge	concept bridge cross section provides horizontal clearance for a parapet with pedestrian guard rail / anti throw screen.				To be confirmed at detailed design	Designer	
	Operation	Public interference	Unauthorised access and damage caused by vandalism	Provide sufficient width for security fencing as per QR typical drawings.				To be confirmed at detailed design	Designer	
	Operation	Access/egress, access ways, entrances/gates	Crew access to the stabling location requires parking on public road increases risk of damage to property or injury.	Crew parking on site will be provided.				To be confirmed at detailed design	Designer	
	Operation	Operations/Interactions	Crew welfare before and after shift. Damage or loss to personal property	provide crew change welfare facilities on site - inc toilets, lockers and lunch room.				To be confirmed at detailed design	Designer	
	Operation	Operations/Interactions	At station and stabling insufficient space for emergency services extends response times	Stabling and station car parks have made provision for emergency and service vehicle parking / access.				To be confirmed at detailed design	Designer	
	Maintenance	Inspections	Inspection of drainage structures and cess drains causes trip / falls	Provide 1:5 slope to one side of drains for safe access. If attenuation basins used provide shallow slopes for safe access / maintenance at the top of the basin.				To be confirmed at detailed design	Designer	

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
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Final	P Duré-Wilcock	Alex Litwinowicz	Not Relevant	D Parminter	Not Relevant	5/7/2017

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