Central Coast Council

Mannering Park Shared Pathway Feasibility Study

July 2017

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1. Introduction

1.1 Background

Central Coast Council's Strategic Plan 2014 – 2018 and Council's Operational Plan 2016 – 2017 identified the need for investigation and design of a shared pathway linking Mannering Park and Chain Valley Bay.

Currently there is no shared pathway for cyclists or pedestrians wishing to travel between Mannering Park and Chain Valley Bay. Currently the existing shared pathway heading east from Mannering Park terminates at Griffith Street and the existing shared pathway heading north from Chain Valley Bay terminates on Tall Timbers Road.

The proposed shared pathway will provide this missing link, increasing pedestrian and cyclist safety and improve on transport facilities.

The section of proposed shared pathway will create a more direct route from Mannering Park to Chain Valley Bay, see Figure 1-1 below.

Figure 1-1 Site location map

Source: (www.sixmaps.com)

1.2 Scope of works

The scope of works for this feasibility study is to undertake an investigation for the feasibility of two proposed routes that will allow tenders to be sought for a design that provides safe, practical and integration of the major elements of a shared pathway.

The intent being to conduct a site analysis to identify the best route to provide the least amount of environmental impact, safety issues and adverse impact on the community within the areas for the two proposed routes.

The two proposed routes are known as:

- Foreshore route
- Ruttleys Road Route

These are highlighted in Figure 1-2 below.

Figure 1-2 Proposed routes

The scope of works includes the following:

- Investigations for both routes - Geotechnical, Ecological, Landform, Heritage
- Feasibility report for both routes considering the following:

Social impacts

- Crime Prevention through Environmental Design
- Pedestrian and bicycle safety
- Accessibility

Environmental Impacts

- Bushfire hazard assessment
- Acid sulphate soils
- Contaminated land
- Mine subsidence
- Heritage
- Identification of and impacts on EEC and habitat
- Mitigation of any possible impacts

Construction

- Techniques and materials
- Life expectancy
- Operational costs
- Construction costs
- Construction constraints and mitigation of those constraints
- Waste management
- Timeframes

The report shall also include:

- Mitigations and associated time and cost for any issues discovered
- Identification of any detailed assessments required for further design
- Preliminary concept of shared path routes
- Final recommendation of which route would be best in the interest of council to adopt.

The investigation for feasibility will take into account all relevant architectural, engineering, shared pathway guidelines, and all relevant standards such as BCA and Australian Standards.

1.3 Limitations

This report: has been prepared by GHD for Central Coast Council and may only be used and relied on by Central Coast Council for the purpose agreed between GHD and the Central Coast Council as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Central Coast Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Central Coast Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The Cost Estimate has been prepared for the purpose of cost comparison between options and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the project can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

Except as otherwise expressly stated in this Report GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials (“ACM”) on the site. If fill material has been imported on to the site at any time, or if any buildings constructed prior to the prohibition date of asbestos in Australia, 31 December 2003, have been demolished on the site or material from such buildings disposed of on the site, the site may contain asbestos or ACM.

2. Project inputs

The following information, site inspections and consultations has been relied upon during these works:

2.1 Reference documents

- Wyong Local Environmental Plan (2013)
- Wyong Shire Council, On-Road Bicycle and Shared Pathway Strategy, 2010
- NSW Government, NSW Bike Plan, May 2010
- Austroads Guide to Road Design Part 6: Roadside Design, Safety and Barriers, 2009
- Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths, 2009
- Austroads Guide to Road Design Part 6B: Roadside Environment, 2009
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, 2009
- Austroads Guide to Traffic Engineering Practice Part 14: Bicycles, 1999
- NSW Bicycle Guidelines, Roads and Traffic Authority, Version 1.2, July 2005
- TransGrid Easement Guidelines – Third Party Development
- NSW Police – Safer by Design

2.2 Design inputs

- Central Coast Council LiDAR data
- Dial before you dig information (DBYD) (refer to Section 4)
- Aboriginal Heritage Due Diligence Assessment – Mannering Park to Chain Valley Bay Shared Pathway - RPS Group, 2017 (Refer to Section 7)

2.3 Site inspections

- Site inspection undertaken 5th June 2017 (refer to Section 3)

2.4 Stakeholder consultation

Various consultations and communications were undertaken as part of the study (Refer to Section 11). These included:

- Central Coast Council – various stakeholders
- Mannering Park Progress
- Mannering Park Precinct
- Chain Valley Bay Progress
- Delta Electricity (informally)

3. Site walkover

3.1 Introduction

A site walkover on 5 June 2017 was undertaken by the following personnel, to familiarise themselves with the project and the potential constraints presented along the routes:

- David Morrison – Senior Civil Engineer (GHD)
- Gilbert Whyte – Senior Ecologist (GHD)
- Tessa Boer-May – Heritage Consultant (RPS Group)

Photographs of both routes were taken a summary of which are provided below.

A site walkover of the Ruttleys road route was limited to the off road sections. The on road sections of Ruttleys Road and Vales Road were driven to familiarise and google street view used to provide images and constraints. Both routes were photographed from north to south.

3.2 Foreshore route site photographs

Photo 1 View of existing shared pathway looking north

Photo 2 View looking south from shared pathway connection point

Photo 3 Typical view of route through existing track

Photo 4 **Location of proposed bridge at Vales Point Power station cooling water intakes – looking south**

Photo 5 **View of proposed bridge at Vales Point power station cooling water intakes – looking north**

Photo 6 View of existing vegetation on foreshore to south of proposed bridge

Photo 7 View of existing track within Delta electricity land

Photo 8 View of foreshore at existing cottages

Photo 9 View looking north to east of Lakeshore Avenue

Photo 10 Typical view along foreshore at Lakeshore Avenue

Photo 11 View looking west along Karoola Avenue

Source: (www.google.com)

Photo 12 View looking south on Tall Timbers Road to connection point

Source: (www.google.com)

3.3 Ruttleys road route

Photo 13 Connection point from existing shared pathway on Griffiths Street

Photo 14 View looking west along Griffiths Street

Photo 15 Intersection of Griffiths St and Vales Road looking south

Source: (www.google.com)

Photo 16 Intersection of Vales Road and Dorothy Street looking south

Source: (www.google.com)

Photo 17 Intersection to Vales Point Power Station looking south

Source: (www.google.com)

Photo 18 Intersection of Vales Road and Ruttleys Road looking south

Source: (www.google.com)

Photo 19 Northern conveyor overpass on Ruttleys Road

Source: (www.google.com)

Photo 20 Entrance to Vales Point stockpile access

Source: (www.google.com)

Photo 21 Existing conveyor crossing Ruttleys Road

Source: (www.google.com)

Photo 22 Delta Power station access looking south

Source: (www.google.com)

Photo 23 Mannering Colliery entrance on Ruttleys Road

Source: (www.google.com)

Photo 24 Entrance to model aero club looking towards Ruttleys Road

Photo 25 View of existing roadway at Aero club looking east

Photo 26 Typical track below TransGrid easement

Photo 27 Typical view east of TransGrid easement

Photo 28 View along edge of existing orchard looking east

Photo 29 Typical View to west of Tall Timbers Road

Photo 30 Existing Shared Pathway on Tall Timbers Road looking south

4. Engineering observations

During the walkover an engineering review was undertaken with the following comments and observations made for each route.

4.1 Foreshore route

Table 4-1 below provides information on the observed constraints and potential alternative routes/options available.

Table 4-1 Engineering review of foreshore route

Chainage	Length	Path Type	Comment/Observation
0 – 300	300 m	On grade - Off road	Shared pathway to follow existing cleared section where possible. Existing fence line location to be defined and repaired as appropriate.
300 – 500	200 m	Bridge	200 m span bridge required at power station intake to ensure clearance from TransGrid infrastructure. Bridge will require to be designed to prevent users jumping from bridge into water and throwing objects.
500 – 800	300 m	On grade – off road	Route to follow existing track where possible. Subject to confirmation with Delta and TransGrid. Minimal clearing required.
800 – 1050	250 m	Raised boardwalk	Raised boardwalk section along foreshore and through to rear of Colliery cottages.
1050 - 1250	200 m	On grade – off road	Shared pathway on grade along rear of cottages. Minimal clearing required.
1250 – 1900	650 m	Raised boardwalk (bridge at water course)	Section inaccessible during site walkover. Construction access likely to be an issue. 30 m bridge required at watercourse.
1900 – 2250	350 m	On grade – off road	Route along foreshore behind existing properties in Kingfisher Shores through to connect into Karoola Avenue via Kingfisher reserve.
2250 - 3350	1100 m	On grade – on road	Route to be within southern verge of Karoola Avenue and Eastern verge of Tall Timbers Road to tie into existing shared pathway.

Table 4-2 Foreshore Route summary

Path Type	Total lengths
On grade – On road	1,100 m
On grade – Off Road	1,150 m
Bridge	200 m, 30m
Raised Boardwalk	900 m
Total	3,350 m

4.2 Ruttleys road route

Table 4-3 below provides information on the observed constraints and potential alternative routes/options available.

Table 4-3 Engineering review of Ruttleys Road route

Chainage	Length	Path Type	Comment/Observation
0 – 3200	3200 m	On grade on road	Shared pathway along southern edge of Griffiths St and eastern edge of Ruttleys Road and Vales Road. The intent being that this would prevent the requirement for users to cross over Vales Road or Ruttleys Road. Refer to Table X below for more details of the constraints along Vales Road and Ruttleys Road.
3200 – 4500	1300 m	On grade – off road	Shared pathway along existing roads and tracks and across TransGrid easement.
4500 – 5000	500 m	Raised boardwalk	An alternative route could be purchased around the Orchard and south of retirement village however this would require land purchase which would cause further delays to the program.

Table 4-4 Ruttleys Road summary

Path Type	Total lengths
On grade – On road	3200 m
On grade – Off Road	1300 m
Raised Boardwalk	500 m
Total	5000 m

Due to the complexity of the route along Vales Road and Ruttleys Road engineering a separate analysis of the potential constraints along the road edge has been undertaken. The issues identified would require resolution as part of a concept and detailed design however as a summary, there were no issues identified that an engineered solution does not appear able to resolve.

Location	Constraint	Potential Solution
Vales Road CH 1000	Dorothy Street Intersection 	Standard intersection crossing. Minor vegetation clearance required.
Vales Road CH 1100	Mannering Park – Signage 	Signage will require to be relocated outside of shared pathway.

Location	Constraint	Potential Solution
Vales Road CH 1150		Maintenance access will need to be maintained for Delta – Thickened section of pathway to accommodate potential for occasional vehicle access.
Vales Road CH 1250	Vales Point Power Station Access 	Standard intersection crossing. Refuge island may be incorporated into centre.

Location	Constraint	Potential Solution
Ruttleys Road CH 1700	Pinch point at Conveyor crossing 	Subject to survey a small bridge and land take may be required across conveyors to accommodate shared pathway. Pathway to allow for retention of w-beam barrier.
Ruttleys Road CH 2550	Pinch point at pipeline crossing 	Subject to survey a small bridge and land take may be required across pipelines to accommodate shared pathway. Pathway to allow for retention of w-beam barrier.

Location	Constraint	Potential Solution
Ruttleys Road CH 2650	Pinch point at intersection with Chain Valley Coal Mining 	Subject to survey a small bridge may be required across pipelines to accommodate shared pathway at intersection. Modifications to barrier arrangement likely to accommodate crossing.
Ruttleys Road CH 2750	Property access 	Warning signage and different surface colouring to indicate shared pathway at property access.

Location	Constraint	Potential Solution
Ruttleys Road CH 2800 - CH 3200	Narrow verge with overhead power lines 	Presence of HV power poles will constrain path width. Options are to split path around poles, narrow path and pass to one side, or maintain path width and generate property acquisition or agreed use.
Ruttleys Road CH 3150	Intersection crossing 	Standard intersection crossing with give way signage. Modification to barrier arrangement will be required, where the barriers in place are noted as being thrie-beam, therefore modification to the barriers will present a challenge. This may require that the path be set back further along the access.

Location	Constraint	Potential Solution
Tall Timbers Road CH 5000	Road Crossing 	Road crossing required to cross Tall Timbers road – type of crossing will require to be confirmed at concept design stage.

5. Desktop services investigation

5.1 Below ground services

Existing services that were found to be within the extents of the routes are listed below. The utilities being identified through a dial before you dig search (DBYD). The services within the vicinity of the routes include:

- Central Coast Council (formally Wyong water)
- NBN Co.
- Telstra
- TransGrid
- Ausgrid

Typically where the path is on grade along the roads, the majority of services impacts would only be localised adjustments to service lids. A summary of services impacted along each of the routes is provided below.

5.1.1 Foreshore route

Table 5-1 below summarises the services encountered along the foreshore route and potential impacts on each service.

Table 5-1 Foreshore route – summary of services encountered

Location	Service encountered	Potential impacts
Section around proposed bridge, see Figure 5-1	Central Coast Council Water – Sewer Rising Main	Bridge construction will require coordination around service. Adjustment of service lids impacted by shared pathway route.
Karoola Avenue	Telstra/NBN	Service lid adjustments.
Tall Timbers Road	Central Coast Water	Service lid adjustments.

These would require detailed consideration in the detailed design stage to ensure they are not impacted. The benefit of the shared pathway would be that access to these assets (particularly the off road ones) could be improved via allowance of service vehicle access onto the path.

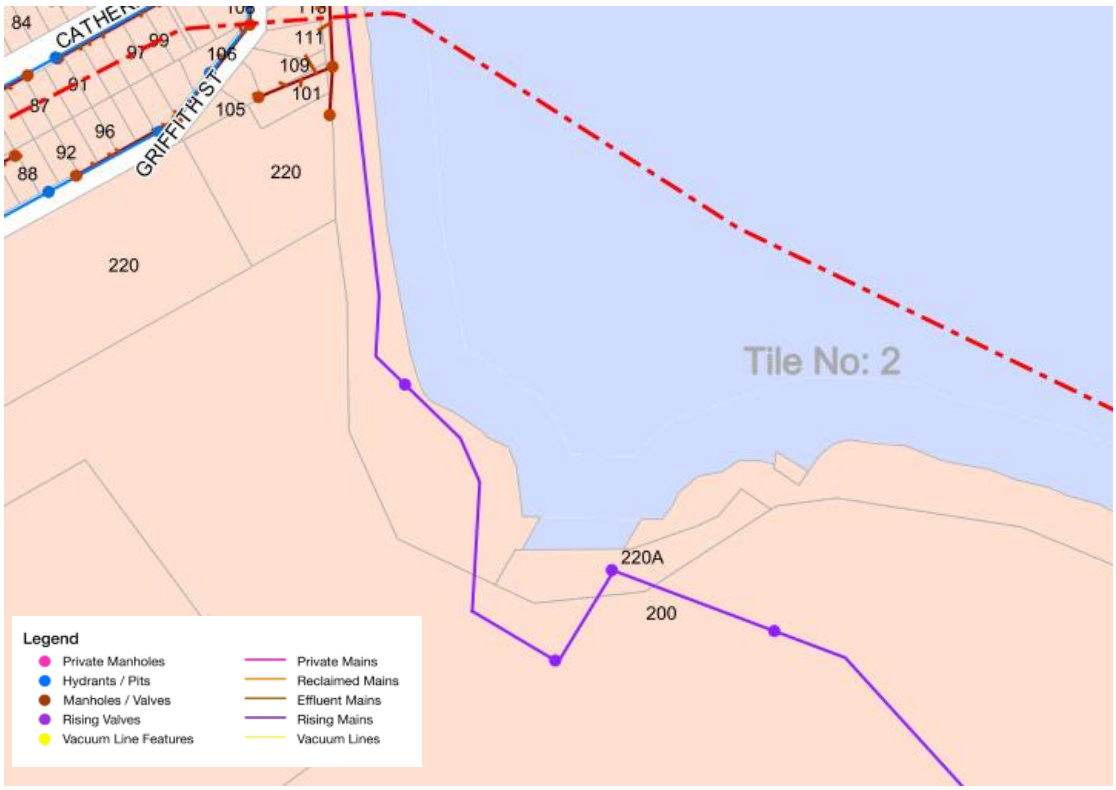


Figure 5-1 Sewer Rising Main around bridge

5.1.2 Ruttleys Road route

Table 5-2 below summarises the services encountered along the Ruttleys Road route and potential impacts on each service.

Table 5-2 Ruttleys Road route – summary of services encountered

Location	Service encountered	Potential impacts
Griffiths St	Central Coast Council Water Ausgrid	Adjustment of service lids
Ruttleys Road	Central Coast Council Water Telstra/NBN Ausgrid TransGrid	Adjustment of service lids Co-ordination with proposed safety barrier Co-ordination required at proposed bridge locations
Aero Club/TransGrid Easement, see Figure 5-2 below	Central Coast Council – Reclaimed Water	Adjustment of service lids Improved access for maintenance

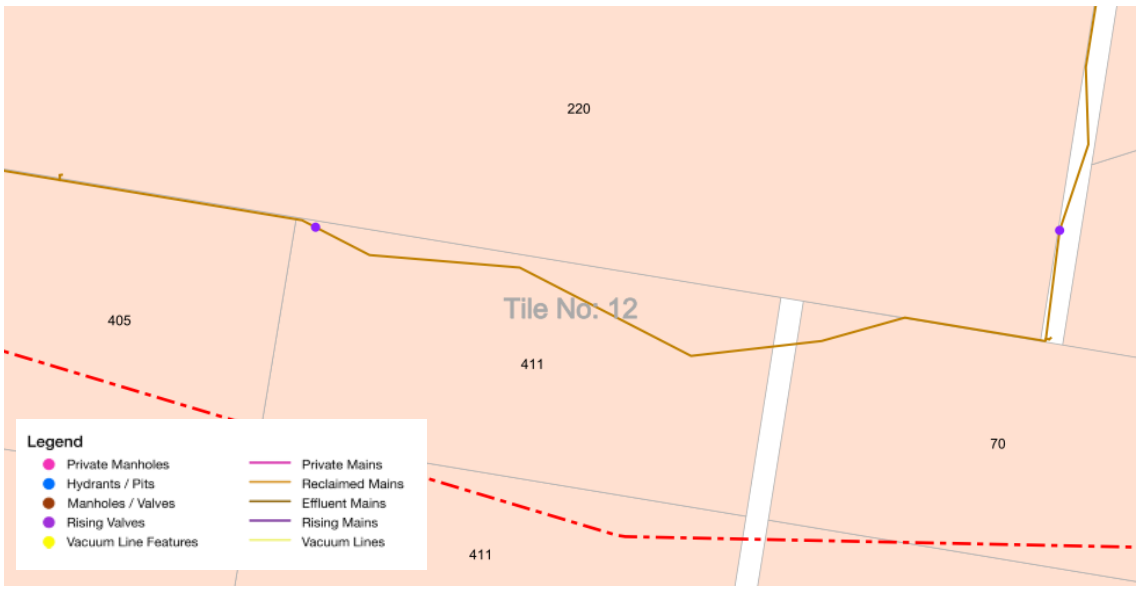


Figure 5-2 Reclaimed water main through Model Aero club off road section

Due to the proposed use of, or crossing of, a number of service maintenance access routes, detailed consideration of maintenance access will be required in the concept phase. The proposed modifications to maintenance access are likely to be a key discussion point in consultation with each asset owner.

5.2 Above ground services

Due to the proximity of the Vales Point Power Station a significant amount of above ground utility infrastructure is located within the vicinity of the two routes. This is generally high voltage infrastructure owned by TransGrid. The constraints associated with this infrastructure is summarised in Section 5.3

5.2.1 Foreshore route

The foreshore route has a number of overhead structures which will require to be considered within the routes. These include the following:

- Overhead towers and cables at proposed bridge (see Figure 5-3)
- Transmission tower at edge of foreshore (see Figure 5-4)

Figure 5-3 View of existing 330kV Overhead towers and cables in vicinity of proposed bridge

Figure 5-4 Transmission tower at edge of foreshore

5.2.1 Ruttleys Road route

The Ruttleys road route has a number of overhead structures which will require consideration within the routes. These include the following:

- Overhead towers and cables east of the Aero club (see Figure 5-5)
- Power poles on the western edge of Ruttleys Road (see Figure 5-6)

Figure 5-5 Existing 330 kV infrastructure east of Aero club

Figure 5-6 View of existing power poles Ruttleys Road

Local narrowing, splitting or deviation of the shared pathways will be necessary at the poles to accommodate the pathway, Figure 5-7 below provides a typical treatment detail for a narrowing treatment.

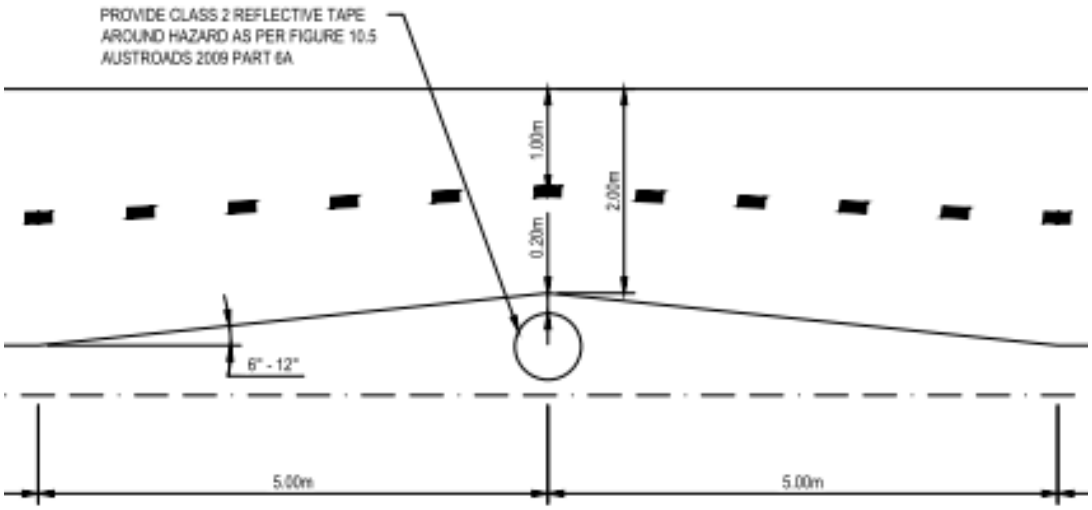


Figure 5-7 Typical shared pathway narrowing at hazard

5.3 TransGrid easement guidelines

A number of existing TransGrid easements are located within the vicinity of the routes. Reference should be made to TransGrid Easement Guidelines for Third Party Development – Refer to Appendix D. TransGrid acquires Transmission Line (TL) easements to provide adequate clearance along the route of a TL for construction and maintenance work. These easements also ensure no work or other activity is undertaken under or near a TL that could create an unsafe situation.

A number of activities and encroachments are not permitted within the easement area. The relevant ones that **are prohibited** within a Transmission Line Easement include:

- The construction of substantial structures.
- Public spaces or recreation areas which encourage people to spend time within or congregate within the easement.
- Any change in ground levels that reduce clearances below that required in AS 7000.

The following activities **may possibly** be approved with conditions.

Roads, carparks, cycleways, walking tracks and footpaths on the outer part of the easement or as a thoroughfare across the easement, subject to horizontal and vertical clearances. Restrictions and other conditions on consent may also apply. These will **not be approved** when located within:

- 20 metres of any part of a transmission line structure
- 10 metres of the centre-line of a transmission line 132kV and below
- 17 metres of the centre-line of a transmission line above 132kV

Sketches providing typical constraints of the routes based on the above are shown below in Figure 5-8 to Figure 5-10 and Photo 31. Further consultation will be required with TransGrid to confirm these.

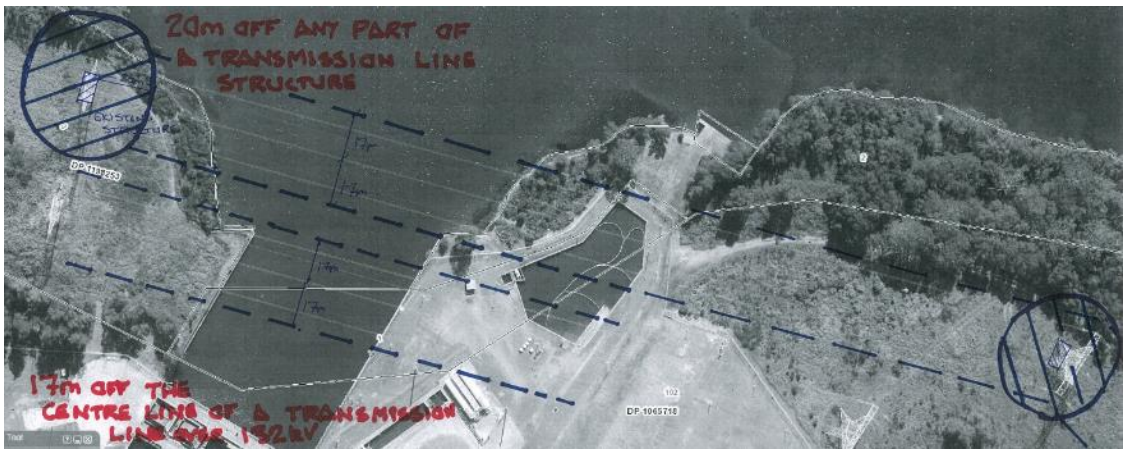


Figure 5-8 TransGrid development constraints at proposed bridge

Photo 31 View of 330kV lines at proposed bridge location

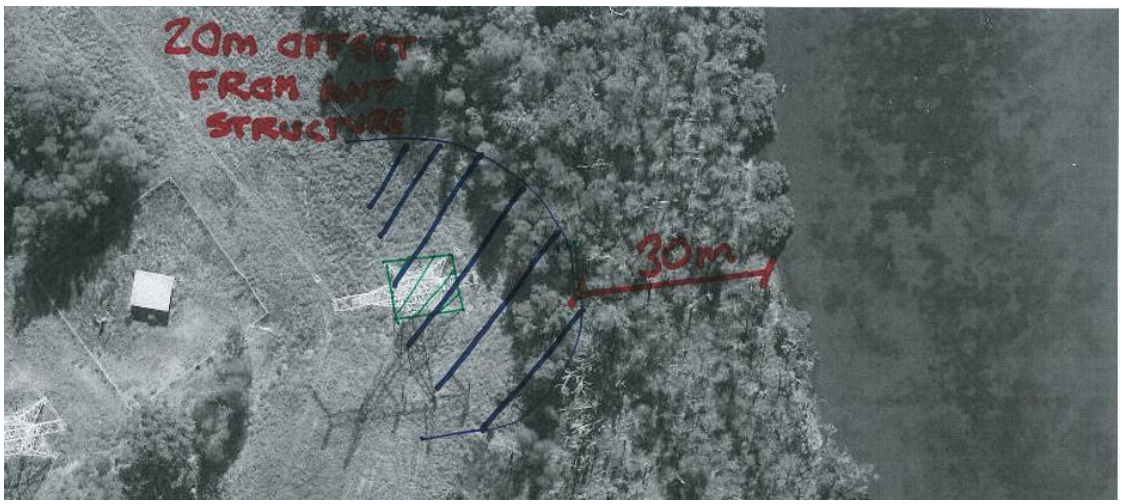


Figure 5-9 TransGrid development constraints at foreshore

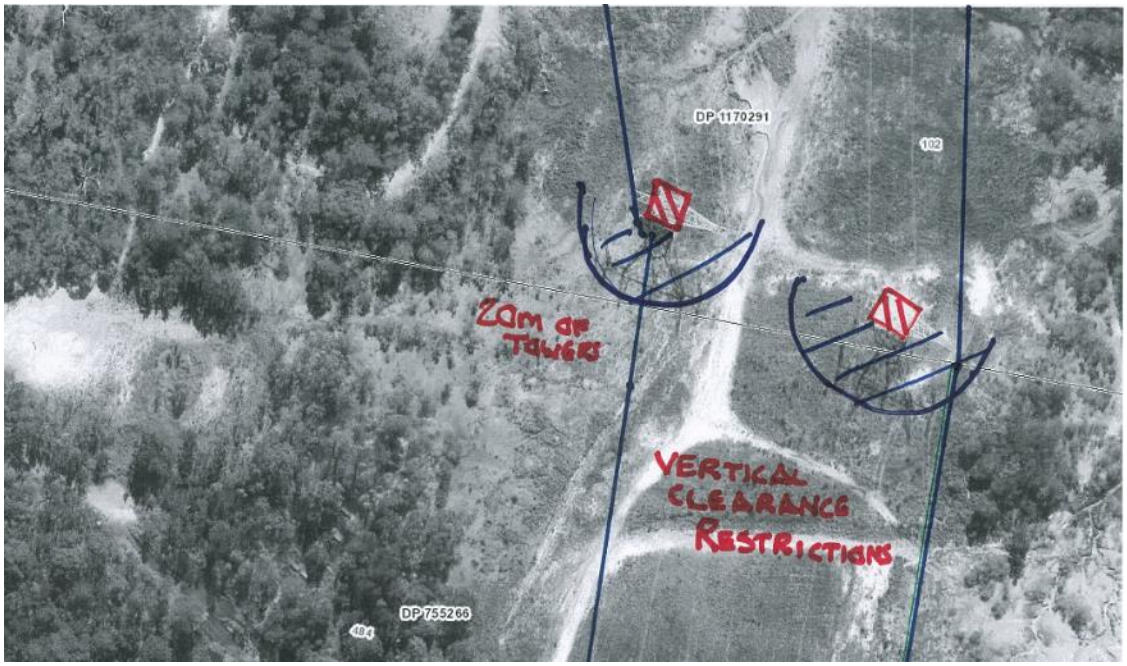


Figure 5-10 TransGrid development constraints east of Aero club

Table 5-3 below summarises the impact these assets shall have on the proposed shared pathway route.

Table 5-3 TransGrid easement constraints summary

Location	Constraint	Impact on shared pathway route
Foreshore Route		
Proposed Bridge at Vales Point Power Station Intakes	330 kV Overhead lines Tower Structures	No bridge allowed to be constructed below easement. Bridge would require to be constructed outside of this easement. Bridge length required is around 200 m total span. Restrictions around construction of bridge and use of cranes would make construction of the bridge extremely difficult.
Foreshore pinch point	Tower Structures	No impact. 30 m available between tower and foreshore to accommodate shared pathway.
Ruttleys Road Route		
Existing easement east or Aero club	Tower structures 330kV Overhead lines	Vertical clearance restrictions below lines. No impact. Towers located outside of proposed shared pathway route.

6. Geotechnical

6.1 Introduction

A geotechnical desktop review has been completed for the proposed routes.

Review of the following documents was undertaken to enable geotechnical appraisal of the preferred route, identify areas of concern and prepare a preliminary scope of investigation.

- Soil Landscapes of the Gosford – Lake Macquarie 1:100,000 Sheet. Department of Conservation and Land Management, Sydney, NSW.
- Gosford – Lake Macquarie 1:100,000 Geology sheet 9131 & part sheet 9231. Department of Mineral Resources, NSW.
- Acid Sulfate Soil Risk Map for Catherine Hill Bay – Edition 2. Department of Natural Resources, NSW Government.
- Swansea North Entrance and Swansea North Entrance No. 1 Extension Mine Subsidence Districts, Plan No. MSD14b. Mine Subsidence Board, NSW Government.

6.2 Soil landscape

As shown on the extracted soil landscape image below (Figure 6-1), the proposed western pathway route is expected to be underlain by 'Doyalson' landscape erosional soils of residual origin along the majority of the proposed western pathway route. Small pockets of alluvial soil of the 'Wyong' soil landscape are anticipated near the northern and southern extents of the western pathway alignment.

The proposed eastern pathway route is expected to traverse through the 'Doyalson' and 'Wyong' soil landscapes, in addition to small areas of 'Disturbed' soil landscapes comprising fill material.

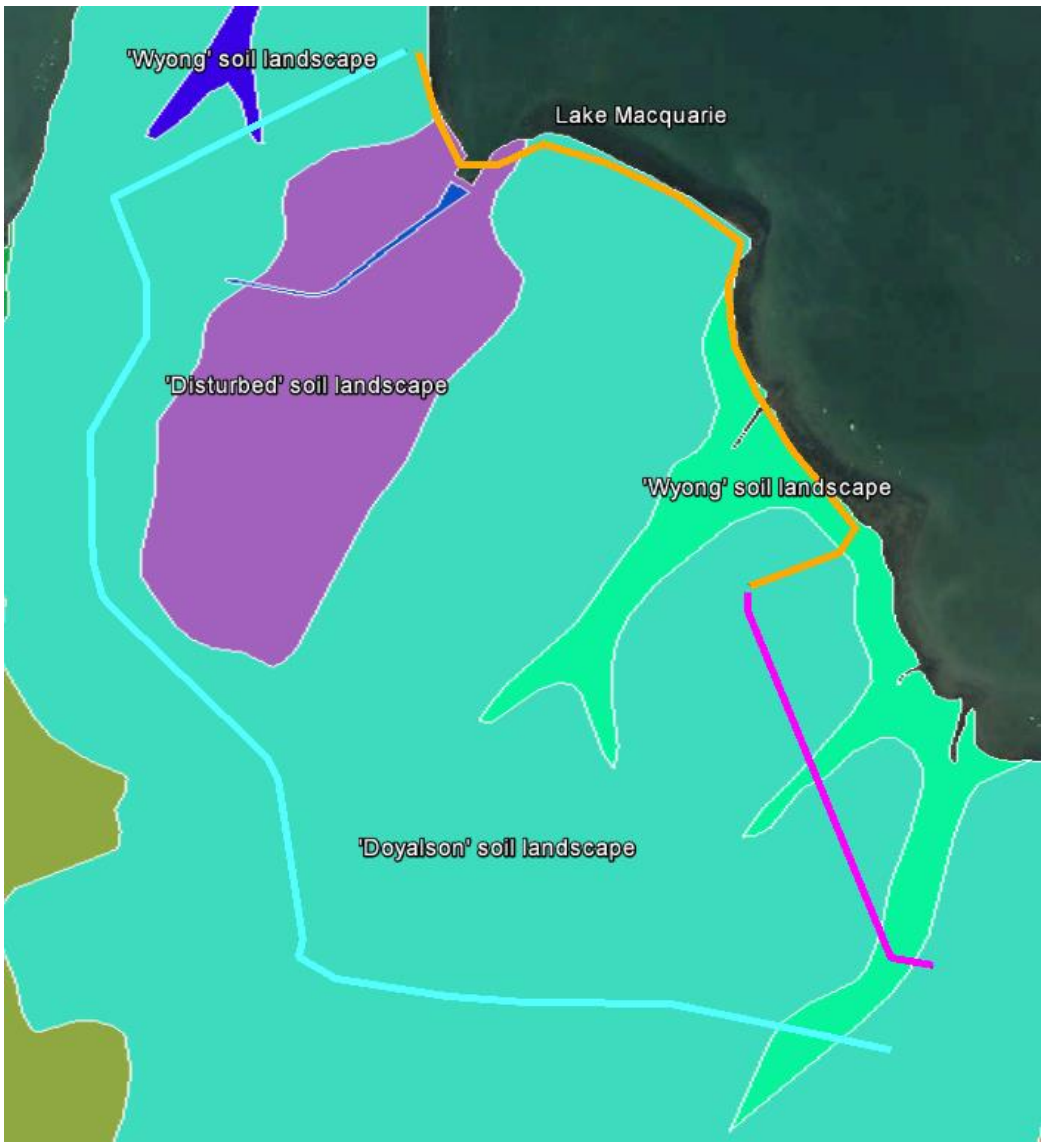


Figure 6-1 Soil landscape areas

Typical characteristics of each soil landscape are listed below.

Doyalson soil landscape

- Gently undulating rises on Munmorah Conglomerate with slope gradients less than 10 % and local relief to 30 m
- Predominantly cleared eucalypt open forest with broad crests and ridges and long gently inclined slopes
- Typically moderately deep (0.5 to 1.5 m) soils over sandstone, conglomerate, siltstone and claystone, with moderately deep to deep (1.0 to >1.5 m) soils along drainage lines
- Limitations include high erosion hazard, foundation hazard (localised), high run-on (localised), mine subsidence district, seasonal waterlogging (localised), hardsetting, stoniness and strongly acidic soils of low fertility

Wyong soil landscape

- Broad poorly drained deltaic floodplains and alluvial flats of Quaternary sediments with slope gradients less than 3% and local relief less than 10 m
- Extensively cleared open forest with meander scrolls, oxbows and swamps
- Soils are typically deep (>2.0 m)
- Limitations include flooding, seasonal waterlogging, foundation hazard, permanent waterlogging (localised), stream bank erosion (localised), acid sulfate potential (localised), strongly acid, poorly drained and impermeable soils of very low fertility with saline subsoils

Disturbed soil landscape

- Level plain to hummocky terrain that has been extensively disturbed by human activity, including complete disturbance, removal or burial of soil
- Local relief and slopes are highly variable
- Original vegetation has been completely cleared and generally replaced with landfill including soil, rock, building and waste materials
- Limitations are highly variable and may include mass movement hazard, steep slopes, foundation hazard, unconsolidated low bearing strength materials, impermeable soils, poor drainage, erosion hazard, very low fertility and toxic materials

6.2.1 Regional geology

As shown Figure 6-2 below, the above mentioned soil landscapes are predominantly underlain by the Early Triassic Munmorah Conglomerate of the Narrabeen Group and Clifton Subgroup. The Munmorah Conglomerate typically comprises conglomerate, pebbly sandstone and shale.

A small pocket of Quaternary Alluvium, typically comprising gravel and sand, is expected near the southern extent of the proposed eastern route.

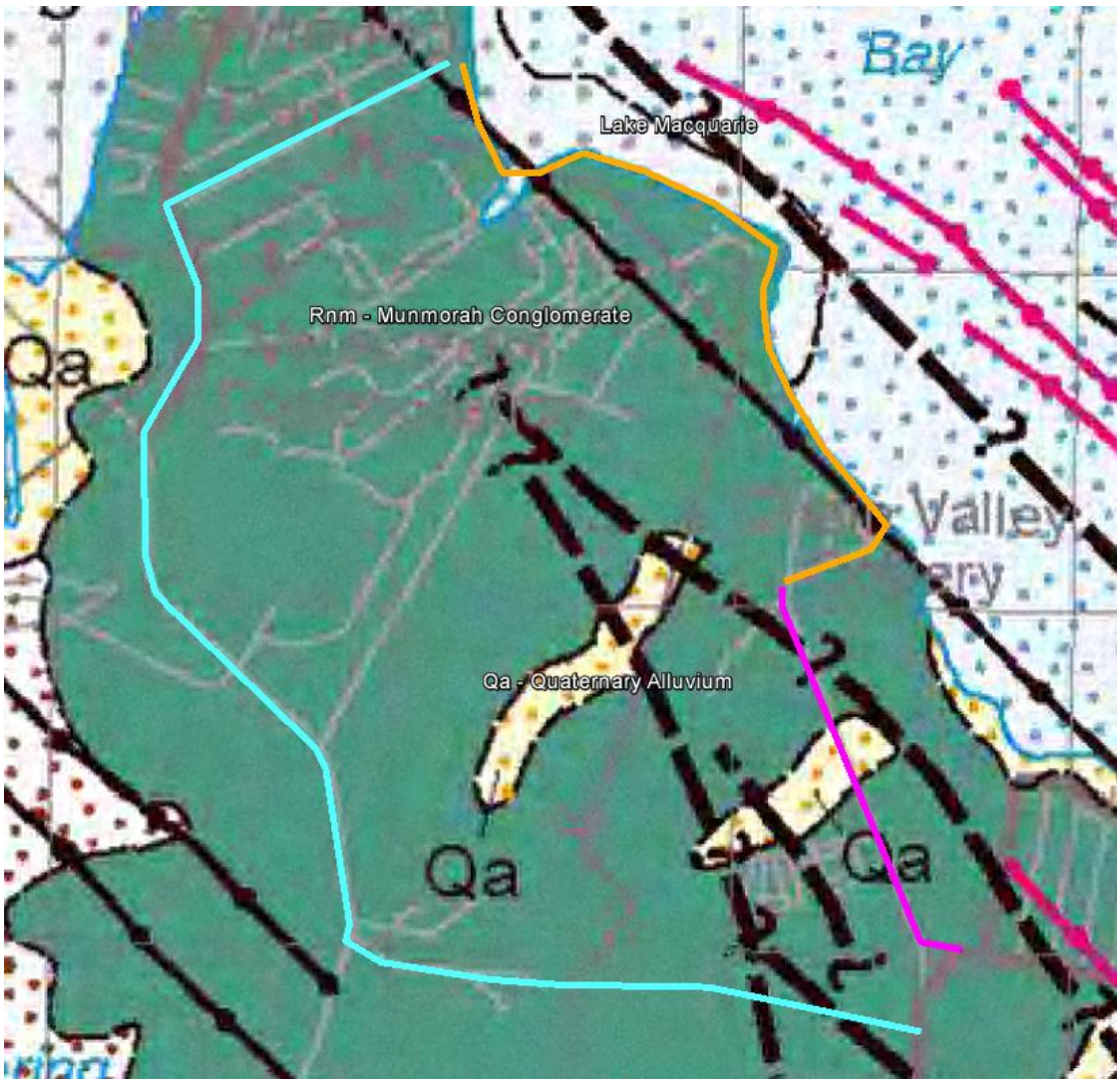


Figure 6-2 Extract showing regional geology areas

6.2.2 Acid sulphate soils

Figure 6-3 below indicates areas of probable occurrences of Acid Sulphate Soil (ASS) materials within the soil profile. Low and high probabilities of occurrence of ASS materials are shown primarily along the eastern coastline.

Depths to ASS materials in areas of high probability are likely within one metre of the ground surface. Depths to ASS materials in areas of low probability are likely between one and three metres below the ground surface.

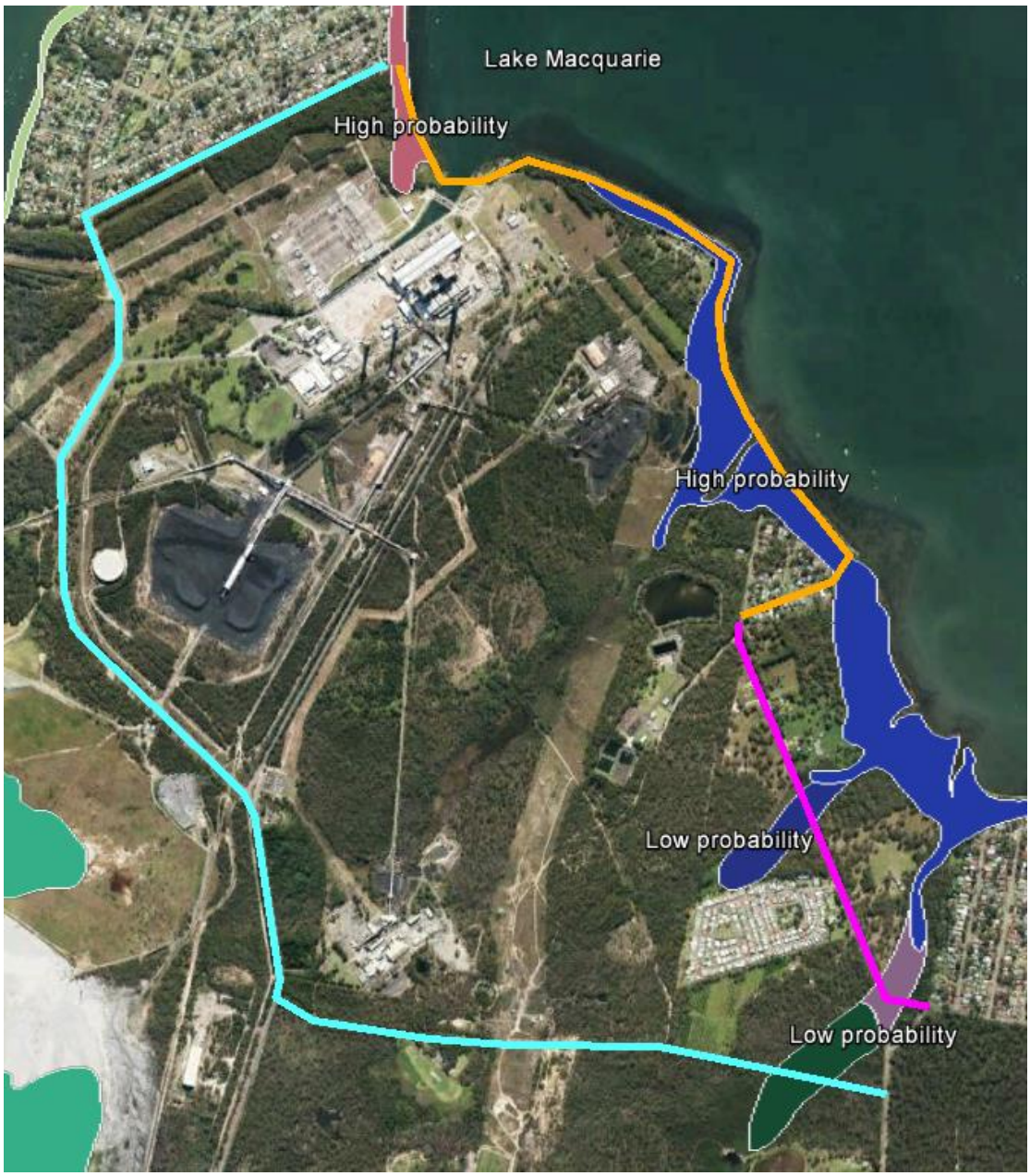


Figure 6-3 Extract showing potential acid sulphate soil locations

6.3 Mine subsidence

Reference to district maps obtained from the Mine Subsidence Board show that the proposed shared pathway is located within the Swansea North Entrance mine subsidence district.

6.4 Further geotechnical investigation

Geotechnical investigation will be required to facilitate design of the proposed shared pathway. Key issues requiring further geotechnical assessment and subsurface investigation are expected to include:

- Foundation conditions in proposed sections of bridges
- Foundation conditions in proposed sections of elevated walkways or boardwalks, particularly where the pathway is significantly above the existing ground surface
- Subsurface conditions, including the potential for ASS conditions, in low elevation and possible ‘swampy’ sections of the proposed pathway

- The geotechnical investigation will require the drilling, logging and sampling of boreholes followed by targeted laboratory testing and geotechnical engineering interpretation.
- We envisage that the geotechnical investigation may be undertaken using a combination of drilling techniques, including:
  - Hand augers supplemented with Dynamic Cone Penetrometer (DCP) testing to assess soil density/consistency
  - Large diameter augers mounted to an excavator and again supplemented by DCP testing
  - Specialist geotechnical drilling rig supplemented with Standard Penetrometer Tests (SPTs) to assess soil density/consistency

The selected drilling technique will depend on the preferred route and its anticipated foundation systems.

Following geotechnical investigation and laboratory testing, a geotechnical investigation report would be prepared, incorporated factual results of the investigation together with discussion and recommendations relating to ground conditions, structural footing options and geotechnical design parameters, earth pressures for retaining structures (if required), site preparation and earthworks, ASS conditions and subgrade CBR.

7. Heritage

7.1 Introduction

RPS were engaged by GHD to provide an Aboriginal Heritage Due Diligence Assessment for proposed shared pathway routes at Mannering. This assessment is included within Appendix C. A summary of which is included below for reference.

7.2 Heritage background

The Lake Macquarie foreshore was often utilised by Aboriginal people, as evidenced by numerous middens identified. There is evidence for Aboriginal sites further away from the foreshore, but these are less common. A search of the Aboriginal Heritage Information Management System was undertaken for a 5 km radius of the project area and 79 Aboriginal sites were identified. The majority of these sites are middens, with most located along the foreshore. Sites further inland tend to comprise surface artefacts (artefact scatters and isolated finds), scarred trees and potential archaeological deposits.

There are no AHIMS registered Aboriginal sites in the Project Area. The closest sites are 300 m east of the Foreshore route and comprise an artefact scatter and a scarred tree.

7.3 Visual inspection

A visual inspection of Foreshore route and Ruttleys Road route was undertaken by RPS Senior Cultural Heritage Consultant/Manager on 5 June 2017, along with David Morrison and Gilbert Whyte of GHD. The Foreshore route included disturbed and modified landforms. Observed modifications included landscaped areas adjacent to residences and installation of power plant infrastructure. Smaller areas of undisturbed and unmodified land were also inspected. No Aboriginal sites were identified along the Foreshore Route.

The Ruttleys Road route comprised a highly modified landforms associate with the road apron of Ruttleys Road. The closest Aboriginal sites to this route option were 1.5 km away. No Aboriginal sites were identified along this route.

7.4 Discussion

There are no Aboriginal sites in either route option and both route options are unlikely to impact Aboriginal heritage. The Foreshore route; however, has a slightly higher likelihood for Aboriginal occupation, due to the high number of middens along the foreshore and that the AHIMS sites in the area are closer to this route option. Whereas the Ruttleys Road route is located further back from the foreshore and is located further away from the AHIMS sites identified.

7.5 Conclusion

This due diligence assessment provided a high level assessment of both route options and identified, that neither are likely to impact Aboriginal heritage. Although, due to its location and landforms present, there is a slightly higher likelihood for Aboriginal occupation along the foreshore route. Once the shared pathway option is identified a detailed due diligence survey of the route will require to be undertaken.

8. Ecological investigations

8.1 Introduction

A preliminary biodiversity assessment has been prepared for the Mannering Park Shared Pathway Feasibility study to assess the potential for impacts of each pathway option on ecological values. This assessment provides a brief overview of potential ecological constraints with particular emphasis on threatened ecological communities, populations and species listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act) and Matters of National Environmental Significance listed under the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

8.2 Methods

8.2.1 Threatened biota database searches

A desktop assessment was undertaken to identify threatened flora and fauna species, populations and ecological communities listed under the TSC Act and FM Act, and MNES listed under the EPBC Act that may be affected by the proposal. Database records pertaining to the proposal area and locality (i.e. within a 10 km radius of the proposal area) were reviewed prior to a field assessment of each of the options. The following databases were queried:

- The Commonwealth Department of the Environment and Energy (DEE) Protected Matters Search Tool (PMST), for all MNES online database selected for a 10 km radius of the scheme envelope (DEE, 2016a)
- DEE online species profiles and threats database (DEE 2016b)
- Office of Environment and Heritage (OEH) Wildlife Atlas database (licensed) for records of threatened species, populations and threatened ecological communities listed under the TSC Act that have been recorded within the locality (OEH 2016a)
- OEH threatened biota profiles for descriptions of the distribution and habitat requirements of threatened biota (OEH 2016b)

8.2.2 Field assessment

The habitat requirements for threatened biota predicted to occur by the desktop assessment were identified prior to the field survey. Those requirements were then compared with those habitats present within the proposal area during the field survey and an assessment of the likelihood of occurrence was completed based on consideration of known distributions, previous records in the locality and habitat requirements for each species. Opportunistic searches for threatened species in areas of suitable habitat were conducted during the field assessment.

The timing and intensity of field surveys were unsuitable for the detection/identification of the majority of threatened biota previously recorded or predicted to occur within 10 km of the proposal area. As such, the survey was not designed to detect all species, rather to provide an overall assessment of the ecological values within the proposal area in order to predict potential impacts of each of the pathway options.

8.3 Results

8.3.1 Threatened biota database searches

State listed threatened biota

Database searches identified sixteen EECs within the locality of the proposal area (listed under the TSC Act). Three of these have a moderate to high likelihood of occurrence within the proposal area and one of these was confirmed to be present along the foreshore during field surveys; *Swamp Oak Floodplain Forest EEC*.

Database searches identified eight threatened flora species, previously recorded or predicted to occur within the locality of the proposal area (listed under the TSC Act). All of these species are considered to have the potential to occur within the proposal area, based on the presence of suitable habitat. One species; *Angophora inopina* (Charmhaven Apple) was identified during the field surveys.

Database searches identified 47 threatened fauna species comprising 33 birds, 12 mammals, one frog and one reptile), which potentially occur in the locality of the proposal area (listed under the TSC Act). Of these, 16 species were considered to have the potential to occur within the proposal area (seven birds, eight mammals and one frog), based on the presence of suitable habitat. Two threatened bird species; Little Lorikeet (*Glossopsitta pusilla*) and Varied Sittella (*Daphoenositta chrysoptera*), were also confirmed to be present within the proposal area during field surveys.

Matters of national environmental significance

Database searches identified two threatened ecological communities (TECs), 18 threatened flora species and 54 threatened fauna species (34 birds, 10 mammals, five frogs and five reptiles) (listed under the EPBC ACT) as potentially occurring in the locality of the proposal area. Of these, twelve threatened flora species and four threatened fauna species (one bird and three mammals) are considered to have the potential to occur within the proposal area, based on the presence of suitable habitat, previous records or known occurrences within the proposal area.

8.3.2 Field assessment

A summary of the ecological values identified within each of the shared pathway options is presented in Table 8-1 and Table 8-2 below.

Table 8-1 Ecological assessment summary for Ruttleys Road route

Ruttleys Road Route	
Vegetation Communities	Exotic Grassland (adjacent to the roadside) Coastal Plains Scribbly Gum Woodland Coastal Plains Smooth-barked Apple Woodland Coastal Wet Sand Cyperoid Heath None of the above listed vegetation communities are Endangered Ecological Communities (EECs) listed under the TSC Act or the EPBC Act
Requirement for Vegetation Clearing	The majority of the route of the proposed pathway occurs adjacent to Ruttleys Road, where little to no vegetation clearing would be required. Vegetation clearing would be required at the southern portion of the route on the western side of Chain Valley Bay. This vegetation consists of mainly Coastal Plains Scribbly Gum Woodland and Coastal Wet Sand Cyperoid Heath.
Potential Threatened Flora	One threatened flora species was identified during the surveys; Angophora inopina (Charmhaven Apple). Large numbers of this species occur in the Coastal Plains Scribbly Gum Woodland and Coastal Wet Sand Cyperoid Heath, which would require clearing for the pathway. This vegetation is also habitat for the following threatened flora species: • Rutidosis heterogama (Heath Wrinklewort) • Tetratheca Juncea (Black-eyed Susan) • Acacia bynoeana (Bynoe's Wattle) • Cryptostylis hunteriana (Leafless Tongue Orchid) • Diuris praecox (Newcastle Doubletail) • Genoplesium insigne (Variable Midge Orchid) • Thelymitra adorata (Wyong Sun Orchid) • Grevillea parviflora (Small-flowered Grevillea) • Angophora inopina (Charmhaven Apple) • Eucalyptus camfieldii (Camfield's Stringbark) It is also important to recognise that Rutidosis heterogama (Heath Wrinklewort), Diuris praecox (Newcastle Doubletail), Genoplesium insigne (Variable Midge Orchid) and Thelymitra adorata (Wyong Sun Orchid) also have the potential to occur in disturbed habitats such as managed roadside verges.

Ruttleys Road Route	
Potential Threatened Fauna	No threatened fauna species were identified during the field surveys. Habitat was identified for a large number of threatened fauna species including the following: • Crinia tinnula (Wallum Froglet) • Uperoleia mahonyi (Mahony's Toadlet) • Calyptorhynchus lathami (Glossy Black-Cockatoo) • Glossopsitta pusilla (Little Lorikeet) • Lathamus discolour (Swift Parrot) • Ninox strenua (Powerful Owl) • Tyto novaehollandiae (Masked Owl) • Daphoenositta chrysoptera (Varied Sittella) • Petaurus norfolcensis (Squirrel Glider) • Pteropus poliocephalus (Grey-headed Flying-fox) • Mormopterus norfolkensis (Eastern Freetail Bat) • Miniopterus australis (Little Bentwing-bat) • Miniopterus schreibersii oceanensis (Eastern Bentwing-bat) • Myotis macropus (Southern Myotis) • Scoteanax rueppellii (Greater Broad-nosed Bat) • Pseudomys novaehollandiae (New Holland Mouse)
Important Habitat Features	The native vegetation, that would require clearing for the Ruttleys Road pathway option, contains low-lying wet areas that is considered to be suitable habitat for amphibian species including the threatened species; Crinia tinnula (Wallum Froglet). This vegetation also contains hollow bearing trees that may be important habitat for nesting birds such as Glossopsitta pusilla (Little Lorikeet) and arboreal mammals such as Petaurus norfolcensis (Squirrel Glider).

Ruttleys Road Route

Recommendations

The following measures should be implemented to reduce impacts to local flora and fauna species.

A biodiversity assessment as part of a Review of Environmental Factors (REF) for the Ruttleys Road pathway option would require targeted surveys for the above listed threatened flora and fauna species. It is also important to note that the detectability of many of the threatened orchid species predicted to occur in the locality are only detectible during their flowering periods, which are generally short in duration. For example, Diuris praecox tends to flower from July to August, while Cryptostylis hunteriana flowers in December. Separate surveys for these species would be required as part of a biodiversity assessment.

To reduce the potential for impacts to threatened biota, the design of the pathway at the southern portion (i.e. through native vegetation) should be determined following a biodiversity assessment. This may allow the implementation of avoidance measures of populations of threatened flora and important fauna habitat features. For example, large densities of Angophora inopina (Charmhaven Apple) were identified in this habitat.

Options such as a boardwalk design should be considered in low-lying areas to maintain current hydrological regimes and to reduce impacts to aquatic habitat for threatened fauna species such as Crinia tinnula (Wallum Froglet).

Table 8-2 Ecological assessment summary for foreshore route

Foreshore route	
Vegetation Communities	Exotic Grassland (adjacent to existing pathway and roadsides) Swamp Oak Floodplain Forest EEC Swamp Oak Floodplain Forest is listed under Schedule 1 of the TSC Act. There is also potential for some areas of this vegetation to be commensurate with River Flat Eucalypt Forest EEC and or Swamp Sclerophyll Forest EEC. These communities are also listed under the TSC Act.
Vegetation Clearing Required	The majority of the northern portion of the route of the proposed pathway occurs along the foreshore where vegetation clearing would be required. This vegetation consists mainly of Swamp Oak Floodplain Forest EEC. The vegetation along Koorala Avenue and Tall Timber's Road consists mainly of Exotic Grassland vegetation.
Potential Threatened Flora	No threatened flora species were identified during the surveys. The vegetation that would require removal along the foreshore contains suitable habitat for threatened flora species such as Melaleuca biconvexa (Biconvex Paperbark).
Potential Threatened Fauna	Two threatened fauna species were identified during the field surveys: Glossopsitta pusilla (Little Lorikeet) and Daphoenositta chrysoptera (Varied Sittella). Both of these species were observed foraging within Swamp Oak Forest EEC vegetation along the foreshore. Habitat was also identified for a number of threatened fauna species including the following: • Uperoleia mahonyi (Mahony's Toadlet) • Calyptorhynchus lathami (Glossy Black-Cockatoo) • Lathamus discolour (Swift Parrot) • Ninox strenua (Powerful Owl) • Tyto novaehollandiae (Masked Owl) • Petaurus norfolcensis (Squirrel Glider) • Pteropus poliocephalus (Grey-headed Flying-fox) • Mormopterus norfolkensis (Eastern Freetail Bat) • Miniopterus australis (Little Bentwing-bat) • Miniopterus schreibersii oceanensis (Eastern Bentwing-bat) • Myotis macropus (Southern Myotis) • Scoteanax rueppellii (Greater Broad-nosed Bat)
Habitat Features	The vegetation to be cleared contains low-lying wet areas that would be habitat for amphibian species including the threatened amphibian species: Uperoleia mahonyi (Mahony's Toadlet). The vegetation also contains hollow bearing trees that may be important habitat for nesting birds such as Glossopsitta pusilla (Little Lorikeet) or arboreal mammals such as Petaurus norfolcensis (Squirrel Glider).

Foreshore route
Recommendations
The following measures should be implemented to reduce impacts to local flora and fauna species. A biodiversity assessment as part of a Review of Environmental Factors (REF) for the Foreshore pathway option would require targeted surveys for the above listed threatened flora and fauna species. To reduce the potential for impacts to threatened biota, the design of the pathway along the foreshore (i.e. through native vegetation) should be determined following the biodiversity assessment. This may allow the avoidance of threatened populations of species and important habitat features to be avoided. For example, populations of Melaleuca biconvexa (Biconvex Paperbark) may occur in the area to be cleared. Options such as boardwalks should be considered in low-lying areas through Swamp oak Forest to reduce impacts to aquatic habitats which are important habitat for fauna species and may contain habitat for Uperoleia mahonyi (Mahony's Toadlet).

8.4 Summary

This preliminary biodiversity assessment has determined that both of the proposed options for the Mannering Park shared pathway would result in similar direct impacts to ecological values within the locality. A summary of potential impacts is presented below for each of the options.

8.4.1 Ruttleys Road route

- Clearing of native vegetation
- Removal of habitat for threatened flora and fauna species
- Habitat fragmentation
- Edge effects (potential for weed encroachment)
- Potential for soil and water pollution during the construction phase
- Potential for alteration to surface water flows

8.4.2 Foreshore route

- Clearing of native vegetation
- Removal of vegetation commensurate with Swamp oak Floodplain Forest EEC
- Removal of habitat for threatened flora and fauna species
- Habitat fragmentation
- Edge effects (potential for weed encroachment)
- Soil and water pollution during the construction phase
- Alteration to surface water flows

8.4.3 Proposed methods for REF

A biodiversity assessment as part of an REF for either of the routes would include the following:

- Detailed field surveys including collection of flora quadrat data, vegetation structure data, assessment of vegetation condition and weed cover
- Identification and mapping of significant fauna habitat including but not limited to, hollow bearing trees, waterbodies and areas containing large woody debris
- Targeted surveys for relevant threatened species recorded within the locality
- Mapping and assessing vegetation types within the study area
- Further determination if any of the vegetation types present correspond to an EEC listed under either the TSC or EPBC Acts
- Assessment of the likelihood of occurrence of threatened species or EECs within the study area
- Assessing the significance of impacts on threatened biota listed under the TSC Act and EPBC Act according to published guidelines
- Assessing the significance of impacts on MNES and determining whether the proposal needs to be referred to the DotE for determination
- Identifying suitable mitigation measures for impacts on biodiversity values

Earlier this year, the NSW Government released its proposed Biodiversity Conservation Reform Package including two draft bills to replace long-standing pieces of environmental legislation, including the *Threatened Species Conservation Act 1995*.

After a period of public consultation, the *Biodiversity Conservation Act 2016 (BC Act)* and *Local Land Services Amendment Act 2016* were assented to on 23 November 2016 and are scheduled to commence in mid-2017.

Where proposed development or clearing has an impact on biodiversity values above a certain threshold (BOS Threshold), a biodiversity development assessment report (BDAR) will be required to be prepared by accredited assessors.

Given that both of the route options would include clearing of vegetation and removal of habitat for threatened species, a biodiversity development assessment report (BDAR), may also be required depending on the outcome of a biodiversity assessment.

9. Contamination

9.1 Introduction

9.1.1 Objectives

The objectives of the preliminary site investigation (PSI) were to:

- Identify the potential for contamination to be present (historical and current) associated with the areas proposed for the construction of the shared pathway
- Assess the potential risk to human health and/or the environment from any contamination that may be disturbed as part of the project

9.1.2 Scope of work

The scope of works included the following:

- A review of the following desktop information sources:
  - A review of historical aerial photographs covering the proposed routes
  - Council information, including the Local Environment Plan (LEP) and land zoning maps
  - NSW Environment Protection Authority (EPA) notices under the *Contaminated Land Management Act 1997* (CLM Act) and licences held under the provisions of the *Protection of the Environment Operations Act 1997* (POEO Act)
  - Published geology, hydrogeology, hydrology and topography records including a search of the Department of Primary Industries (DPI) Office of Water PINEEA groundwater bore database
- A site inspection to gain an understanding of current site conditions, the surrounding built and natural environment and how these influence the potential for site contamination and identify areas of potential environmental concern
- Preparation of this report with reference to the Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011) detailing the results of the PSI, discussions and conclusions with respect to the requirement for further investigation (if required)

9.1.3 Guidelines

Guidelines that were referenced and used for this PSI are listed as follows:

- NEPC 2013, National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999. National Environment Protection Council, as amended in May 2013
- NSW DEC 2006, Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd edition
- NSW OEH 2011, Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites

9.2 Site identification

A summary of the site identification details are provided in Table 9-1.

Table 9-1 Site identification summary

Information	Ruttleys Road Route	Foreshore Route
Street Address	Ruttleys Road, Vale Road and Griffith Street, Mannering Park, NSW	Tall Timbers Road and Chain Valley Bay Foreshore, Mannering Park, NSW
Lot and DP number	Generally located within designated road reserves with the exception of the southern portion which passes through Lots 475, 484, 483 and 481 DP755266	Pathway will impact on lot 76 DP 31322, Lot 7339 DP1167067, Lot 1, 2 and 3 DP 1198253 as well as the Tall Timbers Road reserve
Proposed Pathway Design	Total length: 5 km On road length: 3.3 km Off road length: 2 km Road crossings: 1	Total length: 3.9 km On road length: 1.5 km Off road length: 2.4 km Potential bridges: 2
Local Government Area (LGA)	Central Coast Council	Central Coast Council
Land Use Zoning	Under the Wyong Local Environmental Plan 2013 (LEP) the land is zoned SP2 Electricity Generating Works, RU6 Transition and E2 Environmental Conservation	Under the Wyong Local Environmental Plan 2013 (LEP) the land is zoned RE1 Public Recreation and E2 Environmental Conservation
Current Land Use	Road corridor (Griffith Street, Vales Road and Ruttleys Road), bushland and power line easement	Road corridor (Tall Timbers Road) and undeveloped bushland and waterfront lots adjacent to Lake Macquarie
Proposed Land Use	Shared pathway	Shared pathway

9.3 Site inspection

David Morrison (GHD) completed a site inspection on 5 June 2017. The main sources of potential contamination are shown in Table 9-2 below. The main areas of concern were observed within the southern portion of the Ruttleys Road route between the portion north of the Aero Club and Tall Timbers Road where illegal dumping has occurred.

Table 9-2 Site inspection summary

Items	Ruttleys Road Route	Foreshore Route
Site conditions	Site Use: Pathway proposed within the road corridor. Single lane two-way road with mainly bush land bordering both sides. Road in generally good condition.	Site Use: Pathway proposed within the road corridor of Tall Timbers Road, a single lane two way road in overall good condition, with bushland and low density residential areas bordering both sides.
Surrounding land use	North: Residential land located immediately north of Griffith street.	North: Residential land located immediately north of Griffith street.
	South, East and west: Road reserve including undeveloped bush land and power stations.	South: Undeveloped bushland and a low density residential area branching off Main St, Doyalson North. East: To the east of the Foreshore area is Lake Macquarie and surrounding bushland. Kingfisher Shores housing estate lies to the south east of the route. West: Features to the west of the route include bushland, the Chain Valley Colliery, a small low density residential area north west of Kingfisher Reserve and the Vales Point Power Station.
Ground Surface and Site Drainage	Surface Cover: The roads are bitumen covered, observed to be in a fair condition with minimal cracking with no significant staining noted.	Surface Cover: The roads are bitumen covered, observed to be in a fair condition with minimal cracking with no significant staining noted.
	Vegetation: The areas either side of the road are mainly undeveloped bush land with various tree and shrub species noted. Vegetation was observed to be in a healthy condition with no signs of stress observed.	Vegetation: Vegetation within the areas either side of the road mostly comprise of bush land with various tree and shrub species noted. Vegetation was observed to be in a healthy condition with no signs of stress observed.
	Site Drainage: Site drainage for the site and surrounding area (including Lake Macquarie) has been influenced by land clearing and industrial land use. It is assumed that surface water run off would flow towards the lake, consistent with the site	Site Drainage: Site drainage across the Foreshore Route and surrounding area (including Lake Macquarie) has been influenced by land clearing and industrial land use. It is assumed that surface water run off would flow towards the lake, consistent with the site topography. Surface water on sealed areas of the path would be expected to run off into stormwater drains that ultimately flow

Items	Ruttleys Road Route	Foreshore Route
	topography. Surface water on sealed areas of the site would be expected to run off into stormwater drains that ultimately flow to Lake Macquarie. Surface water on non sealed areas would be expected to infiltrate into the surface soils	to Lake Macquarie. Surface water on non sealed areas would be expected to infiltrate into the surface soils
Potentially Contaminating Activities	Litter: Minor rubbish (plastic and paper debris) was observed intermittently along the road reserves. As shown in Photos 32-34, illegal dumping was observed to the east of the Aero Club and within the TransGrid easement. This may have resulted in localised contamination within the bushland where dumping occurred.	Litter: Minor rubbish (plastic and paper debris) was observed intermittently along the road reserves.
	Fill: There was potential for fill materials (most likely cut form local sources) to have been used during road construction. However, significant areas of fill were not observed. Due to the close proximity of the Chain Valley Colliery and the Vale Point Power Station, there is low potential for ash and coal chitter fill to be present, particularly along the Ruttleys Road Route.	Fill: There was potential for fill materials (most likely cut form local sources) to have been used during road construction. However, significant areas of fill were not observed. Due to the close proximity of the Chain Valley Colliery and the Vale Point Power Station, there is low potential for ash and coal chitter fill to be present.
	Potential Asbestos Containing Material (ACM): No potential ACM was observed during the site inspection. However, there is a potential for ACM to be present in areas where illegal dumping has occurred.	Potential Asbestos Containing Material (ACM): No potential ACM was observed during the site inspection. However, there is a potential for ACM to be present in areas where illegal dumping has occurred.

Photo 32 Unidentified waste east of Aero Club (conveyor belt)

Photo 33 Deposited car within TransGrid easement

Photo 34 Turning area within TransGrid Easement – potential fill

9.4 Environmental setting

9.4.1 Topography

The Ruttleys Road route is located at approximately 20 m Australian Height Datum (AHD) and the Foreshore Route is approximately 5 m AHD (Source http://maps.six.nsw.gov.au/ viewed 16 June 2017). Both routes were observed to be relatively flat with a slight slope north and east toward Lake Macquarie.

9.4.2 Soil landscape and geology

As noted in Section 6.2, the Ruttleys Road route is expected to be underlain by 'Doyalson' landscape erosional soils of residual origin along the majority of the proposed pathway route. Small pockets of alluvial soil of the 'Wyong' soil landscape are anticipated near the northern and southern extents of the Ruttleys pathway alignment.

The proposed Foreshore route is expected to traverse through the 'Doyalson' and 'Wyong' soil landscapes, in addition to small areas of 'Disturbed' soil landscapes comprising fill material.

As noted in Section 6.2 soil landscapes are predominantly underlain by the Early Triassic Munmorah Conglomerate of the Narrabeen Group and Clifton Subgroup. The Munmorah Conglomerate typically comprises conglomerate, pebbly sandstone and shale.

A small pocket of Quaternary Alluvium, typically comprising gravel and sand, is expected near the southern extent of the proposed Foreshore route.

9.4.3 Acid Sulfate Soils

As noted in Section 6.2 there are areas of probable occurrences of ASS materials within the soil profile. Low and high probabilities of occurrence of ASS materials are shown primarily along the eastern coastline.

Depths to ASS materials in areas of high probability are likely within one metre of the ground surface. Depths to ASS materials in areas of low probability are likely between one and three metres below the ground surface.

9.4.4 Hydrology

The route options are located within the Lake Macquarie Catchment and as such the regional hydrology of the area is expected to drain into Lake Macquarie.

Surface water on sealed areas would be expected to run off into stormwater drains that ultimately flow to Lake Macquarie. For non-sealed areas, it is assumed that surface water would infiltrate into the surrounding surface soils.

9.4.5 Hydrogeology

A review of existing groundwater borehole records using the Department of Primary Industries Office of Water database was completed on the 14 June 2017. The search was conducted to identify registered groundwater boreholes in close proximity to the proposed pathways and to record information such as groundwater use and standing water level. Four registered groundwater bores as documented in Table 9-3 were located within 500 m of the either proposed route.

Table 9-3 Groundwater Borehole Information

Well ID	Approximate Location from Proposed Ruttleys Route (m)	Approximate Location form Proposed Foreshore Route (m)	Easting	Northing	SWL (mbgl)	Intended Purpose
GW080830	422	495	363757	6330850	-	Test Bore
GW34560	330	300	364130	6330883	5.50	Domestic
GW202840	500	-	363573	6330859	2.0	Monitoring Bore
GW011915	340	-	363007	6329604	-	Stock

These locations are shown in Figure 9-1 below.

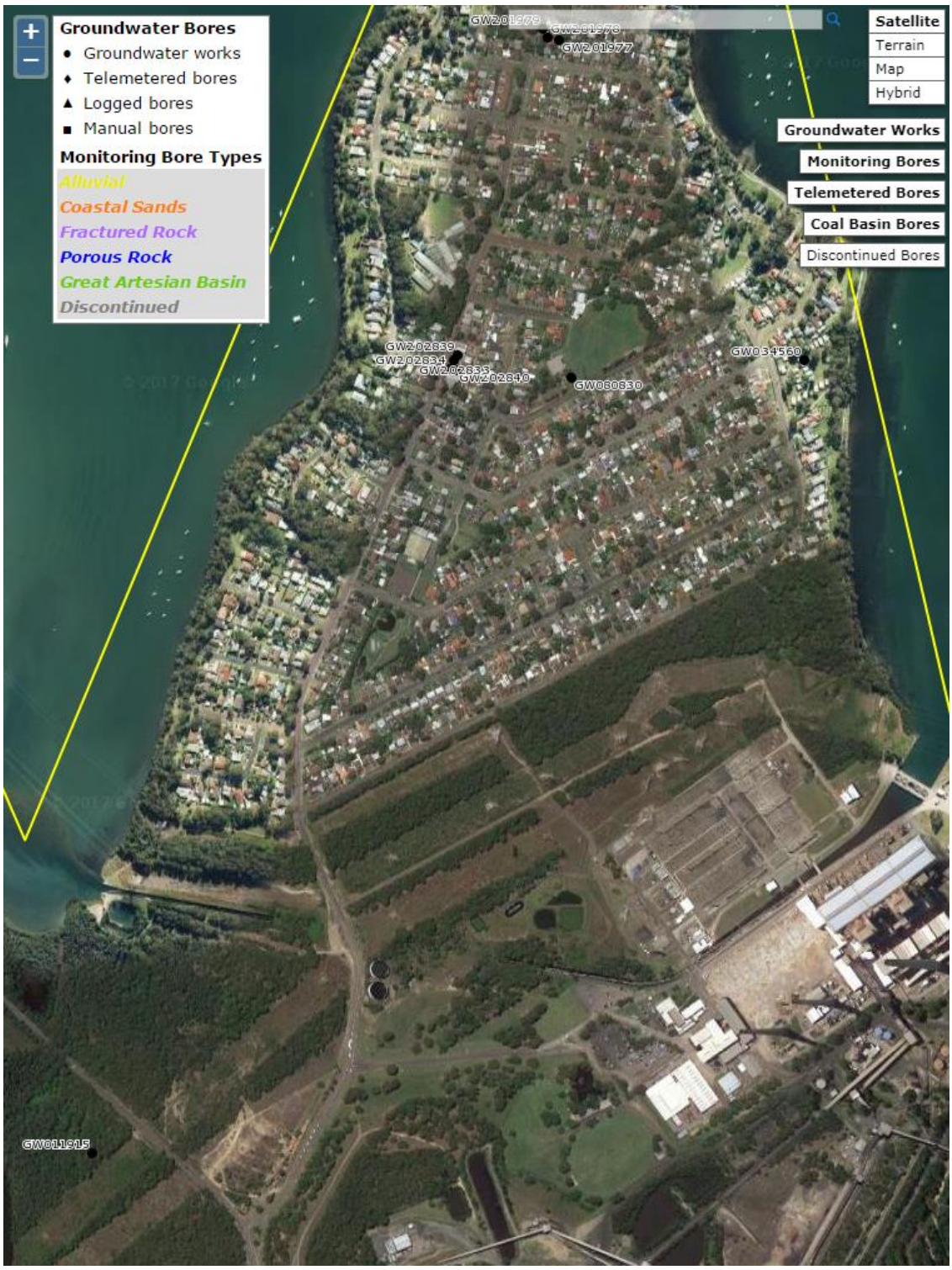


Figure 9-1 Location of Groundwater Bores within close proximity of the proposed pathways

Source: (http://allwaterdata.water.nsw.gov.au/water.stm)

Based on the information available for the area, groundwater within the routes would be expected to be greater than 2 m below ground level (mbgl).

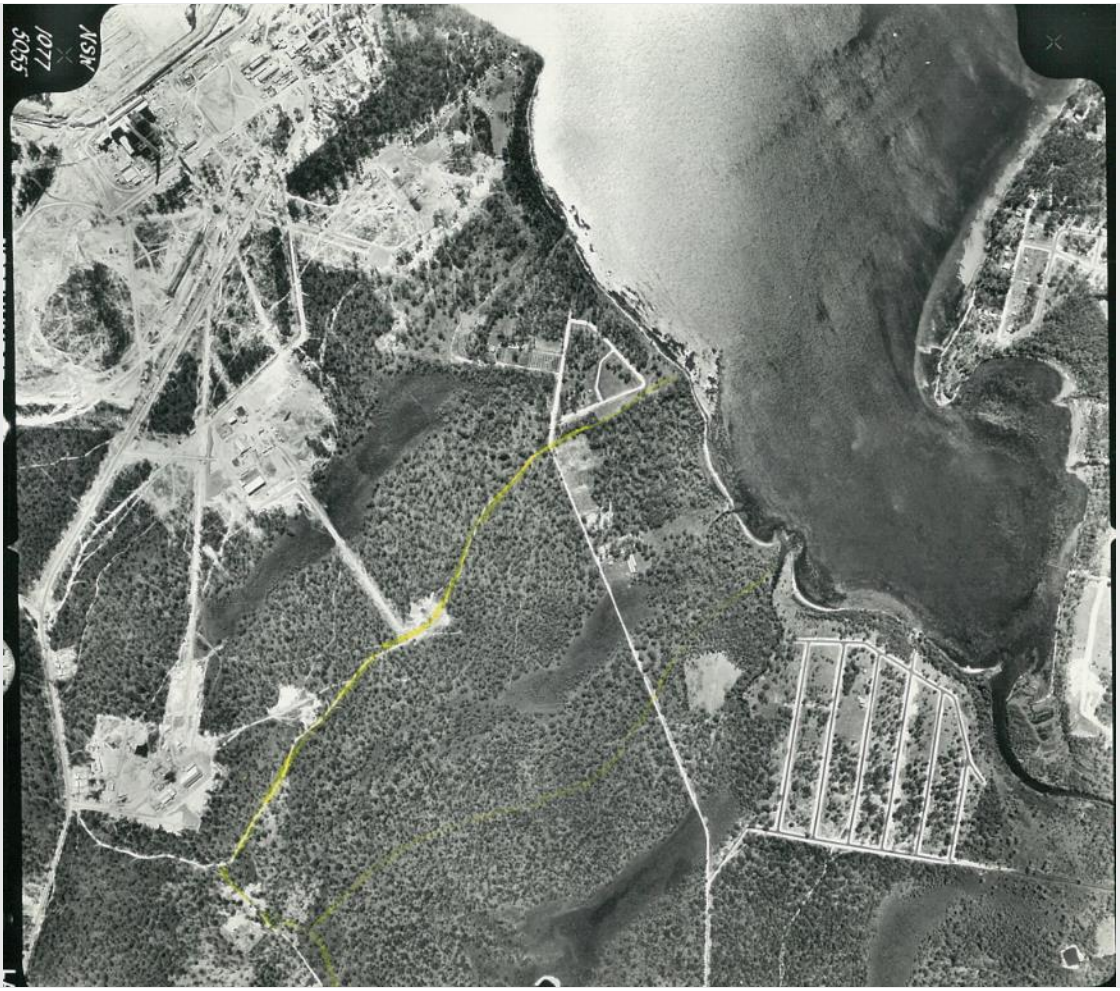
9.4.6 Site history

Historical aerial photographs

A selection of available historical aerial photographs were examined in order to assess past activities and land uses for the proposed pathway routes. Photographs (provided by Council) were examined from the years 1961, 1979 and 1991. Google Earth images were also examined from 2005, 2010 and 2015 (viewed 16 June 2017).

A summary of the information gained from the review of historical aerial photography for the pathway routes and their surrounds is provided below in Table 9-4.

Table 9-4 Review of historical aerial photographs

23 September 1961. NSW 1077 5055 Run 13. Black and White. Scale unknown.	
	
Ruttleys Road Route Vales Point Power Station and Chain Valley Colliery are visible to the north. This historical aerial does not show the area encompassing the northern part of the proposed pathway. A road connecting the power station and Ruttleys Road is visible. The southern part of Ruttleys Road is visible and is surrounded by undeveloped bushland. The unsealed road that forms part of the southern portion of the pathway is visible to the south of the colliery. Tall Timbers Road is apparent in the east however the remaining land between the unsealed road ad Tall Timbers Road is undeveloped bushland.	Foreshore Route Tall Timbers Road is visible and the area surrounding this road remains largely undeveloped in the south. Karoola Avenue and the residential area in Kingfisher Shores is visible however no buildings are apparent. Lake Macquarie borders the route to the east, and the foreshore is undeveloped. This historical aerial does not show the area encompassing the northern part of the Foreshore pathway. Vales Point Power Station and Chain Valley Colliery are visible to the west.

9 July 1979. NSW 2788 152 Run 21. Black and White. Scale 1:16,000

Ruttleys Road Route

Ruttleys Road is visible in its current configuration between the southern portion and Mannering Park. The land immediately adjacent to the road corridor generally consists of access and infrastructure associated with the colliery and power station.

Further industrial development has occurred at the Vales Point Power Station with additional structures and a large coal stockpile is visible immediately east of Ruttleys Road.

In the southern portion of the route there has been land clearing and disturbance in the area between the unsealed road and Tall Timbers Road, likely associated with mining activities.

Foreshore Route

The foreshore route appears mostly unchanged from the previous aerial photograph with the exception of increased residential development evident in the north, Kingfisher Shores and south in Chain Valley Bay.

9 December 1991. NSW 3535-3548 Run 5. Colour. Scale 1:16,000.

Foreshore Route

The northern part of the proposed pathway is not visible in this aerial photograph.

Further residential development at Kingfisher Shores and Chain Valley Bay has occurred. The surrounding area remains mostly unchanged from the previous aerial image.

A sewage treatment plant has been constructed on the western side of Tall timbers Road, opposite the Kingfisher Shores residential area.

1991. NSW Colour. Scale Unknown Supplied by CCC

Ruttleys Road Route- Northern Section

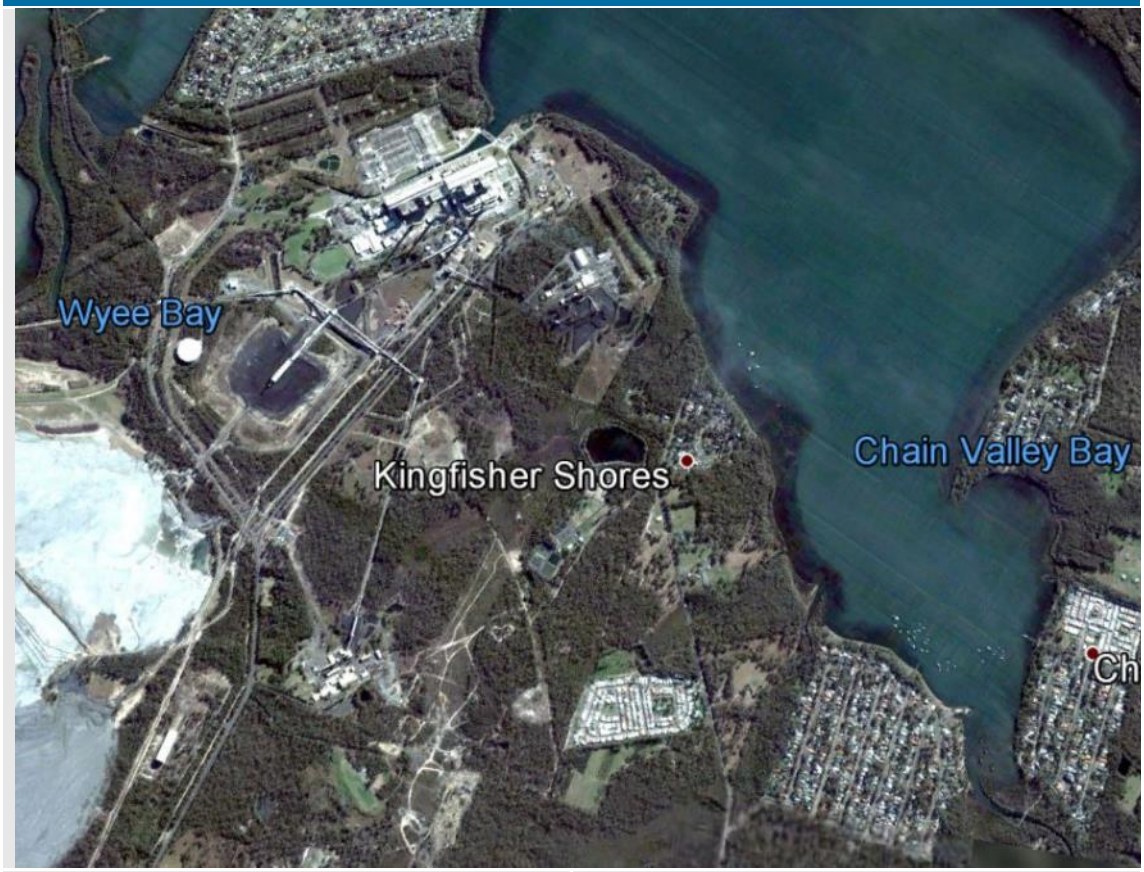
Ruttleys Road and surrounds appear similar to the previous photograph. It is noted that the far northern section of this route is not visible.

1991. NSW Colour. Scale Unknown Supplied by CCC

Ruttleys Road Route- Southern Section

The eastern portion of the route is not visible on this photograph. The southern portion of Ruttleys Roads and surrounds appear similar to the previous photograph with the exception of additional land clearing south of the coal mine.

20 May 2005 Scale Unknown



Ruttleys Road Route

Ruttleys Road is present in its current configuration in relation to the proposed pathway.

There is increased residential development to the north (Mannering Park) and to the north of Griffith Street.

The Vales Point Power Station and coal mine remain to the east of Ruttleys Road. To the west is an ash dam associated with the power station.

In the southern portion of the pathway, the Aero Club is now apparent and formerly disturbed areas of ground are now rehabilitated.

Foreshore Route

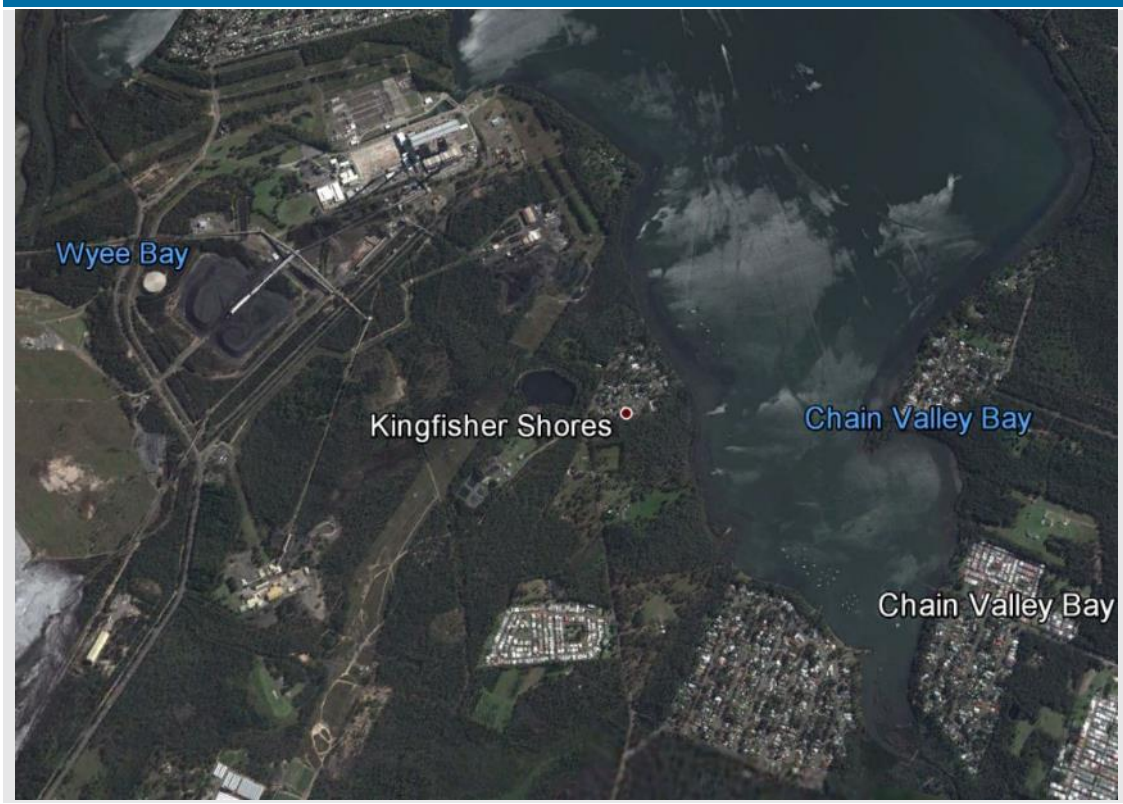
Tall Timbers Road and Karoola Avenue area present in their current configuration in relation to the proposed pathway.

Lake Macquarie borders the proposed track on the eastern boundary with increased development along the foreshore.

2 December 2010 Scale Unknown

Ruttleys Road Route	Foreshore Route
Ruttleys Road remains in its current configuration and the surrounding land use is predominantly unchanged with the exception of some rehabilitation of land west of Ruttleys Road and the presence of an orchard in the south eastern portion of the route.	The surrounding land use is predominantly unchanged with the exception of increased development at Kingfisher Shores and along the foreshore.

4 December 2015 Scale Unknown



Ruttleys Road Route	Foreshore Route
The route and surrounding land use remain predominantly unchanged.	The route and surrounding land use remain predominantly unchanged.

In summary, the existing areas surrounding both proposed routes for the shared pathways have remained predominantly unchanged since 1991. The main land uses around the pathways consisting of industrial land (coal mining and power station), residential land and undeveloped bushland.

9.4.7 Previous investigations

No previous investigations relevant to the proposed pathways were provided by Council for review.

9.4.8 Wyong Shire Council Local environment plan (LEP)

The site is located in the local government area of Central Coast Council (formally Wyong Shire Council) as proclaimed in August 2016. In accordance with the Wyong LEP 2013, the Ruttleys Road route is zoned as SP2 Electricity Generating Works, RU6 Transition and E2 Environmental Conservation. The Foreshore Route crosses zones RE1 Public Recreation and E2 Environmental Conservation land use zones.

Both pathway options are within areas identified as ‘environmentally sensitive land’ under the LEP.

9.4.9 NSW Environment Protection Authority

A search of the datasets maintained by NSW EPA including notices under the CLM Act and POEO Environment Protection License Register was completed. The search results are summarised below.

Contaminated sites register

A site will be on the Contaminated Land: Record of Notices only if the EPA has issued a regulatory notice in relation to the site under the CLM Act.

No contaminated land records were listed for any sites within a one kilometre radius of the proposed pathways.

List of NSW contaminated sites notified to EPA

The sites appearing on the EPA "List of NSW contaminated sites notified to the EPA" indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review information before it can make a determination as to whether the site warrants regulation.

The search identified three listings within the locality of Mannering Park:

- Mannering Colliery (formerly Wyee) – Ruttleys Road – Under Assessment. Located 180 m north of the southern portion of the Ruttleys Road Route and 200 m east of the western portion of the Ruttleys Road Route
- Parkview General Store (former service station) – 2 Vales Road Mannering Park – Under Assessment. Located 1 km from the northern portion of the Ruttleys Road Route
- Mannering Park Mini Mart – 70 Vales Road Mannering Park – Under Assessment. Located 517 m from the northern portion of the Ruttleys Road Route. There is a small service station operating on site
- Shell Coles Express Service Station – 260-270 Pacific Highway, Doyalson North. Located 895 m south of the southern boundary of the Ruttleys Road Route

Given the distance and location of these sites from the proposed routes, the likelihood of significant contamination impacting the proposed routes is considered to be low.

POEO licence register

The POEO register identifies premises that are licensed for certain activities under the POEO Act. Information of particular relevance to this assessment, which are listed on the Register, includes site location, activity type, relevant clean up notice and non-compliance information. Each licence provides information on potential point and non-point sources of soil and groundwater contamination that may be generated on-site through standard operations, accidental spills and leaks.

A search of the register identified three POEO registered premises within a one kilometre radius of the proposed pathways:

- Adelaide Brighton Cement Limited – Morgan Ash, Construction Road Mannering Park. This facility appears to be located within the Vales Point Power Station and comprises cement and lime handling facilities.

- Delta Electricity Vales Point Power Station and Coal Unloader – Vales Point Road Mannering Park. This facility is located 600 m south of the Ruttleys Road Route's northern boundary and 556 m from its western boundary. Additionally it lies within 150 m from the eastern portion of the Foreshore Route. It contains infrastructure such as a Sewage Treatment Plant, general chemical and petroleum product storage facilities, coal processing facilities as well as plant to energy recovery from general waste and generation of electricity from coal.
- LakeCoal Pty Ltd Chain Valley Colliery – Construction Road, Chain Valley Bay. Located 220 m from the western portion of Ruttleys Road Route and 180 m from the southern boundary of the Ruttleys Road Route. The site comprises coal mining and processing infrastructure.

Given the distance and location of these sites from the proposed routes, the likelihood of significant contamination impacting the proposed routes is considered to be low.

9.5 Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments and provides the framework for identifying contamination sources and how potential receptors may be exposed to contamination.

Based on the information collected as part of this investigation, the following preliminary CSM has been developed for the site.

9.5.1 Sources

The potential sources of contamination identified during the site inspection include:

- Migration of contamination from surrounding industrial areas (colliery, power station, sewage treatment plant and service stations)
- Potential use of fill materials for access tracks and roads
- Use of herbicides and pesticides
- potential run off and accumulation of residues such as bitumen coatings, fuels and oils from the adjoining road corridors
- Illegal dumping of waste materials and fill on site pathways

The primary pathways by which current and future receptors could be exposed to the potential sources of contamination are considered to be:

- Direct contact (including ingestion) with potentially contaminated soil
- Inhalation of potential contaminants in soil, if disturbed
- Migration of potential contaminants from soils to surface waters of nearby creeks, dams and Lake Macquarie
- Vertical and horizontal migration of potential contaminants within the groundwater

9.5.2 Receptors

When evaluating potential adverse health/environmental effects from exposure to a contaminated site, all potentially exposed populations should be considered.

Human health receptors

For the proposed pathway, the key human health receptors of interest are considered to include:

- Workers on site during construction of the proposed pathway
- Visitors to the site (e.g. local residents, recreational users)
- Local users of surface water or groundwater (domestic, irrigation, recreational etc.)

Environmental receptors

- Flora and fauna within the site and surrounding land (including Lake Macquarie and surrounding residential and bushland)
- Lake Macquarie
- Local drainage channels and surface water
- Groundwater beneath the site

9.6 Potential for contamination

Table 9-5 summarises the potential areas of environmental concern based on the results of the desk-top review and site inspection.

Table 9-5 Potential areas of environmental concern

Description	Rationale/detail	Potential contamination
General use of pesticides and herbicides	Use of pesticides or herbicides on the site for weed or insect control	Arsenic, OCPs and OPPs
Contaminated fill	Potential use of fill for access tracks and roads	Heavy Metals, TPH, BTEX, PAHs, PCBs OCPs, OPPs, phenols and asbestos
Road runoff	Runoff of residues such as bitumen coatings, fuel and oils	Heavy Metals, TPH, BTEX, phenols
Surrounding industrial areas	Migration of contamination from surrounding industrial areas	Heavy Metals, TPH, BTEX, PAHs, PCBs OCPs, OPPs, phenols and asbestos
Illegal dumping	Illegal dumping of waste materials	Heavy Metals, TPH, BTEX, PAHs, PCBs OCPs, OPPs, phenols and asbestos

TPH – Total Petroleum Hydrocarbons

PAH – Polycyclic Aromatic Hydrocarbons

OPP – Organophosphate Pesticides

BTEX – Benzene, Toluene, Ethyl-benzene and Xylenes.

OCP – Organochlorine Pesticides.

PCB – Polychlorinated biphenyls.

9.7 Further studies

Based on the investigations to date the following recommendations are provided:

- Further assessment of the soils likely to be disturbed as part of the pathway construction project. This investigation is recommended to be undertaken in conjunction with any planned geotechnical investigations.
- Preparation of a Detailed Site Investigation report with reference to the Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011) detailing the results of the soil investigations, discussions and conclusions with respect to the requirement for remediation or management (if required).

Any future site works should be undertaken under the guidance of a suitably qualified environmental consultant and be completed in general accordance with guidelines developed or endorsed by NSW EPA.

10. Social impacts

10.1 Crime prevention through environmental design

10.1.1 Introduction

Crime Prevention through Environmental Design (CPTED) is a crime prevention strategy that focuses on the planning, design and structure of cities and neighbourhoods.

CPTED seeks to influence the design of places by:

- Increasing the perception of risk to criminals by increasing the possibility of detection, challenge and capture
- Increasing the effort required to commit crime by increasing the time, energy or resources which need to be expended
- Reducing the potential rewards of crime by minimising, removing or concealing 'crime benefits
- Removing conditions that create confusion about required norms of behaviours

CPTED is based on four design concepts. They are:

- Surveillance
- Access Control
- Territorial reinforcement
- Space management/maintenance

10.1.2 Surveillance

Surveillance is about creating environments to keep intruders under observation. It aims to provide opportunities for people engaged in their normal daily business to observe the space around them. Natural surveillance means creating clear sightlines and maximising visibility.

Quality surveillance can be achieved or improved by considered the following design principles relevant to shared pathways:

- Pathway can be observed from nearby buildings or roads
- Attractive landscaping, with proper light and clear sight lines, is used to prevent offenders finding a place to hide or entrap victims

10.1.3 Access control

Access control is about decreasing opportunities for crime, by controlling access to a crime target and by creating a perception of risk to an offender. Physical and symbolic barriers can be used to attract or restrict the movement of people.

Effective access control can be achieved on the shared pathways by creating:

- Design pathways that direct pedestrians into target areas
- Public spaces which attract people into the area and discourage intruders

10.1.4 Territorial reinforcement

Territorial reinforcement is about clearly defining private space from semi-public and public space in order to create a sense of ownership. The created ownership shows that the owner has a vested interest in the location, which in turn challenges intruders.

Fences, pathways, signs, lighting and landscaping can be used to define public, semi-public and private space. Territorial reinforcement can be achieved on the shared pathways by:

- Design with a clear distinction between public and private spaces by using physical barriers (fences) and symbolic barrier (vegetation)
- Environmental markers (e.g. signage, lighting, bollards) which define intended use and ownership

10.1.5 Space management/maintenance

Space management involves the formal supervision, control and care of urban space. A well maintained urban environment is essential in sustaining confidence and helping to control vandalism, crime or fear of crime. Space management strategies include:

- Site cleanliness
- Vandal resistance materials and fixtures
- Well maintained infrastructure
- Rapid repair public infrastructure

10.1.6 CPTED Route Summary

The following checklists can be used to allow an assessment of each route to be considered, see Table 10-1 below.

Table 10-1 CPTED summary

Element		Foreshore Route	Comments	Ruttleys Road Route	Comments
Shared Pathways					
Safe pedestrian routes are adequately signed and lit after dark		✓	All path lighting may be designed in accordance with AS/NZS 1158.3.1:2005, Pedestrian area (category P) lighting – performance and design requirements.	✓	All path lighting may be designed in accordance with AS/NZS 1158.3.1:2005, Pedestrian area (category P) lighting – performance and design requirements.

Element		Foreshore Route	Comments	Ruttleys Road Route	Comments
Footpaths and walkways are visible from nearby residences/buildings, parking areas and the street		Griffiths St to Colliery Cottages (1000 m) Colliery Cottages (600 m)	Section between Mannering Park and Kingfisher Shores largely not visible to streets or houses. Cottages during site visit were all occupied.	Ruttleys Road to Tall Timbers Road (1700 m)	Section between Ruttleys Road and Tall Timbers road largely not visible to streets or houses
Sharp corners or sudden changes that reduce sign lines are avoided or modified		1 No.	Potentially within Kingfisher Park	3 No.	Intersection with Griffiths St and Vales Road Ruttleys Road onto Aero Club Road Intersection with Tall Timbers Road
Barriers along paths are visually permeable/see through where possible		Barrier locations Bridge crossings Vales Point Power station fenceline	NSW RTA Bicycle Guidelines, 2005 (section 8.3 Landscape design) to be incorporated into routes.	Safety barrier along Ruttleys Road. Potential barriers across TransGrid Easement and adjacent to orchard.	NSW RTA Bicycle Guidelines, 2005 (section 8.3 Landscape design) to be incorporated into routes.
Open and Public Space					
The area is designed to encourage natural surveillance		500 m	Furthest distance from road or house along route	850 m	Further distance from road or house along route

Element		Foreshore Route	Comments	Ruttleys Road Route	Comments
Signage is provided for easy identification of nearby amenities and help points		2 No. at connection points only	Signage to include both directional and informative information informing users of the direction and distance to key destinations and provide warning of changing conditions	7 No. – intersections or change in direction where signage required	Signage to include both directional and informative information informing users of the direction and distance to key destinations and provide warning of changing conditions

10.2 Pedestrian and bicycle safety

With regards to safety of the route the key issues are:

- Provides physical separation from vehicles
- Provides visual separation from vehicles
- Located on route with history of accidents

The RTA NSW Bicycle Guidelines provides advice when considering the type of cycle facility for urban roads. This advice is based on the existing Annual Average Daily Traffic (AADT) 85th percentile speed information. Where vehicle speeds and volumes are high it suggests separate cycle paths.

10.2.1 Vehicle accident history

Figure 10-1 below provides information on the crashes in a four year period from 2012 – 2016 which provides an indication of the type of accidents particularly along Vales Road and Ruttleys Road.

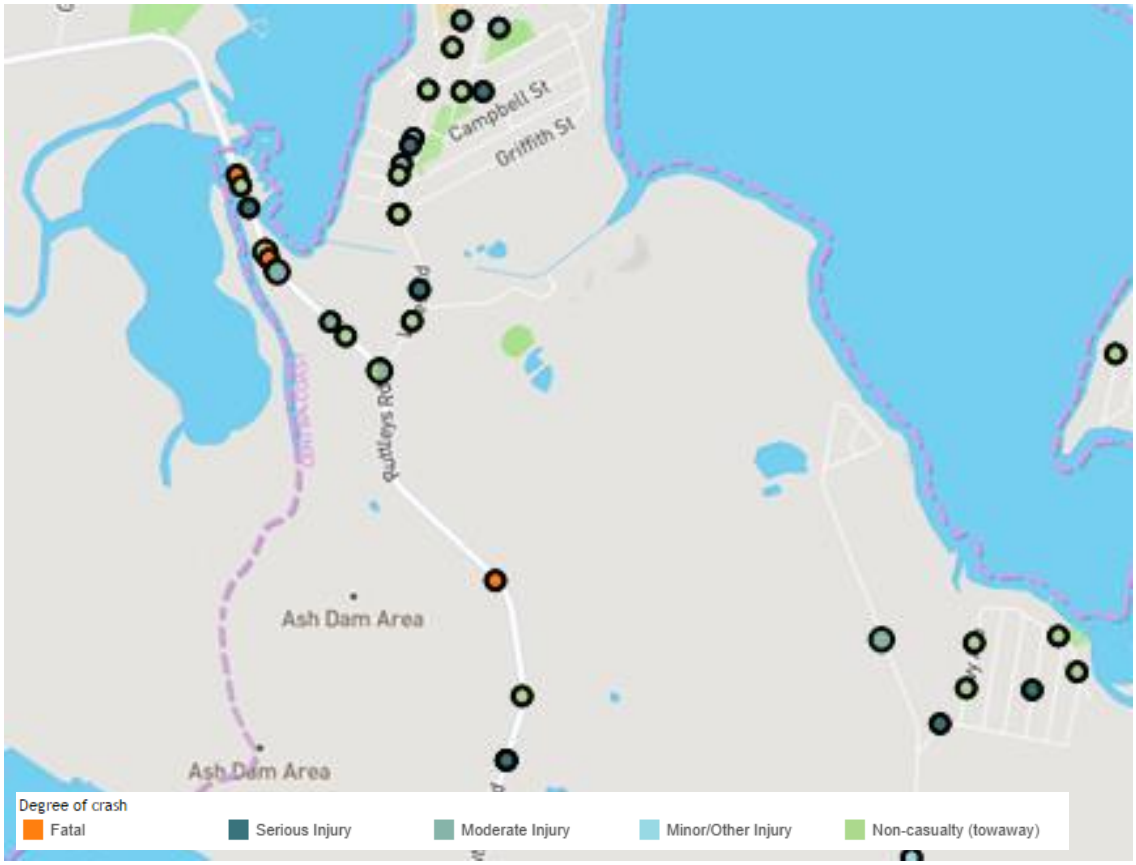


Figure 10-1 Crash Statistics in vicinity of routes

Source: (www.roadsafety.transport.nsw.gov.au)

The accidents on the route are detailed below in Table 10-2 running north to south from Griffith St to Ruttleys Road.

Table 10-2 Vehicle crash details

Year	Degree of Crash	Description	Location Type	Natural Light
Vales Road				
2012	Non-casualty	Off road to left - object	T-junction	Darkness
2014	Non-casualty	Right through	T-Junction	Dusk
2012	Serious Injury	Off road to left	2 way undivided	Dawn
2014	Non-casualty	Off road to left – object	2 way undivided	Daylight
Ruttleys Road				
2012	Serious injury	Left far	T-Junction	Daylight
2012	Non-casualty	Right near	T-Junction	Daylight
2015	Serious injury	Right near	T-Junction	Daylight
2012	Fatal	Off road right – Object	2 way undivided	Dawn
2013	Non-casualty	Head Onn	2 way undivided	Daylight
Tall Timbers Road				
2014	Moderate injury	Rear End	2 way undivided	Daylight
2014	Moderate injury	Off rd. Left	2 way undivided	Daylight

The crash records indicate a clear crash history for vehicles on the roads proposed to be used for provision of a shared path. The high vehicle speeds and potential for vehicle runoff will need to be considered in detail as part of ongoing design in order to minimise risk to path users as well as motorists due to the provision of the shared path.

There is the potential that broader point-to-point cyclists will still be using Ruttleys Road regardless of whether a shared pathway is constructed along the foreshore. The provision of a separated pathway on Ruttleys Road would therefore have the potential to assist more broadly than just catering for cycling movements between Mannering Point and Chain Valley Bay. See Figure 10-2. Traffic volumes however have not been reviewed and this would be undertaken at the next design stage.

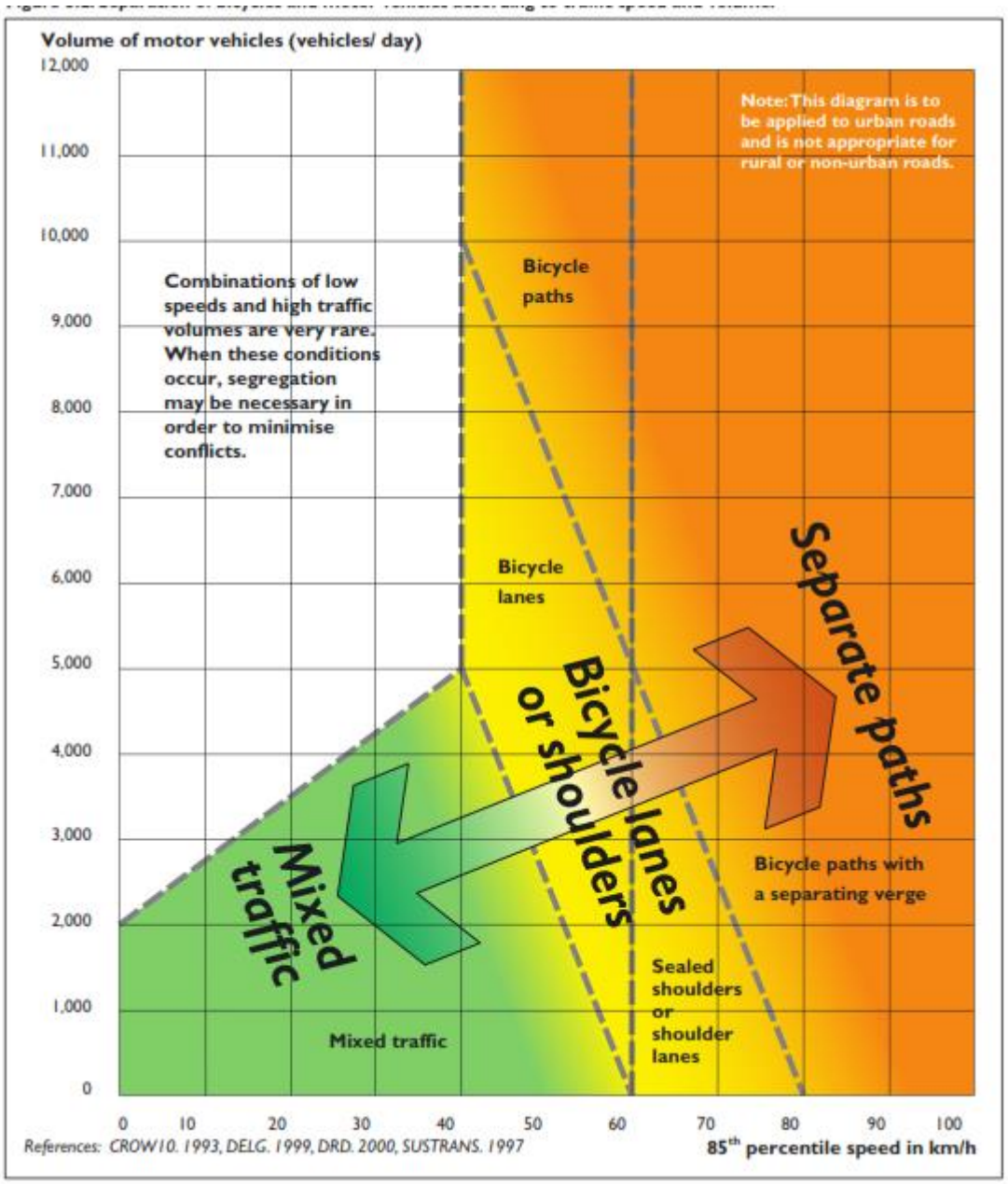


Figure 10-2 Separation of bicycles and motor vehicles according to traffic speed and volume

10.2.2 Posted speed-related considerations

In accordance with road system principles, barriers and fencing may be erected parallel to shared paths where there is a safety risk. The critical issues are the design of the barrier and its location to the adjacent roadway. Barrier fencing may be erected to segregate riders from hazards such as high speed roadways. The posted speeds of the roads in the area are noted in Table 10-3.

Table 10-3 Posted road speeds

Road Name	Posted Speed	Recommended Minimum Treatment
Griffiths Street	50 kph	Bicycle lane or shoulder
Vales Road	60 kph	Separate paths
Ruttleys Road	80 kph	Separate paths
Tall Timbers Road	60 kph	Separate paths

Figure 10-3 below shows the recommended location of barrier fencing adjacent to roads and other potential hazards.

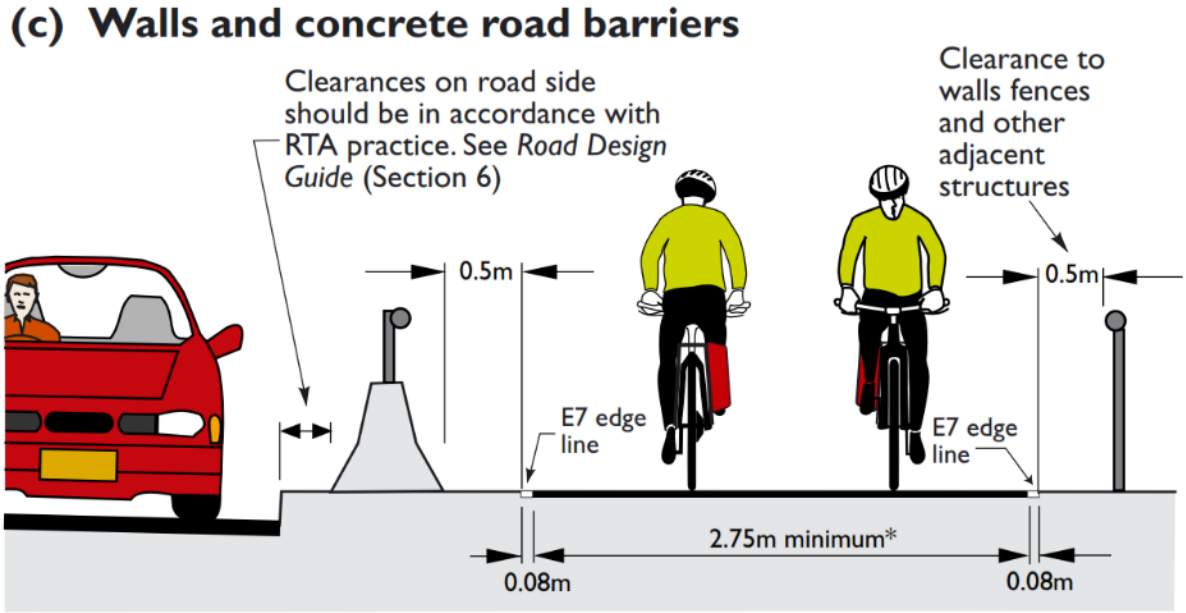


Figure 10-3 Barrier fencing for off-road paths

Detailed survey would be required to confirm that these widths are achievable within the existing road corridor.

10.2.3 Intersections and road crossings

Intersections are locations where there is considerable potential for conflict between cyclists and motor vehicles. Providing a clear path for cyclists at intersections in essential to maintaining continuity and safety. A typical intersection crossing detail is shown in Figure 10-4.

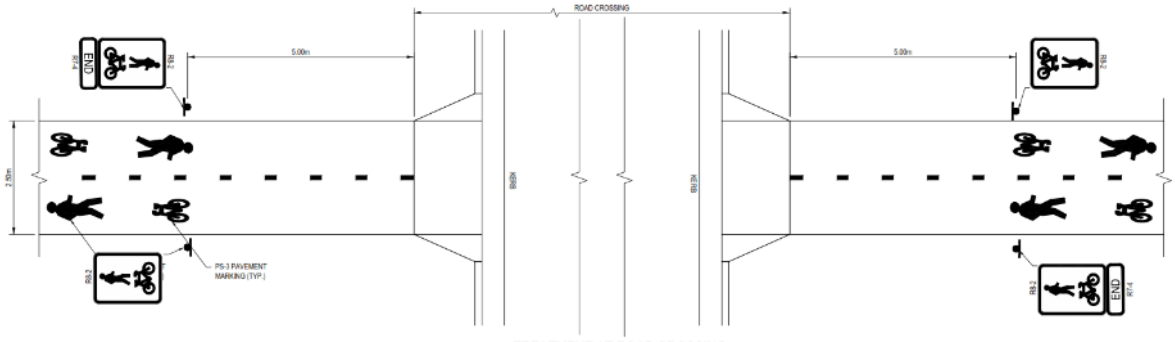


Figure 10-4 Typical road crossing treatment

Road crossings are also required at a number of locations and should be reduced if possible to avoid the potential for conflict between cyclists and motor vehicles. For the purposes of the assessment it has been assumed that the Ruttleys Road route would follow the eastern carriageway to avoid the requirement to cross both Vales Road and Ruttleys Road.

A comparison of road crossings for each option is provided in Table 10-4 below.

Table 10-4 Intersection and road crossings

	Foreshore Route	Ruttleys Road Route
Intersection Crossings	None	Dorothy St Vales Point Power Station Access Construction Road Mannering Park Colliery Access Road
Road Crossings	None	Tall Timbers Road
Driveway Crossings	18 No Properties along Karoola Avenue 2 Properties Tall Timbers Road	3 informal service access points Commercial premise access

Figure 10-5 shows a typical intersection crossing and signage details for a shared pathway.

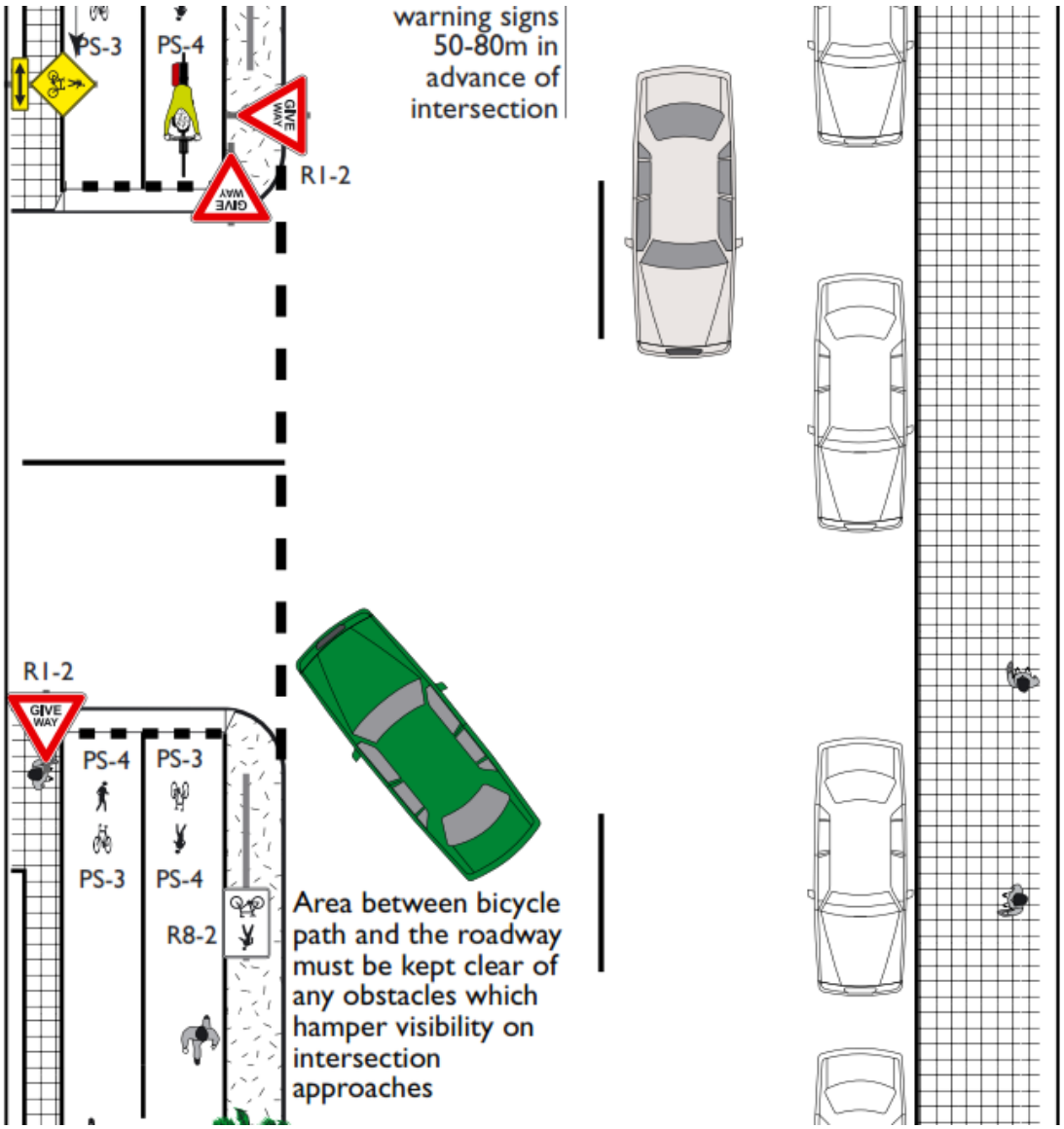


Figure 10-5 Typical intersection detail

Smooth wide kerb ramping and contrasting pavement surfacing can also be provided to enhance the crossings and improve overall safety.

10.3 Accessibility

Pedestrians and cyclists need to be able to undertake and complete meaningful trips. Routes comprising roads and paths should combine to form an effective, convenient and safe network and link to key destinations. Connectivity and accessibility is a critical component of effective bicycle routes. Cycle routes in particular need to be direct and convenient if they are to be well-used. If the bicycle route involves a significant detour or increase in gradient, then cyclists may refuse to use it.

Table 10-5 below summarises the relative length to each of the key attractors and generators. For comparison purposes all distances have been measured from the centre of Griffiths St.

Table 10-5 Destination distances

Destination From	Destination To	Foreshore Route	Ruttleys Road Route	Difference
Mannering Park	Kingfisher Shores	2.6 km	6.2 km	3.6 km
Mannering Park	Chain Valley Bay	4.3 km	4.9 km	0.6 km
Mannering Park	Lake Munmorah Shopping Centre	5.1 km	5.3 km	0.2 km
Mannering Park	Lake Munmorah High School	6.2 km	6.9 km	0.7 km
Total Distances		**18.2 km**	**23.3 km**	**5.1 km**
Total Distances – Kingfisher Shored excluded		**15.6 km**	**17.1 km**	**1.5 km**

Therefore from an accessibility view point apart from accessing Kingfisher Shores there is not a significant difference in the distances required to travel for the two routes.

11. Stakeholder consultation

Early consultation was sought from a number of parties under the instruction of Central Coast Council. The intent being to ensure that stakeholders input was considered in the assessment. This should not replace any formal stakeholder consultation required.

11.1 Central Coast Council

A number of internal stakeholders were contacts to obtain input into the study. It was clear from this consultation that there is no consensus within Central Coast Council as to a preferred route with opposing views from difference stakeholders. A summary of these are contained below within Table 11-1.

Table 11-1 Central Coast Council stakeholder comments

Ruttleys Road Route	Foreshore Route
Safety Issues The inland route may be quite unsafe for the portion that cuts between Ruttleys Road and Tall Timbers Road. There would be very limited surveillance of this area as there are no adjoining land uses.	**Safety Issues** The foreshore route will also experience this issue along the power station portion of the site.
Land Tenure The part of this route that cuts between Ruttleys Road and Tall Timbers Road is under a land claim by the Darkinjung Local Aboriginal Land Council. Future ownership of this part of the route may cause issues.	**Land Tenure** Previous discussions with Delta Electricity staff about security issues for the power station if a shared pathway was constructed along the foreshore. As a result, Delta Electricity were very negative about a shared pathway along the lakeside of the power station site.
Social Issues There are major problems of dumping, environmental damage, anti-social behaviour, arson etc. in the east to west section of the Ruttleys option that should be hopefully significantly improved through investment, community ownership and greater permitted usage.	**Most direct route** This route is the more direct route between the 2 suburbs, which also has the benefit of passing through Kingfisher Shores, so will have the added bonus of connecting residents of Kingfisher Shores to both Mannering Park and Chain Valley Bay, particularly school children riding bikes to the Carters Road school precinct.
Cost Ruttleys Rd is a vastly cheaper option and gives the opportunity to better manage some other problems. Safety and fencing etc. would be key costs to consider.	**Scenic Amenity** This route is far superior from a scenic amenity perspective. As a result, the shared pathway will likely attract higher usage from the community, for recreation as opposed to simply getting from Point A (e.g. Home) to Point B (e.g. School). There are no foreshore shared pathways on this northern side of the highway so it would be a key recreational drawcard for this area, as it also takes in the playground at Kingfisher Shores.

Ruttleys Road Route	Foreshore Route
Bushfire Management There should be a bush fire and land management synergy here, as well as making better use of council managed Crown land.	**Environmental benefits** The inland route will cut between Ruttleys Road and Tall Timbers Road through the proposed green corridor for this area. The foreshore route will not cut through this green corridor.

Central Coast Council also provided GHD with recent construction costs for their shared pathways to use within their cost estimates.

11.2 Mannering Park Progress

David Morrison (GHD) met with Sue Wynn at GHD's Central Coast Office on Wednesday 21 June. This was to follow up on email correspondence provided. The main issues raised were:

- Completion of shared pathway around Mannering Park which means route extended along the length of Griffith Street to meet up with Vales Road footpath and from Vales Road to the foreshore down Waverly Road
- A graded track between communities from Ruttley Road to Chain Valley Bay that will allow safe passage of people and vehicles both private and emergency in times of natural or man-made disasters
- GHD to look at potential alternative route to connect into Tall Timbers Road to avoid the requirement for a raised boardwalk section
- Demonstrated understanding that the foreshore route is appealing and have no issues with the route as long as it can be delivered in a timely manner (within the next 5 – 10 years max), however Griffiths Street should be included in this route as a minimum

11.3 Mannering Park Precinct and Chain Valley Bay Progress

David Morrison (GHD) met with Andrew Whitborne – Chairman – Mannering Park Precinct Committee on site Wednesday 7 June.

At this meeting Andrew provided a background to the project and provide an explanation as to why they preferred the Foreshore Route: The main issues being:

- Most direct route between Mannering Park and Chain Valley Bay
- Route allows connection of Kingfisher Shores to Shared pathway network
- Number of fatalities on Ruttleys Road

At the meeting Andrew provided GHD with preliminary costings and concepts for the proposed bridge which he had been provided by local contractors familiar with this type of work. These are contained within Appendix B for completeness.

Subsequent to the meeting Andrew also emailed GHD providing evidence of a recent accident which occurred at the Mannering Park Colliery Site on Ruttleys Road. The intent being to highlight their concerns around the risks of the shared pathway users on Ruttleys Road.

Photo 35 Evidence of recent accident on Ruttleys Road

11.4 Delta Electricity

During the site inspection of 5 June Delta Electricity accompanied GHD representatives around their site.

Whilst at the site Delta highlighted the potential security issues which they may be presented with by providing improved access along their foreshore boundary.

Concerns were also raised around the bridge at the intakes. This intake creates significant undercurrents into the structure and consideration would be required to prevent people jumping into the water from the bridge or throwing debris into the water, which may damage the intakes.

Photo 36 View of existing power station intakes

12. Construction

12.1 Techniques and materials

The proposed shared pathway would be a combination of the following elements

- At grade pathway – road edge
- At grade pathway – off road
- Elevated pathway
  - Bridge structures
  - Boardwalk structures

Different bridge and boardwalk structures could be considered the main ones are provided below.

12.2 At grade pathway – road edge

Along the road edge the typical path construction would be in the form of a concrete pathway which will be formed, reinforced with mesh and poured using conventional methods.

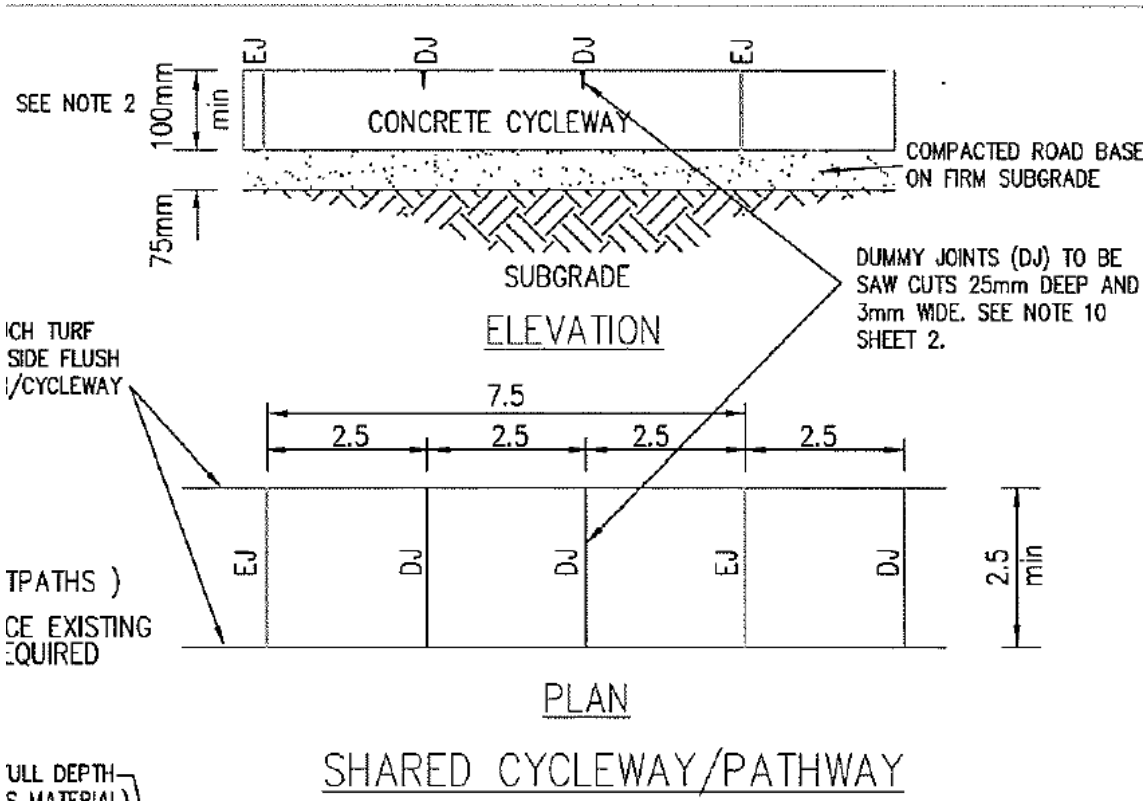


Figure 12-1 Central Coast Council Standard shared pathway construction

Existing service pit covers along the route would require to be modified to suit.

Where necessary concrete barriers could be placed along the edge of the road to provide protection to the users. These would be pre cast units which would be doweled into a concrete base. These would be installed under traffic management either with localised lane closure or narrowing of the carriageway. Where the available space is less constrained, use of w-beam between the road and the path is also a possibility.

12.3 At grade pathway – off road

Due to the sensitive nature of the surrounding vegetation only the minimum clearing required for the proposed pathway and site access will be able to be undertaken. This will require a well-planned construction strategy to minimise access locations.

Generally, tracked equipment will be required due to the sand subgrade, which makes access for rubber tyred equipment difficult. Earthworks would be undertaken using conventional methods with equipment such as small dozers, excavators, dump trucks and positracks. Gravel for sub-base would be imported to site and will most likely need to be double handled to get to the pathway alignment. The sub-base would be placed with a positrack or a small grader and compacted with rollers. A good supply of water will be required to assist construction, this will also most likely need to be double handled to get to the work face.

The concrete pathway would be formed, reinforced with mesh and poured using conventional methods as the on road construction.

12.4 Elevated pathway

12.4.1 Bridge structures

Bridge structures have been required where access is required across water or constraints such as large services or conveyors. This will make access for construction also difficult. Concrete footings would be formed and placed in-situ. Concrete may need to be pumped or double handled were this is not possible. Trusses fabrication would occur offsite and be transported to site for erection. Erection will require cranes to be utilised. The trusses would also be proportioned to allow lifting into place from the existing road corridor. This will require large cranes (possibly up to 300 tonne mobile cranes), but minimises any requirement for construction of crane pads.

Decking will also need to be placed using cranes.

12.4.2 Piled boardwalk

There are a number of options for the piled boardwalks. One option being timber piles. The timber piles for piled boardwalk could be installed with tracked equipment. The timber piles can be lifted and vibrated or driven into place. These would then be cut and levelled to allow construction of the superstructure. The deck construction would require cranes to lift the deck elements in to place.

Structural Materials and Type

The materials proposed need to be appropriate for use in the environment given the adjacent Bushland and Coastline. The materials also need to be appropriate:

- For the design life required for the proposed path
- To cater for the expected limited maintenance likely during operation
- For the corrosive environment due to the proximity to the sea

There is some sections of the shared pathway that corrosive soils (ASS) will be found in the vicinity of the proposed path.

A summary of the different potential materials for the boardwalk structures has been provided below:

- Timber is considered to be a relatively cheap construction material, can be protected against poor soil condition and will fit with the surrounding nature. Timber will require a higher and more regular level of maintenance than other materials due to degradation, and loosening of bolts due to expansion or shrinkage of the material. Timber will burn in the event of a fire. Due to the bushfire risks these were not considered appropriate.
- Steel is a more expensive construction material, but may be required for larger spans or difficult terrain. Steel will be able to provide a better overall design life than timber depending on appropriate protective coatings applied, and should have limited maintenance over its life time. Steel will be impacted by fire depending on the intensity and duration.
- Concrete may be cheaper than steel construction depending on the type of structure and could be prefabricated to allow quicker installation onsite. Concrete can be designed to span significant distances and can be designed to provide a long design life exceeding steel based on concrete mix design and reinforcement covers. Concrete typically would have very limited maintenance requirements during the life of the structure. Concrete, similar to steel will be impacted by fire depending on the intensity and duration.
- Fibre reinforced plastics are lightweight materials that may be able to be used for short to medium spans. FRP is very resistant to corrosive environments so would not degrade over time due to exposure. FRP can be fabricated with specific aesthetics to match natural materials so could be considered in lieu of timber. Maintenance would be reduced compared to timber, but regular inspections and tightening may need to occur over the life of the structure. It is unlikely that any FRP structure would be able to resist fire.

The recommended boardwalk system would be similar to that used at Magenta Shared Pathway, which was an in situ concrete deck supported by ultrafloor. The main advantages for this system include

- Bushfire resistance
- Durability and maintenance
- Rideability and smooth surface
- Cost effectiveness when compared to other concrete solutions

13. Preliminary cost estimate

13.1 Basis of estimate

GHD have prepared preliminary a concept cost estimate for the shared pathway routes. The estimate provides an indicative estimate of the costs involved in the project.

The estimate has been prepared using linear rates for different treatments along the alignment. The rates for these different treatments have been determined using information drawn from previous projects and experience working in the area and information reasonably available to GHD. This is based on assumptions and judgments made by GHD. An allowance for Council costs associated with project management, design and investigation, contract management and associated tasks has been made. This estimate assumes the works are progressed in the quickest and most efficient manner without delays for reviews, procurement, installation and shutdowns.

A number of issues increase the estimated rates for the different treatments. These issues include:

- Site access will only be available at a limited number of points throughout the route.
- Site access will be limited to particular vehicles/plant. This will mean some materials would be double handled.
- The work area will be narrow to minimise impact, but this will add to the constraints on access.

The cost estimate is preliminary only and has been developed without a site survey and geotechnical investigation and is based on our preliminary routes. The estimate therefore includes a number of assumptions. Actual prices, costs and other variables may be different to those used to prepare the cost estimate and may change.

For the estimates a contingency of 40% has been applied directly to the rates. This level of contingency has been adopted from the RMS Project Estimating Manual, which specifies contingencies for concept level estimates should be within 25% and 40%. The use of the upper limit of this range of 40% has been selected to reflect the lack of survey and geotechnical information available to develop the concept design.

13.2 Preliminary estimate

13.2.1 Pathway type summary

Table 13-1 below provides a summary of the different pathway types likely required for each route.

Table 13-1 Summary of different pathway types

Pathway Type	Foreshore route (m)	Ruttleys Road route (m)
On grade pathway – road edge	1100	3170
On grade pathway – off road	1150	1300
Bridge Structure	200, 20	(3 crossings at 10 m approx each)
Boardwalk Structures	880	500
Total	3350	5000

13.2.2 Foreshore route

The preliminary cost estimate for the concept design for the Foreshores Road are summarised within Table 13-2.

Table 13-2 Preliminary project estimate – Foreshore route

Treatment	Total Length (m)	Rate ($/m)	Estimate ($)1
Construction			
At grade – road reserve	1100	$245	$270,000
At grade – nature reserve	1150	$265	$310,000
Minor bridge crossings	20	$8,000	$160,000
Boardwalk	880	$1,700	$1,500,000
Long span bridge	200	$15,000	$3,000,000
Utility adjustments	1100	$100	$110,000
Signage, Line marking and furniture			$50,000
Other project costs			
Project management			$50,000
Investigation and design			$540,000
Construction Superintendent			$200,000
Total (excl GST)			**$6,200,000**

13.2.3 Ruttleys Road route

The preliminary cost estimate for the concept design for the Ruttleys Road are summarised within Table 13-3.

Table 13-3 Preliminary project estimate – Ruttleys Road route

Treatment	Total Length (m)	Rate ($/m)	Estimate ($)
Construction			
At grade – road reserve	3170	$245	$780,000
At grade – nature reserve	1300	$265	$350,000
Minor bridge crossings	30	$20,000	$600,000
Boardwalk	500	$1,700	$850,000
Concrete safety barriers	1600	$350	$560,000
Utility adjustments	3170	$100	$320,000
Signage, Line marking and furniture			$100,000
Other project costs			
Project management			$40,000
Investigation and design			$360,000
Construction Superintendent			$150,000
Total (excl GST)			**$4,100,000**

13.3 Cost estimate assumptions

- Estimate values have been rounded up to the nearest $10,000.
- Concrete safety barriers assumed to be required along entire length of Ruttleys Road).
- Both prices relate to 2.5 m wide shared path, adopting 125 mm thick concrete with one layer of SL72 mesh obtained from Central Coast Council.
- These prices were taken from the recently completed Tall Timbers Rd shared path project for the road reserve price and the Griffith St nature reserve project for the nature reserve price. The Griffiths St project had relatively close street access and therefore concrete could be laid relatively easily using a concrete pump. That may not be the case in the proposed shared path route adjacent to the lake.
- Prices include a concrete pump for the nature reserve but not for the road reserve.
- Will be heavily dependent on the site locations and site conditions. For example any retaining walls, acid sulphate soils, soft ground conditions, crossings over waterways etc. will alter these rates significantly.
- The road reserve price does not include any driveways or bus stops included in the construction.
- Rate assumes excavation spoil can either be reused on site or disposed of at another location without cost. If a suitable disposal site cannot be found close by there may be additional haulage costs. Additionally if the spoil is acid sulphate and cannot be disposed of on site it would require being taken to Buttonderry landfill, at a cost of approximately $250/tonne.
- Utility adjustments assumed to comprise of adjustment to access chambers only. Further survey and detail required (including co-ordination with service providers to confirm costs). These have only been applied along the at-grade road reserve sections.
- Other project costs have been developed as a percentage of the construction costs for the project.
- No drainage infrastructure allowed for.
- No costs associated with property acquisitions have been allowed for. These would require to be identified once the concept design is developed.

13.4 Operational cost – potential maintenance activities

13.4.1 Maintenance life cycle costs

The key maintenance activities along with their application rates and the expected frequencies have been provided in this section of the report.

Indicative maintenance costs occurred per interval has been identified in Table 13-4.

Table 13-4 Indicative maintenance costs and intervals

Bridge element	Operation	Lifespan and frequency	Rate/m2
Reinforced concrete deck, substructures and shared pathways	Concrete maintenance	100 years Every 35 years	$25/m^2 deck area
Steel or steel/reinforced concrete composite	Re-paint steelwork	100 years Every 25 years	$40/m^2 of painted area
Timber hardwood	Timber maintenance	50 years maximum 15 years	$10 - $30/m^2 of structure area

14. Options assessment

14.1 Assessment criteria

The following assessment criteria, Table 14-1, was used in the assessment. For the purposes of the assessment GHD applied a weighting based on their judgment and understanding of the key project drivers.

Table 14-1 Options assessment criteria

Criteria	Description	Adopted Weighting
Engineering	This ranks the engineering risk associated with each option and its relative complexity and potential issues	5.0%
Services – Above Ground	This ranks the above ground services which will require to be co-ordinated with and approvals sought	5.0%
Services – Below Ground	This ranks the potential number of services that will required to be utilised	2.5%
Geotechnical	This ranks the geotechnical conditions encountered along the routes and the anticipated complexities particularly around bridge and boardwalk structures	2.5%
Heritage	This ranks the impacts to cultural heritage such as the loss of heritage structures or artefacts	5.0%
Contamination	This ranks the potential for contamination along the route and potential increases in capital cost	5.0%
Ecology	This ranks the environmental impacts from clearing, filling and other associated works associated with the works	5.0%
CPTED	This ranks the overall safety of the option and its relative distance from residences and roads	10.0%
Safety	This ranks the operational safety between options. - Allows for connection to future cycle links - Allows for lower skilled cyclists - Off road cycle way - Allows for connection to future cycle links - Allows for lower skilled cyclists Will be utilised by experienced cyclists and deterred	15.0%

Criteria	Description	Adopted Weighting
Accessibility	Appeal to riders of all abilities, hilly/number of intersections/volume of traffic/length of option	15.0%
Stakeholders	This ranks the opinions of the stakeholder groups and there preferred options	5.0%
Constructability	This ranks the complexity around access to construct the works and for the ability for construction vehicle access and materials delivery	10.0%
Construction cost	This ranks the CAPEX costs for each option comparably. It should be noted that comparative estimates will be used to rank the options.	15.0%

It is important to note, that the assessment criteria above are not absolute judgements of a particular criteria against another, but are assessed relatively in consideration of what the shared path is aiming to achieve and how it is to be delivered.

14.2 Scoring guidelines

During the assessment GHD compared each assessment criterion against each other to determine the weightings to be applied to the criteria. The scoring guidelines used are summarised below in Table 14-2.

Table 14-2 Scoring guidelines

Scoring	5	3	1
Engineering	Least complex	Neutral complexity	Most complex
Services – Above Ground	Lowest number of above ground assets to co-ordinate, reach approvals with	No significant difference	Highest number of above ground assets to co-ordinate, reach approvals with
Services – Below Ground	Lowest number of potential service interactions		Highest number of potential service interactions
Geotechnical	Least complex potential geotechnical conditions	No significant difference	Most complex potential geotechnical conditions
Heritage	No heritage impacts anticipated	No significant impact to the heritage	Significant impacts with heritage anticipated
Contamination	Least potential contamination encountered		Most potential contamination encountered
Ecology	Improves environmental outcome from the project	No significant impact to the environment	Significant impacts which will not be allowed in the approval
CPTED	Shortest distance between shared pathway and residences/roads	No significant difference	Longest distance between shared pathway and residences/roads

Scoring	5	3	1
Safety	Least number of intersection crossings and interfaces with traffic		Most number of intersection crossings and interfaces with traffic
Accessibility	Highest appeal. Will attract more users and all range of skills. Good connectivity	Neutral impacts more users with a range of skills. Riders may still use current route	lowest appeal, indirect route, poor connectivity, low comfort level and high number of interfaces
Stakeholders	Most stakeholders in favour of route.	Neutral stakeholder	Lowest stakeholders in favour of route.
Constructability	Least difficult to access for construction	No significant difference with access	Most difficult to access for construction
Construction Cost	Lowest Costs		Highest Costs

14.3 Route assessment scoring

The following scoring has been assigned for each of the routes as follows in Table 14-3.

Table 14-3 Route assessment scoring

Option Selection Criteria Score	Foreshore Route	Ruttleys Road Route
Engineering	1	5
Services – Above Ground	3	3
Services – Below Ground	5	1
Geotechnical	1	5
Heritage	3	5
Contamination	3	3
Ecology	3	5
CPTED	3	3
Safety	5	1
Accessibility	3	3
Stakeholders	3	3
Constructability	1	5
Construction Cost	1	5
Total Score	**35**	**47**
Weighted Score	**2.7**	**3.5**

Based on the above weighting and scoring to the criteria the outcome is that the **Ruttleys Road option** is the preferred route.

However we would, recommend that Central Coast Council hold a workshop with all project stakeholders to determine this weighting, re-evaluate the scoring and understand its sensitivity. This may involve the community groups if deemed necessary.

15. Statutory and planning framework

A summary of the statutory and approvals framework for the Ruttleys Road route are provided below.

15.1 NSW legislation

15.1.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act and Regulation provide the framework for development assessment and approval in NSW. The EP&A Act and Regulation include provisions to ensure that the potential environmental impacts of a development are considered in the decision making process prior to proceeding to construction.

Relevant environmental planning instruments (EPIs) made under the EP&A Act include:

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)

The proposal is permissible without consent in accordance with Clause 94(1) of ISEPP which states that 'development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land'. Road infrastructure facilities include 'road related areas' which is further defined under the *Road Transport (General) Act 2005* and *Road Transport Act 2013* as 'a footpath or nature strip adjacent to a road, or an area that is open to the public and is designated for use by cyclists or animals'.

As consent is not required, assessment and approval under Part 5 of the EP&A Act, in the form of a review of environmental factors (REF), would be required.

State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14)

The aim of SEPP 14 is to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State. Clearing, draining, filling or constructing a levee on land mapped under SEPP 14 requires development consent. The closest SEPP 14 area to the site is approximately 300 metres to the east near Mannering Bay. Therefore the consent requirements of SEPP 14 are not triggered by the proposal.

State Environmental Planning Policy No. 71 – Coastal Protection (SEPP 71)

The aim of SEPP 71 is to protect and manage the natural, cultural, recreational and economic attributes of the NSW coast. Clause 8 of the Policy lists a number of matters that must be considered 'by a consent authority when it determines a development application to carry out development on land to which this Policy applies'. The preferred route is situated within the SEPP 71 coastal zone, however as consent is not required for the proposal, consideration of the SEPP 71 matters is not triggered.

Wyong Local Environmental Plan (LEP) 2013 (LEP)

The preferred route is located within the following land use zones under the *Wyong Local Environmental Plan 2013* (Wyong LEP):

- Zone SP2 – Infrastructure (located along the northern portion of the route within Lot 102 DP 1170291)
- Zone RE1 – Public Recreation (located along the eastern portion of the route within Lot 475 DP 755266)
- Zone RU6 – Transition (located along the eastern portion of the route within Lot 484 DP 755266)

- Zone E2 – Environmental Conservation (located along the eastern portion of the route within Lot 151 DP 755266)

The proposal (defined as development that is incidental or ancillary to development for the purpose of a road) is permitted with consent within each of these zones. However, as discussed above, the proposal is permissible without consent in accordance with ISEPP. Therefore the LEP does not apply.

15.1.2 Threatened Species Conservation Act 1995 (TSC Act)

The TSC Act lists threatened species, populations or ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats, as the result of an activity.

A preliminary biodiversity assessment has been prepared for the proposal to assess the potential for impacts of each pathway option on ecological values. Results of this preliminary biodiversity assessment are provided in Section 8.

Potential impacts associated with the preferred route include:

- Clearing of native vegetation
- Removal of habitat for threatened flora and fauna species
- Habitat fragmentation
- Edge effects (potential for weed encroachment)
- Potential for soil and water pollution during the construction phase
- Potential for alteration to surface water flows

As such, a biodiversity assessment as part of the REF would be required for the preferred route.

As part of the biodiversity assessment, an assessment of significance that addresses the requirements of Section 5A of the EP&A Act (and Section 94 of the TSC Act) must be completed. If a significant impact is deemed likely, following the assessment of significance; a species impact statement may be required.

In addition, given that the preferred route would include clearing of vegetation and removal of habitat for threatened species, a biodiversity development assessment report (BDAR), may also be required depending on the outcome of a biodiversity assessment.

Under section 91 of the TSC Act, a license is required to harm any threatened species population or community, or their habitat.

15.1.3 Heritage Act 1977

The *Heritage Act 1977* is administered by the NSW Heritage Division of the Office of Environment and Heritage (OEH) and aims to ensure that the heritage of NSW is adequately identified and conserved. The *Heritage Act 1977* is concerned with all aspects of conservation ranging from the most basic protection against damage and demolition, to restoration and enhancement.

Under Section 57 of the *Heritage Act 1977*, approval must be obtained for works, which have the potential to interfere with a heritage item or place, which is either listed on the State Heritage Register (SHR) or the subject of an interim heritage order.

The search of the SHR and the State Heritage Inventory (SHI) is provided in 0.

The ‘Bulk Store Building’ (at 464 Ruttleys Road, Mannering Park) was identified as a local heritage item (under the LEP). This item is not situated along the preferred route, and is not expected to be impacted by the proposal.

15.1.4 National Parks and Wildlife Act 1974 (NPW Act)

The NPW Act aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The NPW Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act. All native fauna and some native flora are protected under the NPW Act. The NPW Act is administered by OEH.

There are no national parks or nature reserves within the vicinity of the preferred route.

It is an offense not to notify the OEH of the location of Aboriginal sites and objects under Section 89A of the NPW Act. If an impact to an Aboriginal heritage object or site is likely from a proposal, a permit must be sought under Section 90 of the NPW Act.

RPS were engaged by GHD to provide an Aboriginal Heritage Due Diligence Assessment for proposed shared pathway routes at Mannering. This assessment is summarised in Section 7, and the full report is included within Appendix C.

A search of the Aboriginal Heritage Information Management System was undertaken for a five kilometre radius of the project area and 79 Aboriginal sites were identified. The majority of these sites are middens, with most located along the foreshore. There were no AHIMS registered Aboriginal sites identified along the preferred route.

The due diligence assessment provided a high-level assessment of the preferred route, and identified that it was unlikely to impact Aboriginal heritage.

Appropriate management would be implemented to ensure the works do not impact on this site. In addition, consultation with OEH regarding the preferred route would be instigated and be ongoing throughout construction.

As part of the REF, a detailed due diligence survey of the preferred route will be required.

15.1.5 Fisheries Management Act 1994 (FM Act)

The FM Act aims to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

The FM Act lists a number of aquatic threatened species, populations or ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats, as the result of an activity. An assessment of significance that addresses the requirements of section 5A of the EP&A Act (and Section 220ZZ of the FM Act) must be completed to determine the significance of the impact. If a significant impact is deemed likely, following the assessment of significance, a species impact statement may be required.

A summary of the preliminary biodiversity assessment are provided in Section 9. To further assess any impacts associated with aquatic threatened species or communities, a biodiversity assessment would be required for the REF.

Under Part 7 of the FM Act, a permit is required for dredging and reclamation, obstruction of fish passage, harm to marine vegetation and use of electrical or explosive devices in a waterway. This work is not proposed as part of the preferred route.

15.1.6 Protection of the Environment Operations Act 1997 (POEO Act)

The POEO Act establishes, amongst other things, the procedures for issuing licences for environmental protection in relation to aspects such as waste, air, water and noise pollution control. The owner or occupier of premises engaged in scheduled activities is required to hold an environment protection licence and comply with the conditions of that licence. The proposal does not fit the definition of a scheduled activity as defined under Schedule 1. Therefore an environmental protection licence is not required.

It is an offense under the POEO Act to cause water, air, noise or land pollution. Pollution incidents or accidents must also be reported under the POEO Act.

15.1.7 Contaminated Land Management Act 1997 (CLM Act)

The CLM Act establishes a process for investigating and (where appropriate) remediating land that is considered to be contaminated.

Section 59(2) of the Act requires notification of contaminated sites.

Section 60 of the Act requires landowners to report any contamination that represents a significant risk of harm to human health or the environment to the NSW Environment Protection Authority (EPA).

A search of the contaminated land record and the sites notified under the CLM Act for the preferred route is summarised in Section 9.

15.2 Commonwealth legislation

15.2.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act approval is required from the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance (NES) or the environment of Commonwealth land.'

A preliminary biodiversity assessment has been prepared for the proposal to assess the potential for impacts of each pathway option on ecological values. Results of this preliminary biodiversity assessment are provided in Section 8.

Database searches identified two threatened ecological communities (TECs), 18 threatened flora species and 54 threatened fauna species (34 birds, ten mammals, five frogs and five reptiles) (listed under the EPBC ACT) as potentially occurring in the locality of the proposal area. Of these, twelve threatened flora species and four threatened fauna species (one bird and three mammals) are considered to have the potential to occur within the proposal area, based on the presence of suitable habitat, previous records or known occurrences within the proposal area.

Potential impacts associated with the preferred route include:

- Clearing of native vegetation
- Removal of habitat for threatened flora and fauna species
- Habitat fragmentation
- Edge effects (potential for weed encroachment)
- Potential for soil and water pollution during the construction phase
- Potential for alteration to surface water flows

As such, a biodiversity assessment as part of the REF would be required for the preferred route.

If an impact on NES matters is considered likely the proposal must be referred to the Commonwealth Department of the Environment.

15.3 Summary of approval requirements

The proposal is permissible without consent in accordance with Clause 94(1) of ISEPP which states that 'development for the purpose of a road or road infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land'.

As consent is not required, assessment and approval under Part 5 of the EP&A Act, in the form of a REF, would be required.

The REF would include, but not necessarily be limited, the following specialist assessments in accordance with relevant legislation:

- Biodiversity Assessment
- Detailed Site Contamination Investigation
- Aboriginal Heritage Assessment

The above is based on preliminary route and constraints assessment. The required assessment and approvals for the proposal should be reviewed again once the final route and design are confirmed.

16. Recommendations for concept design

A number of issues were identified with the route options assessment process undertaken to select the preferred route, in particular the environmental impacts of the options and the comparative costing between options.

As such, the following recommendations are made for the progression of the preferred option.

16.1 Concept design requirements

The following is proposed to be undertaken to progress the concept design:

- Topographical Survey – using LIDAR data to complement
- Horizontal and Vertical Alignment of route
- Early discussions with utility companies (in particular TransGrid)
- Concept boardwalk design options
- Concept bridging options
- Identification of any property acquisitions required (if any)
- Review of Environmental Factors (REF)

16.2 Design criteria

For the progression of the concept design, the following design criteria are proposed to be adopted:

16.2.1 Gradients

The gradient requirements for disabled access are appropriate for the design. These requirements include:

- Generally up to 1 in 20 (5%) generally
- Up to 1 in 14 (7.1%) for ramps, with a flat landing (assumed 2.5 m long) every 20 m
- Step ramps of up to 1 in 8 (12.5%) for short sections (assumed maximum length of 20 m)

16.2.2 Widths

The following shared pathway width criteria have been developed from Austroads Guide to Road Design: Part 6A, Pedestrian and Cyclist Paths, 2009, and the NSW Bicycle Guidelines, 2005.

- On-grade width of 3 m sealed path and 0.5 m unsealed verge on either side.
- Elevated structure width of 3.8 m – this includes a 3 m pathway, 0.25 m clearance to the handrail on both sides and 0.15 m pedal clearance from the handrail to the uprights of the posts supporting the handrail.
- Adjacent to a traffic barrier width – 3.5 m plus a 0.5 m unsealed verge on the non-barrier side of the pathway. The 3.5 m is made of 0.5 m clearance from the shared pathway side of the barrier, and a 3 m wide pathway.

17. References

- Acid Sulfate Soil Risk Map for Catherine Hill Bay – Edition 2. Department of Natural Resources, NSW Government, 1997
- *Contaminated Land Management Act 1997* (CLM Act)
- Gosford – Lake Macquarie 1:100,000 Geology sheet 9131 & part sheet 9231. Department of Mineral Resources, NSW, 2015
- NEPC (2013). *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 1999*. National Environment Protection Council, as amended in May 2013
- NSW DEC (2006). *Contaminated sites: Guidelines for NSW Site Auditor Scheme, (2nd Edition)*. New South Wales Department of Environment and Conservation, 2006
- NSW Land and Property Information. *Spatial Information Exchange*. https://maps.six.nsw.gov.au/
- NSW OEH (2011). *Contaminated sites: Guidelines for Consultants Reporting on Contaminated sites*. New South Wales Office of Environment and Heritage, 2011
- *Protection of the Environment Operations Act 1997*
- Soil Landscapes of the Gosford – Lake Macquarie 1:100,000 Sheet. Department of Conservation and Land Management, Sydney, NSW, 1993
- Swansea North Entrance and Swansea North Entrance No. 1 Extension Mine Subsidence Districts, Plan No. MSD14b. Mine Subsidence Board, NSW Government
- Wyong Shire Council (2013). *Wyong Local Environmental Plan 2013 (LEP)*

Appendices

Appendix A – Route Option Sketches

LEGEND

- Cadastre
- Foreshore Route
- Existing shared pathway
- Ruttleys Road Route

Paper Size A4

0 125 250 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Job Number 22-18991
Revision 0
Date 11 Jul 2017

Proposed route locations

Figure 1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton

LEGEND

- Cadastre
- Foreshore Route
- Ruttleys Road Route
- Existing shared pathway

Construction type

- Off road - On grade
- On road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Proposed route locations

Sheet 1 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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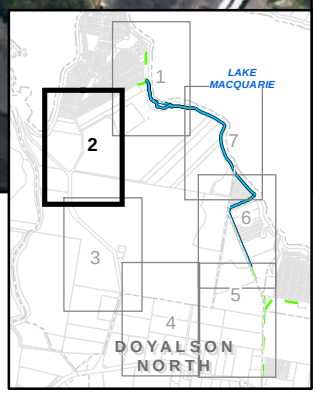
Data source: LPI: Imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton



LEGEND

Cadastre

Ruttleys Road Route

Construction type

On road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Proposed route locations

Sheet 2 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 2

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Data source: LPI: Imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton

LEGEND

- Cadastre
- Ruttleys Road Route
- On road - On grade

Construction type

- Off road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Proposed route locations

Sheet 3 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 2

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

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Data source: LPI: Imagery, 2015; DTDB/DCDB, 2015. Created by: tmorton

LEGEND

- Cadastre
- Ruttleys Road Route

Construction type

- Off road - On grade
- On road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Proposed route locations

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Revision	0
Date	11 Jul 2017

Figure 2

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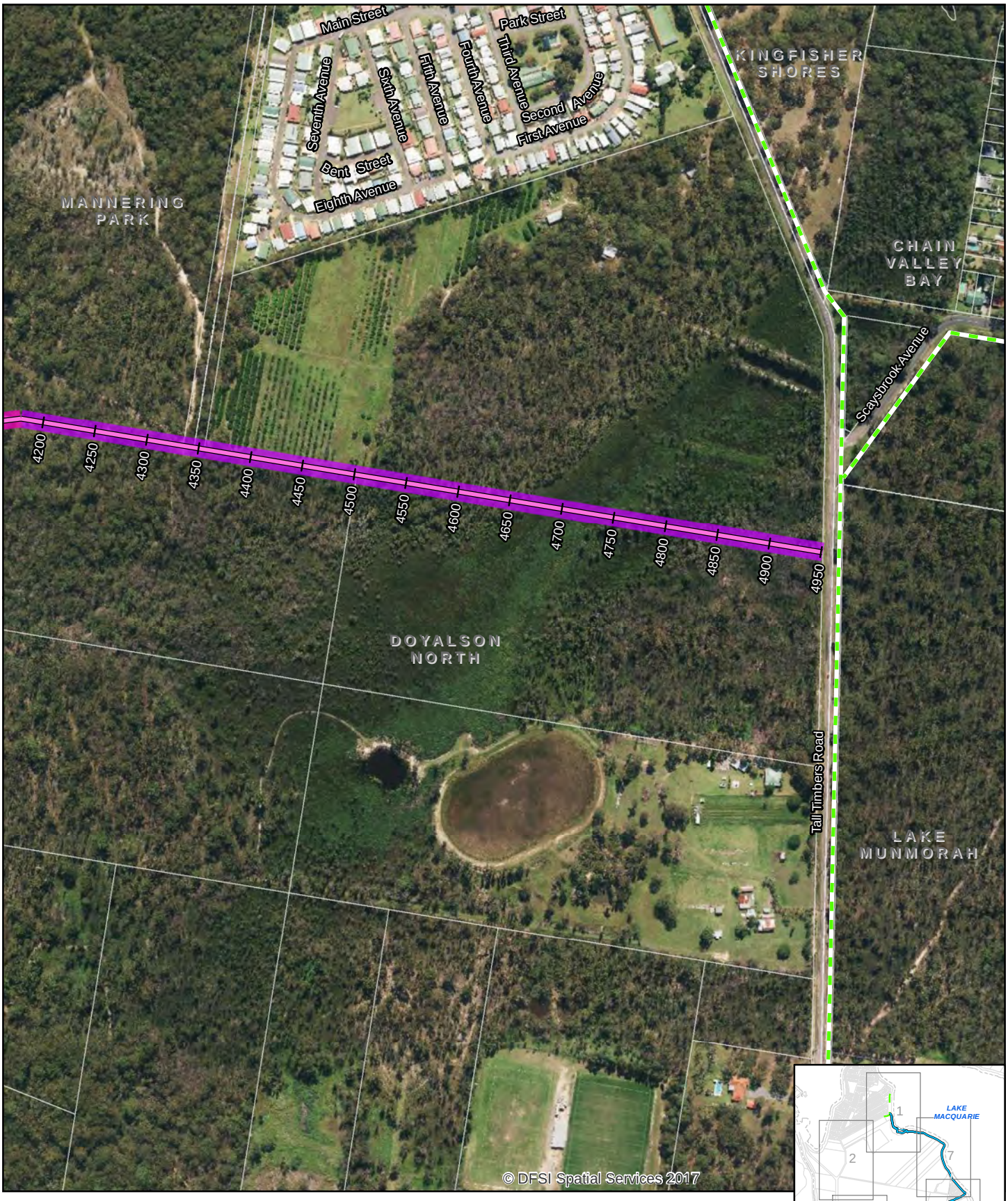

LEGEND

- Cadastre
- Ruttleys Road Route
- Existing shared pathway

Construction type

- Off road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study
Proposed route locations
Sheet 5 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 2

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LEGEND

- Cadastre
- Foreshore Route
- Existing shared pathway

Construction type

- On road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Proposed route locations

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Job Number	22-18991
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Date	11 Jul 2017

Figure 2

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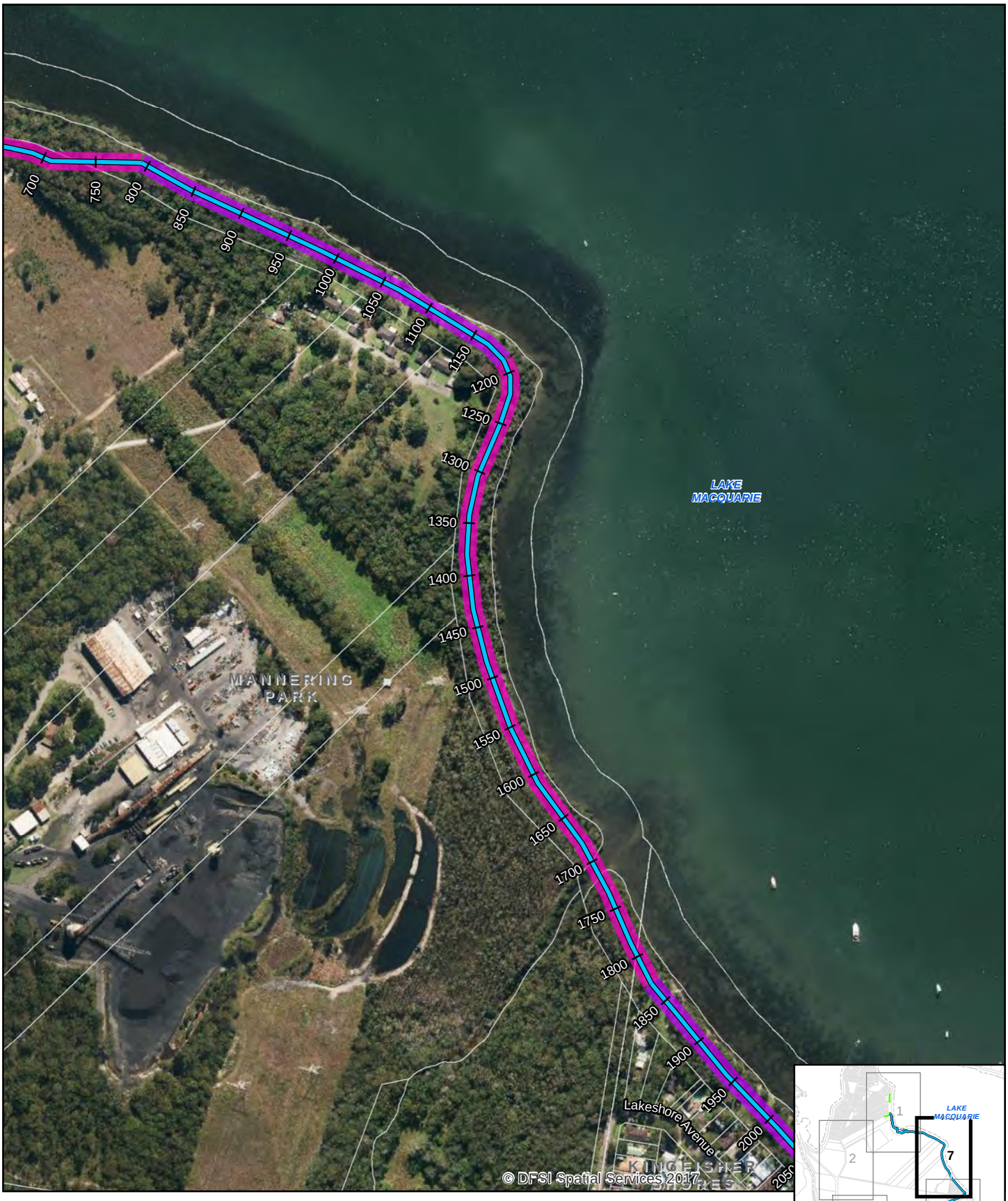

LEGEND

- Cadastre
- Foreshore Route

Construction type

- Off road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Proposed route locations

Sheet 7 of 7

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Revision	0
Date	11 Jul 2017

Figure 2

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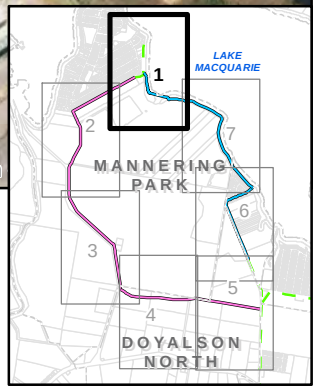

LEGEND

- Cadastre
- Foreshore Route
- Ruttleys Road Route
- Existing shared pathway

Construction type

- Off road - On grade
- On road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study
Engineering constraints
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Date	11 Jul 2017

Figure 3

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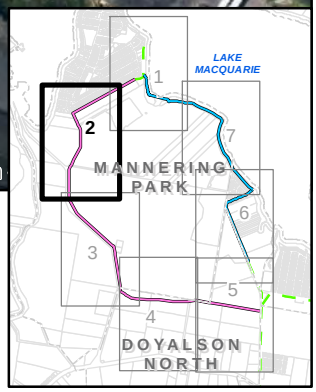

LEGEND

- Cadastre
- Ruttleys Road Route

Construction type

- On road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

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Sheet 2 of 7

Job Number	22-18991
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Figure 3

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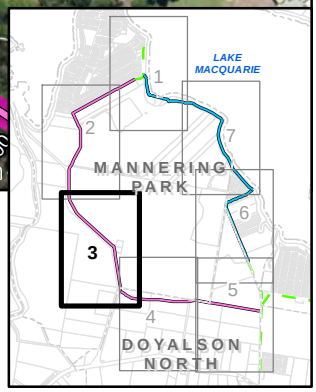

LEGEND

- Cadastre
- Ruttleys Road Route
- On road - On grade

Construction type

- Off road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study
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Job Number 22-18991
Revision 0
Date 11 Jul 2017

Figure 3

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LEGEND

- Cadastre
- Ruttleys Road Route

Construction type

- Off road - On grade
- On road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

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Job Number	22-18991
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Date	11 Jul 2017

Figure 3

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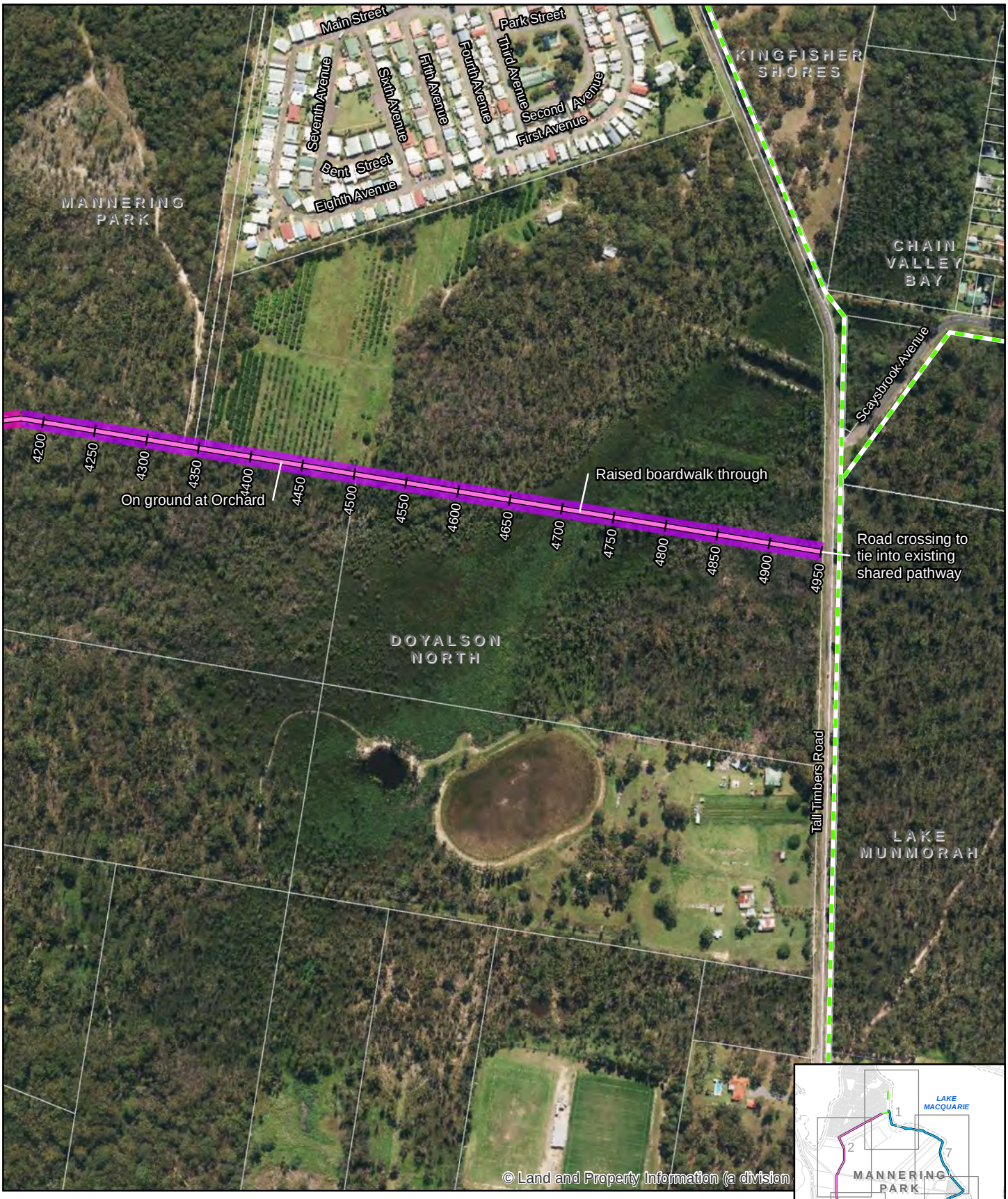

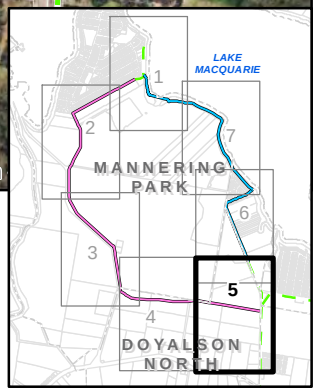

LEGEND

- Cadastre
- Ruttleys Road Route
- Existing shared pathway

Construction type

- Off road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study
Engineering constraints
Sheet 5 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 3

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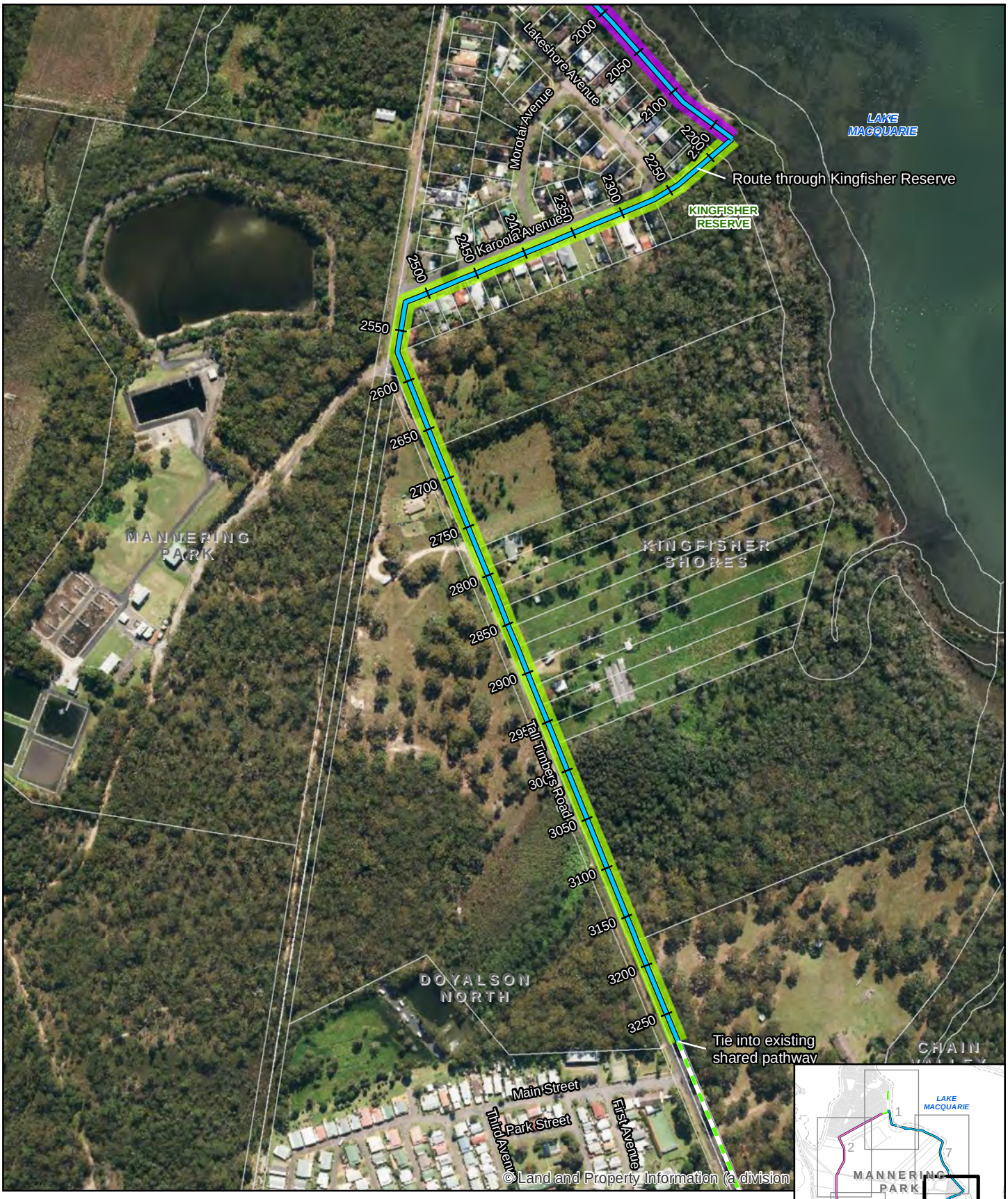

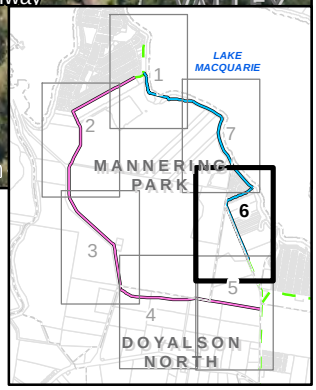

LEGEND

- Cadastre
- Foreshore Route
- Existing shared pathway

Construction type

- On road - On grade
- Off road - Boardwalk bridge

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study
Engineering constraints
Sheet 6 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 3

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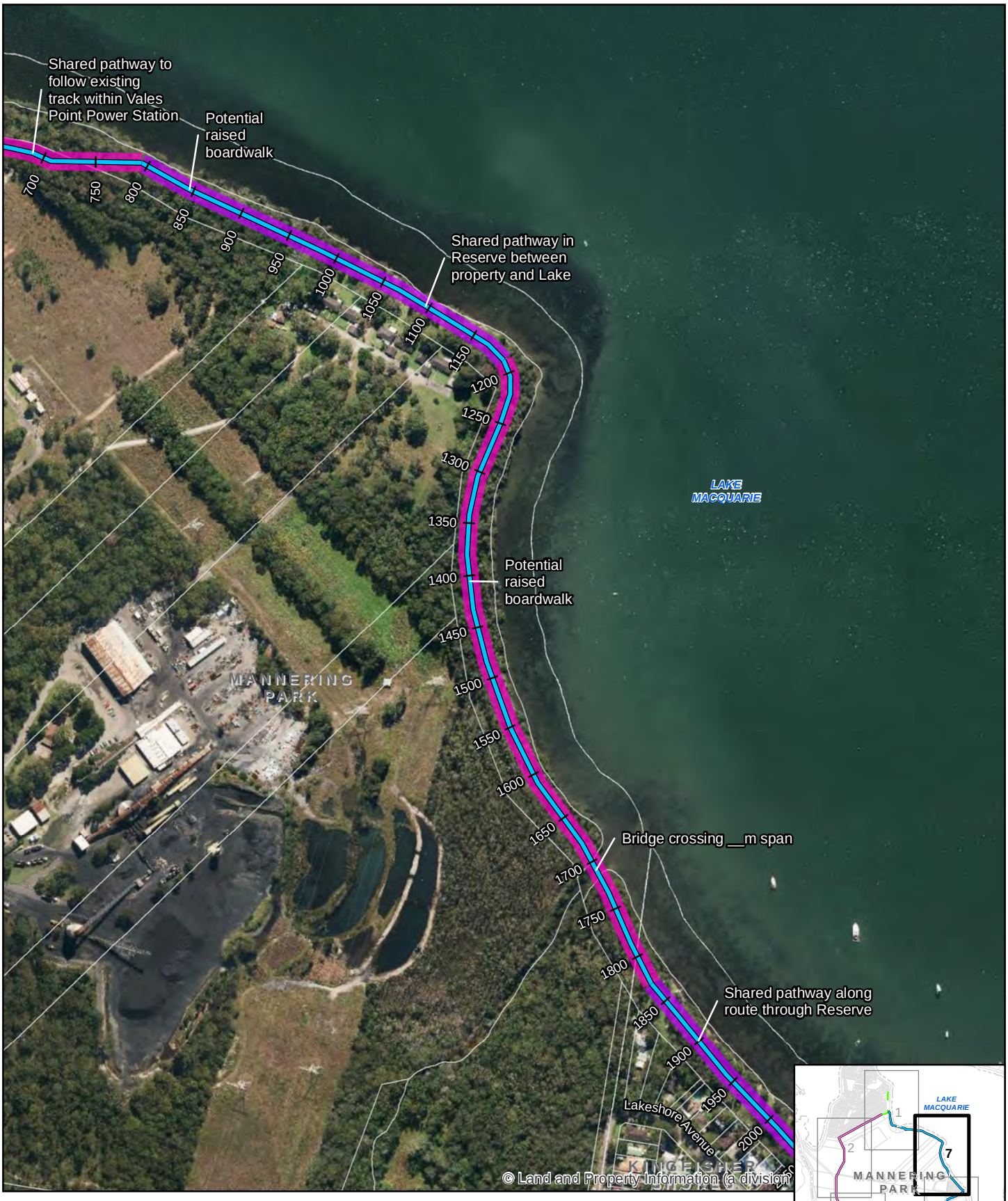

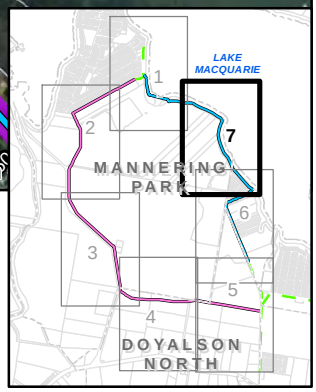

LEGEND

- Cadastre
- Foreshore Route
- Off road - Boardwalk bridge

Construction type

- Off road - On grade

Paper Size A4

0 25 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study
Engineering constraints
Sheet 7 of 7

Job Number	22-18991
Revision	0
Date	11 Jul 2017

Figure 3

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LEGEND

- Foreshore Route
- Ruttleys Road Route
- Existing shared pathway
- Cadastre
- Cleared / Disturbed vegetation
- Coastal Wet Sand Cyperoid Heath
- Exotic Grassland
- Freshwater Wetland Complex (EEC)
- Scribbly Gum/Smooth-Barked Apple Woodland
- Swamp Oak Floodplain Forest (EEC)

Paper Size A4

0 125 250 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Central Coast Council
Mannering Park Shared Pathway
Feasibility Study

Job Number 22-18991
Revision 0
Date 11 Jul 2017

Vegetation communities

Figure 4

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Appendix B – Stakeholder Correspondence

From: Michael Trumm [mailto:mtrumm@abergeldie.com]
Sent: Monday, 10 December 2012 11:52 AM
To: Andrew Whitbourne
Subject: RE: Arch Bridge

Hi Andy

We have put together a budget price of $1,405,000 (excluding GST) for the design, fabrication, delivery and installation of a steel arch bridge. This price also includes the construction of piled abutments either side of the canal behind the existing canal walls. We have priced Option 2 of the attached sketches with post tensioning to the bridge deck.

The price allows for assembly of the bridge somewhere on the lake shore, loading of the bridge onto barges, moving the barges into the canal, and lifting of the bridge from the barges to the abutments. Hopefully there is a suitable area available close to the site where the bridge can be assembled and loaded onto barges.

We have also allowed for the installation of screens in lieu of the handrails shown on the drawings.

Please advise if you need any further information.

Yours faithfully
Abergeldie Complex Infrastructure
Michael Trumm
Estimating Manager

ABERGELDIE
COMPLEX INFRASTRUCTURE

PO Box 10 Regents Park NSW 2143 | **p:** 02 8717 7712 | **f:** 02 8717 7778 | **m:** 0409 245 263
mtrumm@abergeldie.com | mail@abergeldie.com | www.abergeldie.com

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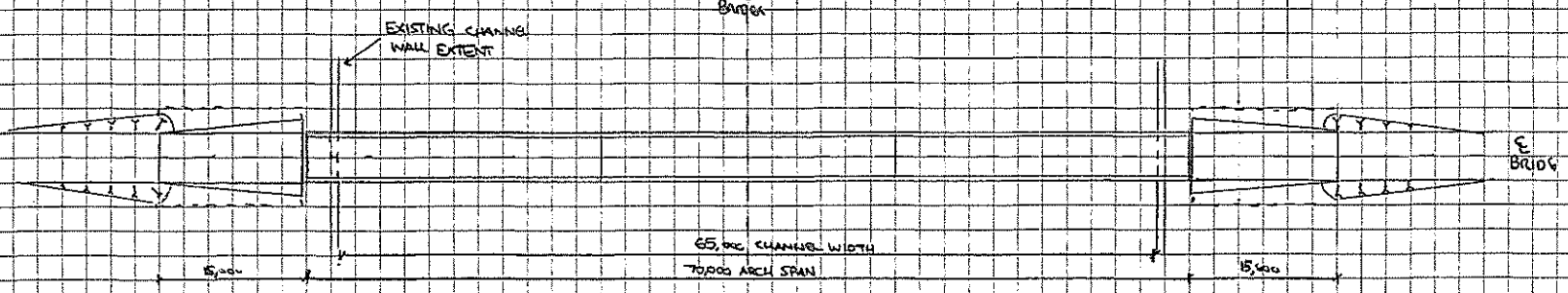
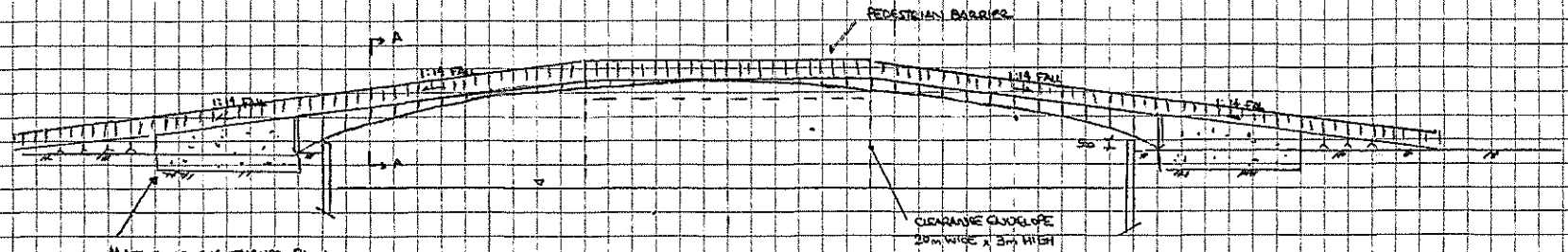
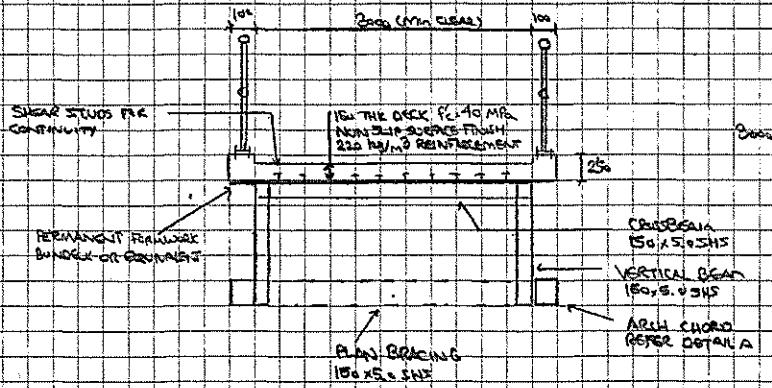
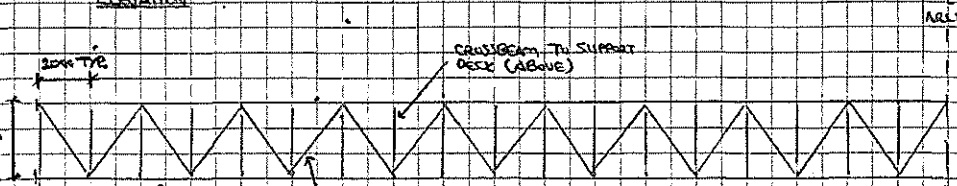


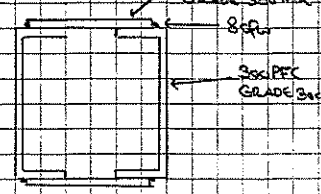
PLAN





ELEVATION





DETAIL A

NOTES:

1. ALL STEELWORK SHALL BE PAINTED WITH AN APPROVED RTA CORROSION PROTECTION SYSTEM
2. TOTAL STEELWORK WEIGHT 32.0 t EXCLUDING DECK FORMWORK
3. ARCH SHALL FOLLOW A CIRCULAR PROFILE OF RADIUS 173m
4. ARCH SHALL BE ERECTED WITHOUT DECK

No	Revision	By	Chk	Appd	Date

Drawing Originator: Beca

Original Scale (A3):

Design	DT	16/11/12	Approved for Construction*
Drawn	DT	16/11/12	
Dsg Verifier			
Dwg Check			Date

* Refer to Revision 1 for Original Signature

Client: ABERGELDIE

Project: VALES POINT INLET CANAL PEDESTRIAN BRIDGE

Title: CONCEPT

Discipline:

Drawing No: SK-001

Rev: 1

DO NOT SCALE

IF IN DOUBT ASK

to Wyong LEP 1991 in November 2013. As a result, this mapping amendment has been incorporated into Wyong LEP 2013 mapping prior to gazettal. The Planning Proposal rezoned part of Lot 2 DP 1005467 (fronting Yeramba Road) from 7(b) (Scenic Protection Zone) (E3 Environmental Management under Wyong LEP 2013) to 2(a) (Residential Zone) (R2 Low Density Residential under Wyong LEP 2013). The minimum lot size map has been amended accordingly. Council request

- Parts of 129CR Griffiths Street, Mannering Park (Lot 7329 DP 1148149); 220CR Vales Road, Mannering Park (Lot 7330 DP 1148105); and 14CR Kenneth Place, Mannering Park (Lot 7332 DP 1148185): A strip of Crown foreshore land adjacent to Delta Electricity's Vales Point Power Station, zoned 6(a) (Open Space and Recreation Zone) under Wyong LEP 1991, was proposed to be zoned SP2 Infrastructure – Electricity Generating Works under Wyong LEP 2013 due to requests made by Delta Electricity in relation to security issues along the foreshore area adjacent to their site. On 17 April 2013, the Mannering Park Community Precinct Committee submitted an objection to the proposed zoning of this land. Unfortunately, as this was 5 days after the final date that submissions were accepted (12 April 2013), Council staff were not able to consider the objection prior to finalisation of the 8 May 2013 Council report. Since this time, the Precinct Committee has been liaising with the DP&I in relation to their objection to the proposed SP2 zoning of this site. As a result, the DP&I has elected to direct Council to rezone these sites to RE1 Public Recreation, the direct conversion from the 6(a) (Open Space and Recreation Zone). DP&I amendment

Sheet 18

- 11 Pacific Highway, Doyalson (Lot 1 DP 259306); 30 Pacific Highway, Doyalson (Lot 3 DP 259306); and 20 Pacific Highway, Doyalson (Lot 202 DP 1126914): Zoning of TransGrid land amended from redundant existing SP2 Infrastructure - Electricity Generation zone, to RU6 Transition zone. Lot Size map also amended from no minimum lot size to 40 Hectares in accordance with other RU6 zoned land. Note: E2 Environmental Conservation zone retained as is. DP&I amendment

(g) Lot Amalgamation

Sheet 7A and Sheet 13

- Precinct 7A deleted from lot amalgamation maps. Council request

Sheet 10

- 10 Oscar Drive, Chittaway Point (Lots 1, 2 and 3 DP 21536 and Lot 1 DP 1014033): Site reinstated on lot amalgamation map. Council request

(h) Lot Size

Sheet 7A and Sheet 13

- Precinct 7A zonings incorporated into lot size maps. Council request

(i) Urban Release Area (URA)

Sheet 7A and Sheet 13

- Precinct 7A incorporated into maps (as Warnervale South Part A and B). Council request

Sheet 13

- Louisiana Road, Hamlyn Terrace split into east and west - based on 10(a) (Investigation Precinct Zone) or 1(c) (Non-Urban Constrained Lands Zone) zoning prior to becoming an URA. DP&I amendment

(j) Concurrent Planning Proposals

- 21 Dec 2012

To

- manneringparkprecinctcommittee@yahoo.com

Hide

Photos

- image001.gif
- image002.jpg

Download All

Attachments

- Greenway-Lakeside-Main_Sterling3000_3D.pdf
- Greenway-Lakeside-Main_Sterling3000_Data.pdf

Download All

Hello Andrew

We have assessed your project including all the information you have given and we recommend the following:

- Fleetwood Stirling™ Shared Cycle Pedestrian Bridge (see attached similar product application. This drawing has not been amended for Chain Valley Bay, but is does give the visual idea of our product)
- 75 lineal metres between the towers (you will need at least 5 lineal metres clear between foundation points and canal wall to ensure that Zone Of Influence to the walls is not impacted)
- The Stirling™ bridge structure type is the most cost effective for such spans as you require, without intermediate supports within the channel
- Value of $620,000.00 + GST should be allowed for the design, manufacture and installation complete. This does not, of course, include the approach paths to either end

Wyong Shire Council have currently contracted us to deliver one of our Stirling™ Shared Cycle Pedestrian Bridges for Tumbi Umbi creek.

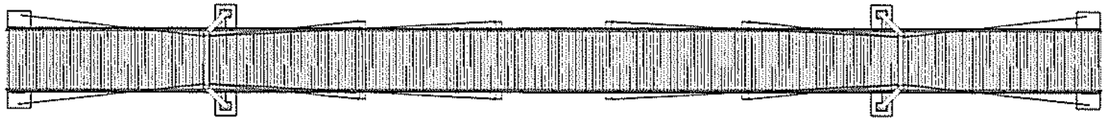
I would be glad to assist with any further enquiry.

Once again, my sincere apologies for the length of delay in response on this project. It has been particularly busy for me of recent with an interstate project, however I am back in the NSW office and clear for 2013!

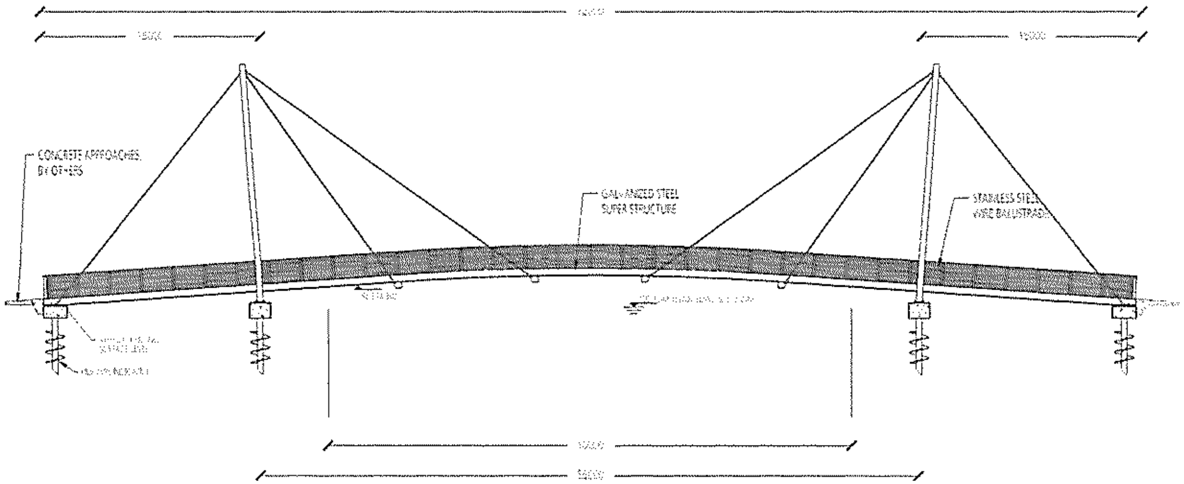
Kind regards

ROGER JOYCE
Project Director
T 1300 989 100
M 0419 902 300
E roger.joyce@fleetwoodurban.com.au

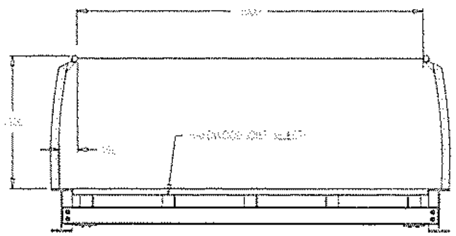
TYPICAL PLAN VIEW



TYPICAL SIDE ELEVATION



TYPICAL SECTION



BUILT ON STRENGTHS | Est. 1970

Greenway Lakeside - Main

STIRLING™ 3000 NTS Data

SYSTEM OPTIONS

SUPER STRUCTURE PROTECTION	HDG		Enduro3
JOIST MATERIAL	Select	Eco-Joist	Steel
DECKING MATERIALS	Select	Eco-Deck	Fibre
BALUSTRADE TYPE	SS Wire	Bond	York
BALUSTRADE PROTECTION	HDG	Enduro2	Enduro3
HANDRAIL MATERIAL	Select	Eco-Rail	Steel
COLUMN MATERIAL	Select	Eco-Rail	Steel
COLUMN PROTECTION	HDG	Enduro2	Enduro3

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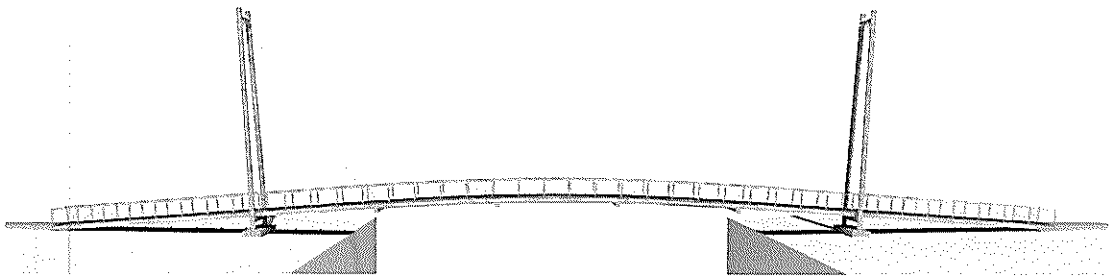

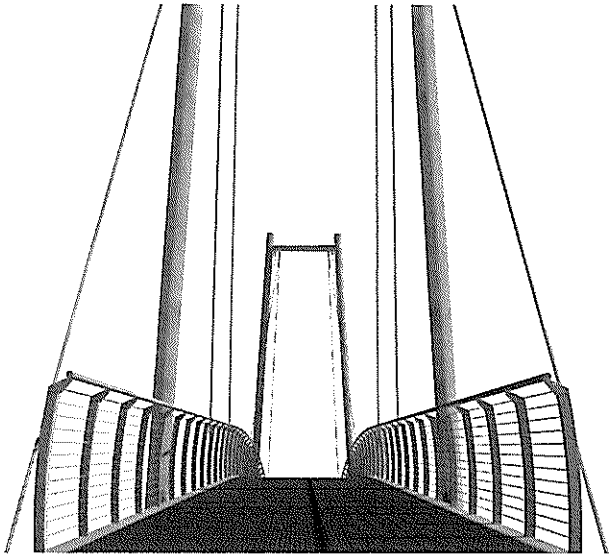

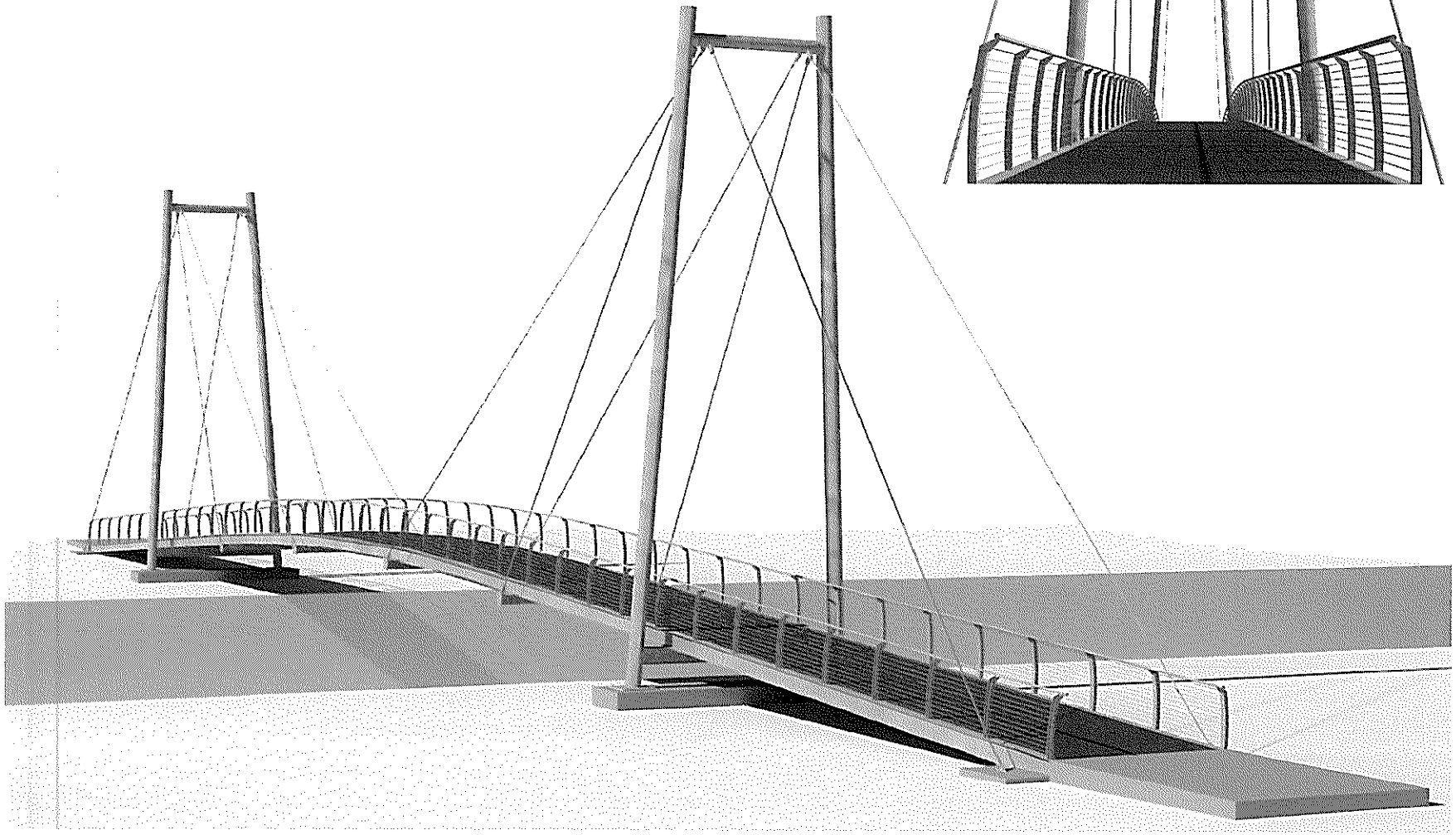

BUILT ON STRENGTHS | Est. 1970

Greenway Lakeside - Main

STIRLING®	3000		NTS Data
SYSTEM OPTIONS			
SUPER STRUCTURE PROTECTION	HDG		Enduro3
JOIST MATERIAL	Select	Eco-Joist	Steel
DECKING MATERIALS	Select	Eco-Deck	Fibre
BALUSTRADE TYPE	SS Wire	Bond	York
BALUSTRADE PROTECTION	HDG	Enduro2	Enduro3
HANDRAIL MATERIAL	Select	Eco-Rail	Steel
COLUMN MATERIAL	Select	Eco-Rail	Steel
COLUMN PROTECTION	HDG	Enduro2	Enduro3

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Appendix C – Heritage Assessment

ABORIGINAL HERITAGE DUE DILIGENCE ASSESSMENT

Mannering Park to Chain Valley Bay Shared Pathway NSW

Prepared for ***GHD***

27 JUNE 2017

Prepared by:

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Client Manager:
Report Number: PR136555
Version / Date: Final | 27/06/2017

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Document Status

Version	Purpose of Document	Original	Review	Review Date
1	Draft Report	T.Boer-Mah	D.Rigby	22.6.2017
2	Final	T.Boer-Mah	D.Rigby	27.6.2017

Approval for Issue

Name	Signature	Date
T. Boer-Mah		27.6.2017

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Executive Summary

RPS has been engaged by GHD to provide an Aboriginal Heritage Due Diligence Assessment for an options assessment of two proposed shared pathway routes at Mannering Park. There are two route options under consideration: Foreshore route and the Rutleys Road route. There are no ground disturbing works required at this stage and this due diligence assessment report is for the purposes of route selection only.

The Lake Macquarie foreshore was often utilised by Aboriginal people as evidenced by numerous recorded middens. There is evidence for Aboriginal sites further away from the foreshore, but these are less common. A search of the Aboriginal Heritage Information Management System was undertaken for a 5 kilometre radius of the project area and 79 Aboriginal sites were identified. The majority of these sites are middens, with most located along the foreshore. Sites further inland tend to comprise surface artefacts (artefact scatters and isolated finds), scarred trees and potential archaeological deposits.

There are no AHIMS registered Aboriginal sites in the Project Area. The closest sites are 300 metres west of the Foreshore route and comprise an artefact scatter and a scarred tree.

A visual inspection of Foreshore route and Rutleys Road route was undertaken by RPS Senior Cultural Heritage Consultant/Manager on 5 June 2017, along with David Morrison and Gilbert Whyte of GHD. The Foreshore route included disturbed and modified landforms. Observed modifications included landscaped areas adjacent to residences and installation of power plant infrastructure. Smaller areas of undisturbed and unmodified land were also inspected. No Aboriginal sites were identified along the Foreshore Route and the closest AHIMS registered Aboriginal site was over 300m from the route.

The Rutleys Road route comprised of highly modified landforms associated with the road apron of Rutleys Road. The closest Aboriginal sites to this route option were 1.5 kilometres away. No Aboriginal sites were identified along this route.

There are no Aboriginal sites in either route option and both route options are unlikely to impact Aboriginal heritage. Of these, the Foreshore route has a slightly higher likelihood for Aboriginal occupation, due to the high number of middens along the foreshore and generally the recorded AHIMS sites are closer to this route option. Conversely, the Rutleys Road route is located further back from the foreshore in a less archaeologically sensitive landscape and is located further away from the recorded AHIMS sites.

Recommendation 1

Once the shared pathway route is identified for detailed design, a comprehensive due diligence survey of the development impact footprint is to be undertaken.

1.0 Introduction

RPS has been engaged by GHD to provide an Aboriginal Heritage Due Diligence Assessment for an options assessment of two proposed shared pathway routes at Mannering Park. There are two route options under consideration: Foreshore route and the Rutleys Road route.

1.1 The Project Background

Wyong Council's Strategic Plan 2014-2018 and Council's Operational Plan 2016-2017 identified the need for investigation and design of a shared pathway linking Mannering Park and Chain Valley Bay. Currently there is no shared pathway for cyclists or pedestrians wishing to travel between Mannering Park and Chain Valley Bay. The new shared Pathway will improve the safety of cyclists and pedestrians, improving transport facilities in the locality.

The existing shared pathway heading east from Mannering Park township terminates at Griffith Street. The shared pathway heading west from Chain Valley Bay currently terminates at the intersection of Tall Timbers Road and Scaysbrook Avenue, Chain Valley Bay.

To complete the shared pathway link two options are being considered the: Foreshore route and the Rutleys Road route.

1.2 The Project Area

The Project Area comprises two routes which are south of Mannering Park in the Wyong Local Government Area (LGA).

The Foreshore route is approximately 3.6 kilometres in length. It begins at the eastern end of Griffith Street and proceeds south along the foreshore, past Mannering Power Station to Kingfisher Shores. It then proceeds to the south west along Karoola Avenue, and then southeast to link up with the existing shared pathway along Tall Timbers Road (Figure 1).

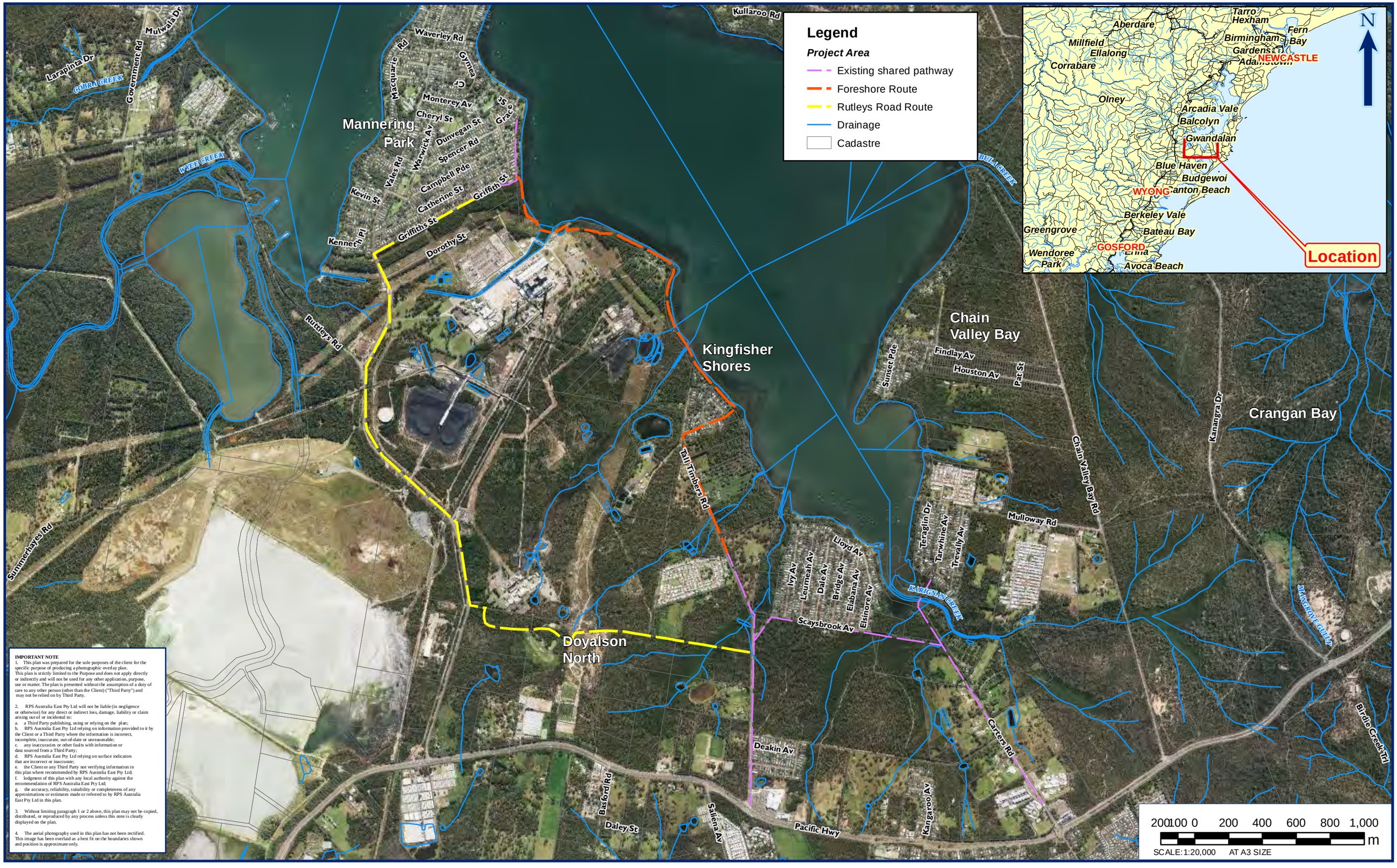
The Rutleys Road route is approximately 4.6 kilometres in length. It begins at the eastern end of Griffith Street, proceeds south along Vales Road and then south along Rutleys Road. Approximately one kilometre north of the junction of Rutleys road and the Pacific Highway the route proceeds eastwards across sealed and unsealed tracks and vegetation to meet the existing shared path along Tall Timbers road (Figure 1).

1.3 Proposed Activity

There are no ground disturbing works required at this stage. This due diligence assessment report is for the purposes of route selection only.

1.4 Authorship and Acknowledgments

This report was written by Tessa Boer-Mah, RPS Cultural Heritage Manager, with input from RPS Graduate Cultural Heritage Consultant, Lucy Irwin. The report was reviewed by Darrell Rigby, RPS Cultural Heritage Technical Director.



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TITLE : **FIGURE 1: PROJECT AREA**

LOCATION : **MANNERING PARK**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **19/06/2017**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): A A3 (Natalie.Wood)

PATH: J:\JOBS\136k\136555 Mannering\10 - Drafting\Arcgis Map Documents\Arch\136555 Figure 1 PA A A3 20170619.mxd

CLIENT: **CENTRAL COAST COUNCIL**

JOB REF: **PR136555**

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
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2.0 Legislative Context

The following overview of the legal framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. RPS will not be liable for any actions taken by any person, body or group as a result of this general overview, and recommends that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the summary below.

Although there are a number of Acts protecting and managing cultural heritage in New South Wales (see Appendix 1); the primary ones which apply to this report include:

- National Parks & Wildlife Act 1974
- National Parks & Wildlife Regulation 2009

In brief, the *National Parks & Wildlife Act 1974* protects Aboriginal heritage (places, sites and objects) within NSW; the National Parks and Wildlife Regulation 2009 provides a framework for undertaking activities and exercising due diligence.

2.1 National Parks and Wildlife Act 1974

The *National Parks & Wildlife Act 1974* (NPW Act) protects Aboriginal heritage (places, sites and objects) within NSW. Protection of Aboriginal heritage is outlined in s86 of the Act, as follows:

- "A person must not harm or desecrate an object that the person knows is an Aboriginal object" s86(1),
- "A person must not harm an Aboriginal object" s86(2)
- "A person must not harm or desecrate an Aboriginal place" s86(4).

Penalties apply for harming an Aboriginal object or place. The penalty for knowingly harming an Aboriginal object (s86[1]) and/or an Aboriginal place (s86[4]) is up to $550,000 for an individual and/or imprisonment for 2 years; and in the case of a corporation the penalty is up to $1.1 million. The penalty for a strict liability offence (s86[2]) is up to $110,000 for an individual and $220,000 for a corporation.

Harm under the NPW Act is defined as any act that: destroys defaces or damages the object; moves the object from the land on which it has been situated; and/or causes or permits the object to be harmed. However, it is a defence from prosecution if the proponent can demonstrate 1) that harm was authorised under an Aboriginal Heritage Impact Permit (AHIP) (and the permit was properly followed); or 2) that the proponent exercised due diligence in respect to Aboriginal heritage. The **'due diligence' defence (s87(2))**, states that if a person or company has exercised due diligence to ascertain that no Aboriginal object was likely to be harmed as a result of the activities proposed for the Project Area (subject area of the proposed activity), then liability from prosecution under the NPW Act will be removed or mitigated if it later transpires that an Aboriginal object was harmed.

2.1.1 Notification of Aboriginal Objects

Under section 89A of the NPW Act Aboriginal objects (and sites) must be reported to the Director-General (now Chief Executive) of OEH within a reasonable time (unless it has previously been recorded and submitted to AHIMS). Penalties of $11,000 for an individual and $22,000 for a corporation may apply for each object not reported.

2.2 National Parks and Wildlife Regulation 2009

The *National Parks and Wildlife Regulation 2009* ("NPW Regulation") provides a framework for undertaking activities and exercising due diligence in respect to Aboriginal heritage. The NPW Regulation 2009 outlines the recognised due diligence codes of practice which are relevant to this report, but it also outlines

procedures for Aboriginal Heritage Impact Permit (AHIP) applications and Aboriginal Cultural Heritage Consultation Requirements (ACHCRs); amongst other regulatory processes.

2.3 Due Diligence and Codes of Practice

The aims of a due diligence assessment are to:

- assist in avoiding unintended harm to Aboriginal objects;
- provide certainty to land managers and developers about appropriate measures for them to take;
- encourages a precautionary approach;
- provides a defence against prosecution if the process is followed; and
- results in more effective conservation outcomes for Aboriginal cultural heritage.

One of the benefits of the due diligence provisions are that they provide a simplified process of investigating the Aboriginal archaeological context of an area to determine if an Aboriginal Heritage Impact Permit (AHIP) is required.

Under the s80A *National Parks & Wildlife Regulation* 2009 ("NPW Regulation") a number of due diligence codes are recognised.

This report has been written to meet the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010) ("Due Diligence Code") (DECCW 2010).

2.3.1 Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010)

This publication sets out a minimum benchmark for acceptable due diligence investigations to be followed. The purpose of the code is set out reasonable and practical steps in order to:

(1) identify whether or not Aboriginal objects (and places) are, or are likely to be, present in an area

(2) determine whether or not their activities are likely to harm Aboriginal objects (if present)

(3) determine whether an AHIP application is required. (DECCW 2010:2)

Investigations under the code include the following:

- A search of the Aboriginal Heritage Information Management System (AHIMS) database to identify if there are previously recorded Aboriginal objects or places in the Project area,
- Identification of landscape features including, land within 200m of water, dune systems, ridgetops, headlands, land immediately above or below cliff faces and/or rockshelters/caves,
- Desktop assessment including a review of previous archaeological and heritage studies and any other relevant material,
- Visual inspection of the project area to identify if there are Aboriginal objects present, and
- Assessment as to whether an AHIP is required.

This report has complied with the requirements of the code listed above. Other requirements under the code are outlined below.

Aboriginal consultation is not required for an investigation under the due diligence code (DECCW 2010:3). However, if the due diligence investigation shows that the activities proposed for the area are likely to harm objects or likely objects within the landscape, then an Aboriginal Heritage Impact Permit will be required with full consultation.

A record of the due diligence procedure followed must be kept to ensure it can be used as a defence from prosecution (DECCW 2010:15).

Following a due diligence assessment (where an AHIP application was not required), an activity must proceed with caution. If any Aboriginal objects are identified during the activity, then works should cease in that area and OEH notified (DECCW 2010:13). The due diligence defence does not authorise continuing harm.

2.4 Wyong Local Environmental Plan (2013)

The Wyong Local Environmental Plan (LEP) has aims to protect heritage 1.2 (f) with provisions laid out in Section 5.10. Heritage items in the Wyong LGA are listed in Schedule 5 of the LEP. No Aboriginal sites in the Project Area are listed in Schedule 5.

2.5 Aboriginal Community Consultation

Aboriginal community consultation is not a formal requirement of the due diligence process (DECCW 2010:3); therefore the proponent is not obliged to undertake Aboriginal community consultation. Aboriginal community consultation was not undertaken for this due diligence assessment.

3.0 Environmental Context

The purpose of reviewing the relevant environmental information is to assist in identifying whether Aboriginal objects or places are present within the Project Area. The environmental context forms part of the desktop assessment required under the Due Diligence Codes (DECCW 2010:12-13).

3.1 Geology and Soils

Aboriginal people often made stone tools using siliceous, metamorphic or igneous rocks and therefore understanding the local geology can provide important information regarding resources in a study area. The nature of stone exploitation by Aboriginal people depends on the characteristics of the source, for example whether it outcrops on the surface (a primary source), or whether it occurs as gravels (a secondary source) (Doelman et al. 2008).

The Project Area is underlain by both the Quaternary Alluvial and Clifton sub-group geological formations.

The Quaternary Alluvial geological formation largely comprises gravel, sand, silt and clay. The Clifton Sub-Group is a Triassic geological formation, falling under the Narabeen Group of formations. It predominantly includes pebbly sandstone, grey green and grey siltstone and claystone. Some small areas in the landscape may contain coarse quartz sandstone (Murphy 1993:49).

The dominant soil landscapes represented within the Project Area are the Wyong and Doyalson landscapes.

The Wyong soil landscape is characterised by broad, poorly drained floodplains on Quaternary alluvium. These deltaic floodplains and alluvial flats are subject to flooding and seasonal waterlogging, with strongly acidic impermeable soils of very low fertility. Slope gradients of this landscape are approximately 3%, with local relief at below 10 metres (Murphy 1993:87). Topsoils comprise brownish black loam generally up to 40 cm in depth which is underlain by clay (Table 1).

The Doyalson soil landscape is characterised by gently undulating rises on Munmorah Conglomerate. Soils in this area are moderately deep occurring over sandstones and conglomerates, moderately deep soils occurring on fine-grained siltstones and claystone and moderately deep to deep leached earths and soils occurring along drainage lines. Slope gradients in this landscape are generally below 10% with local relief to approximately 30 metres (Murphy 1993:55). Topsoils comprise brown loose loamy sand to sand and light yellow clayey sand in the upper 40cm of the soil profile, this is underlain by clay (Table 2).

Table 1 Wyong Soil Landscape (Murphy 1993:87-8)

Soil	Dominant Material
wy1	Brownish black loam to silty clay loam with moderate sub-angular structure and a rough ped fabric 0-40 cm. It occurs as topsoil (A horizon) Colour ranges from a common brownish black (10YR 1.7/1) when organic matter is abundant to greyish yellow brown (10YR 4/2). Roots are common, but charcoal and rock fragments are absent.
wy2	Brownish silty to heavy clay with massive structure when wet and strong angular blocky structure when dry. It occurs as subsoil (B horizon). This material is often plastic and silty. It is often permanently waterlogged at depth with strong anaerobic odour. Roots are rare and charcoal and rock fragments are absent

Table 2 Doyalson Soil Landscape Murphy (1993:55-6)

Soil	Dominant Material
do1	Brown loose sand to loamy sand with coarse-grained texture and single-grained structure with sandy fabric 0-10cm. It occurs as topsoil (A1 horizon). This material is often water repellent. Colour ranges from brownish black (10YR 3/1) to dull yellowish brown (10YR 5/3). Gravel-sized sandstone rock fragments, quartz and conglomerate pebbles may be common. Roots are common and charcoal fragments often present.
do2	Light yellow clayey sand with sandy fabric up to 30cm. It usually occurs as shallow subsoil (A2 horizon) but is sometimes exposed at the surface (A1 horizon). Colours range from dull yellowish brown (10YR 5/3) to dull yellow orange (10YR 7/3). Roots are common, charcoal fragments are few and sandstone rock fragments, quartz and conglomerate pebbles are often present.
do3	Light sandy clay loam to sandy clay loam with massive structure and porous earthy fabric, occurring 30-40 below ground surface. It occurs as subsoil (B horizon). Colour ranges from brown (10YR 4/4) to more common bright yellowish brown (10YR 6/6). Sandstone rock fragments and quartz and conglomerate pebbles are often common, but roots are few and charcoal fragments are absent
do4	Light grey sandy clay loam to medium clay with massive structure and dense earthy fabric. It occurs as deep subsoil overlying bedrock (B3 –C horizon). Colour ranges from common light grey (2.5Y 8/1, 10YR 8/1) to dull yellow orange (10YR 7/2, 10YR 6/4). Stones including sandstone rock fragments, quartz and conglomerate pebbles are often present. Charcoal fragments are absent and roots are few.
do5	Light to medium clay with strongly developed structure and smooth ped fabric. It occurs as subsoil (B horizon) on fine- grained bedrock. Colour ranges from reddish brown (5YR 4/8) to dull yellow orange (10YR 7/2). Grey and/or orange and/or red mottles are often present and increase in number with depth. Small rock fragments are commonly present, roots are few and charcoal fragments are rare or absent.

3.2 Topography and Hydrology

Topography where underlain by the Wyong soil landscape is generally broad, with levees and swamps commonly occurring. Low lying, slightly elevated terraces are occasionally present in this area (Murphy 1993:87). Where underlain by the Doyalson soil landscape, topography is generally characterised by undulating rises with local relief to 30 metres. Broad crests and ridges and long gently inclined slopes are the dominant landform elements in the area. Drainage lines are broad where occurring, rock outcrop is usually absent (Murphy 1993:55).

The Project Area is along the foreshore of Lake Macquarie, a large coastal salt water lagoon. Several smaller streams and drainage lines flow through the Project Area towards Lake Macquarie including Karignan Creek, in addition to several lakes and interconnected coastal lagoons including Lake Munmorah, Colongra Lake and Mannering Lake, which are located within one kilometre of the Project Area.

3.3 Flora and Fauna

The purpose of this section is to provide an indication of the types of flora and fauna resources which were likely to have been available to Aboriginal people in the past. It is based on broad scale vegetation mapping for NSW (Keith 2002) and does not replace more detailed studies undertaken for the Study Area.

Past Aboriginal people are likely to have encountered Sydney Coastal Dry Sclerophyll Forests.

The Sydney Coastal Dry Sclerophyll Forest is the most diverse of the Sydney dry sclerophyll forests and encompasses a wide range of related forest and woodland communities. In sheltered gullies with moist but freely draining soils the eucalypt canopy may exceed 25 metres high. Common tree species found within this community include the Sydney red gum, red bloodwood, Sydney peppermint, brown stringybark, various species of scribbly gum and the old man banksia. The community is also characterised by a shrub layer that features various species of wattle and banksia, as well as the mountain devil, flaky-barbed teatree, broad-

leaved geebung and the grass tree. Typical grasses include wiry panic, oat speargrass, heath bogrush and black bog-rush (Keith 2002:147).

This vegetation community would have provided habitats for a variety of animals, as well as potential food and raw material sources for Aboriginal people. Grass trees, for example, were used by Aboriginal people to manufacture spears and resin, and also as a food source (Nash 2004:5). Various banksia species were collected and used to manufacture needles for basket and mat weaving, while the fruit of the geebung was eaten and string and fishing lines were soaked in a geebung bark infusion to prevent fraying (Nash 2004:2, 4). Eucalyptus trees were a particularly important resource; leaves were crushed and soaked for medicinal purposes, bowls, dishes, and canoes were made from the bark, and spears, boomerangs and shields were crafted from the hard wood (Nash 2004:4-8).

Typical animals which may have been hunted or trapped by Aboriginal people include kangaroos, wallabies, sugar gliders, possums, echidnas, a variety of lizards and snakes, birds, as well as rats and mice. The bones of such animals have been recovered from Aboriginal sites excavated in the Sydney region suggesting they were sources of food (Attenbrow 2010:70-76), although the hides, bones and teeth of some of the larger mammals may have been used for Aboriginal clothing, ornamentation, or other implements.

3.4 Synthesis of Environmental Context

The Project Area includes environments that could be considered suitable for the occupation of past Aboriginal communities. Flora and fauna species utilised as dietary resources by past Aboriginal people were likely abundant within the Project Area prior to European settlement. Raw materials, such as quartz, for the production of stone tools could have been sourced from the underlying geology. The landscape is located close to several water sources of varying potability. Soils in the area are largely characterised by moderately deep to deep soils, which may have been subject to significant movement as a result of land uses.

4.0 Heritage Context

The purpose of reviewing the relevant heritage information is to assist in identifying whether Aboriginal objects or places are present within the Project Area. The heritage context forms part of the desktop assessment required under the Due Diligence Codes (DECCW 2010:12-13).

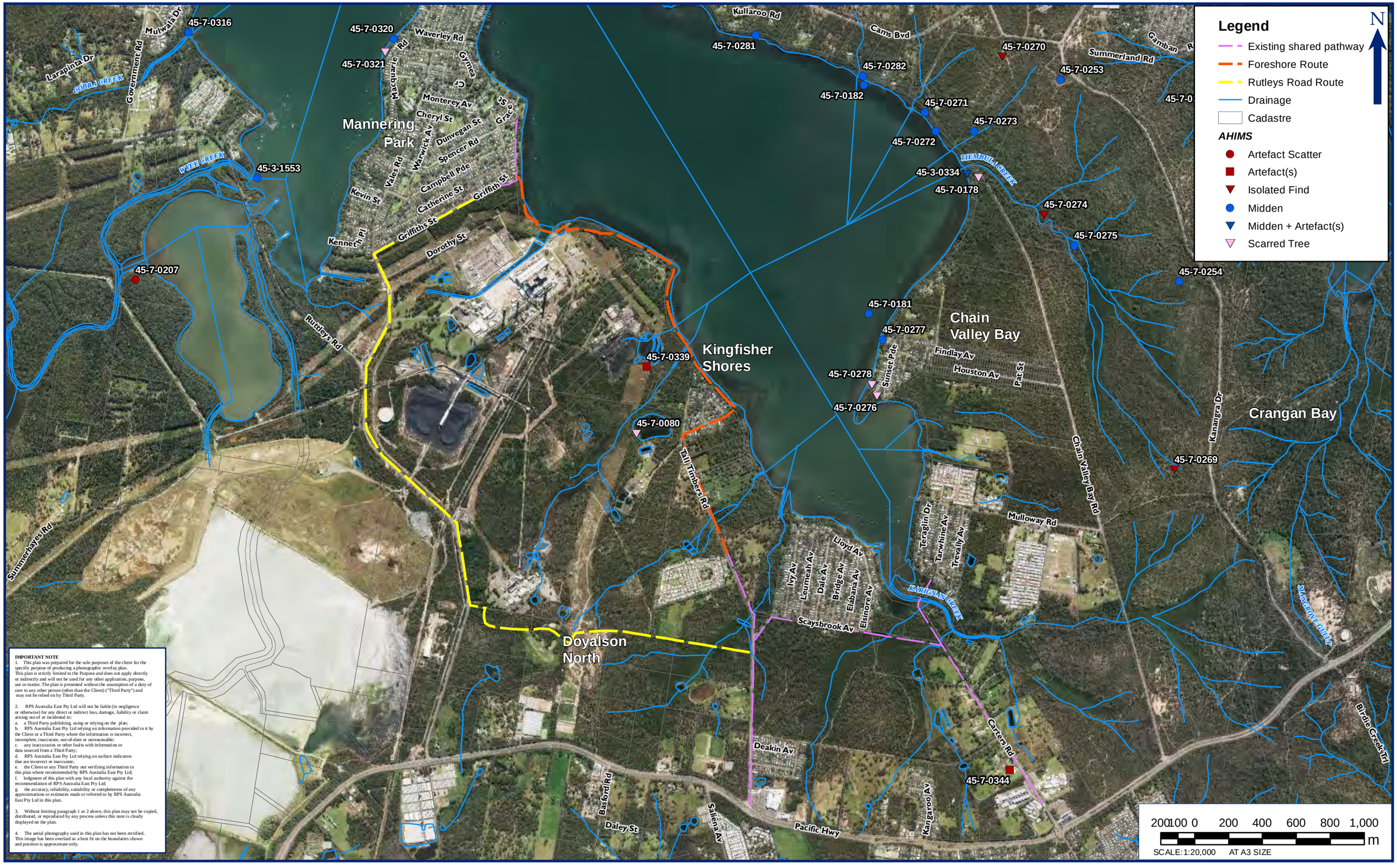
4.1 Aboriginal Heritage Information Management System (AHIMS)

The Lake Macquarie foreshore was often utilised by Aboriginal people, as evidenced by numerous middens identified. There is evidence for Aboriginal sites further away from the foreshore, but these are less common. A search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 1 June 2017 for a 5 kilometre radius of the project area and 79 Aboriginal sites were identified(Table 3). The majority of these sites are middens, with most located along the foreshore. Sites further inland tend to comprise surface artefacts (artefact scatters and isolated finds), scarred trees and potential archaeological deposits (Figure 2).

Table 3 AHIMS Search Results Summary

Site Type	Frequency	Percent
Midden	42	53.16%
Artefact	20	25.32%
Modified Tree	7	8.86%
Potential Archaeological Deposit (PAD)	3	3.80%
PAD with Artefact	2	2.53%
Grinding Groove	2	2.53%
PAD with Midden	1	1.27%
Ochre Quarry	1	1.27%
Modified Tree with Burial	1	1.27%
Total	79	100%

Source: AHIMS Search Eastings: 359000 to 369000, Northings: 6325500 to 6335500, GDA94, Zone 56



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4. The aerial photography used in this plan has not been rectified. This image has been overlaid as a best fit on the boundaries shown and position is approximate only.

TITLE : **FIGURE 2: PROJECT AREA WITH AHIMS**

LOCATION : **MANNERING PARK**

DATUM:GDA 1994

PROJECTION: GDA 1994 MGA Zone 56

DATE : **19/06/2017**

PURPOSE: **HERITAGE**

VERSION (PLAN BY): A A3 (Natalie.Wood)

PATH: J:\JOBS\136k\136555 Mannering\10 - Drafting\Arcgis Map Documents\Arch\136555 Figure 2 PA A A3 20170619.mxd

CLIENT: **CENTRAL COAST COUNCIL**

JOB REF: **PR136555**

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4.2 Archaeological Heritage Literature Review

This section draws upon previous archaeological work undertaken in the local area.

Dallas. (1986). Appendix C: Pipeline Route between Gwandalan and Mannering Park Sewage Treatment Works, Wyong Shire Council.

In 1986, an archaeological survey was conducted for a pipeline route between the Gwandalan and Mannering Park Sewage Treatment Work sites. As a component of this report a pedestrian survey of the proposed pipeline area was conducted. During the course of this survey, an Aboriginal midden site was located at the south side of the mouth of Tiembula Creek. The midden had been subject to both surface and subsurface disturbance including garbage dumping, tracks caused by vehicular movement and construction and maintenance of a power line. The proposed pipeline traversed the easternmost limit of the shell scatter, it was concluded in this report that the pipeline construction was unlikely to unearth midden deposit (Dallas 1986).

RPS. (2011) Cultural Heritage Assessment for Mannering Colliery, NSW. Report to Centennial Mannering Pty Ltd.

In November 2011, RPS conducted a Cultural Heritage Assessment for the Mannering Colliery Extension located near Lake Macquarie. Three recorded sites were present within the proposed development area, and the riparian corridor of Wyee Creek was also considered to have high potential for archaeological deposits. As a component of this report an archaeological field survey was undertaken, resulting in the identification and recording of two new sites; a midden and a culturally modified tree. Both were located along the foreshore (RPS 2011).

4.3 Synthesis of Heritage Context

The desktop assessment conducted for this due diligence assessment indicates that middens and artefacts are the most likely site features to be identified within the project area. With middens more likely to occur along the foreshore and waterways draining into Lake Macquarie, with surface artefacts, scarred trees and PADs more likely to occur over 200 metres from the foreshore.

5.0 Field Results and Route Selection

A visual inspection of Foreshore route and Rutleys Road route was undertaken by RPS Senior Cultural Heritage Consultant/Manager on 5 June 2017, along with David Morrison and Gilbert Whyte of GHD.

The Foreshore route included disturbed and modified landforms, as well as some natural landforms. The Foreshore route has existing pathways and landscaped lawns (Plate 1). Modifications to this area include installations associated with the Mannering Power Station (Plate 2) and the electricity easement (Plate 3). Less disturbed areas included cleared tracks (Plate 4). Portions of the foreshore were thickly vegetated (Plate 5), with others partially landscaped and vegetated (Plate 6). Ground surface exposure was approximately 30% (Plate 7) and ground surface visibility 40%. The closest AHIMS Aboriginal sites were 300 metres from the Foreshore Route.

No Aboriginal sites were identified along the Foreshore Route.

The Rutleys Road route comprised highly modified landforms associated with the road apron of Rutleys Road, disturbed landforms associated with the electricity easement, as well as orchards and vegetated areas. There was a high degree of modification and disturbance along Rutleys Road (Plate 8), as well as the electricity easement (Plate 9). Areas with lower disturbance include dirt tracks (Plate 10) and highly vegetated areas (Plate 11). Throughout this route there were areas of exposure, some just topsoil erosion, but, in others it had been eroded to B horizon (Plate 12). Exposures overall were approximately 30% with visibility at 40% overall. The closest Aboriginal sites to this route option were 1.5 kilometres away. No Aboriginal sites were identified along this route.

5.1 Route Selection

There are no Aboriginal sites in either route option and both route options are unlikely to impact Aboriginal heritage. The Foreshore route has a slightly higher likelihood for Aboriginal occupation, due to the high number of middens along the foreshore and generally the recorded AHIMS sites are closer to this route option. Conversely, the Rutleys Road route is located further back from the foreshore in a less archaeologically sensitive landscape and is located further away from the recorded AHIMS sites.

6.0 Conclusions and Recommendations

This due diligence assessment provided a high level assessment of both route options and identified that neither are likely to impact upon Aboriginal heritage. Due to the sensitivity of the foreshore for Aboriginal heritage, there is a slightly higher likelihood for Aboriginal occupation along the Foreshore route. Once the shared pathway option is identified a detailed due diligence survey of the route is to be undertaken.

Recommendation 1

Once the shared pathway route is identified for detailed design, a comprehensive due diligence survey of the development impact footprint is to be undertaken.

7.0 References

Attenbrow, V. 2010. Sydney's Aboriginal Past: Investigating the archaeological and historical records: UNSW Press.

Dallas, M. 1986. "Pipeline Route between Gwandalan and Mannering Park Sewage Treatment Works." Report to Wyong Shire Council.

DECCW. 2010. "Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales." edited by Department of Environment Climate Change and Water.

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Keith, D. 2002. A Compilation Map of Native Vegetation for New South Wales: NSW Biodiversity Strategy.

Murphy, C.L. 1993. Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheet (Redhead, Wyong, Gosford, Spencer, Laguna): Department of Conservation and Land Management.

Nash, Daphne. 2004. "Aboriginal Plant Use in South-Eastern Australia." edited by Australian National Botanic Gardens.

RPS. 2011. "Cultural Heritage Assessment for Mannering Colliery, NSW." Centennial Mannering Pty Ltd.

8.0 Plates

Plate 1 Example of landscaped lawns and pathways along Foreshore Route

Plate 2 Landform Modification around Mannering Power Station along Foreshore Route

Plate 3 Modification and disturbance for electricity easement along Foreshore Route

Plate 4 Dirt tracks along Foreshore Route

Plate 5 Vegetated foreshore along Foreshore Route

Plate 6 Landscaped and vegetated area at Kingfisher Shores along Foreshore Route

Plate 7 Example of exposure along Foreshore Route

Plate 8 Modified and disturbed landforms along the Rutleys Road Route

Plate 9 Electricity easement in Rutleys Road Route

Plate 10 Dirt track along Rutleys Road Route

Plate 11 Highly vegetated area along Rutleys Road Route

Plate 12 Example of an exposure along the Rutleys Road Route

Appendix 1

Legislative Requirements

Summary of Statutory Controls

The following overview of the legal framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. RPS will not be liable for any actions taken by any person, body or group as a result of this general overview, and recommend that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the summary below.

COMMONWEALTH

Aboriginal & Torres Strait Islander Heritage Protection Act 1984 (ATSIHIP Act)

The purpose of this Act is to preserve and protect all heritage places of particular significance to Aboriginal and Torres Strait Islander people. This Act applies to all sites and objects across Australia and in Australian waters (s4).

It would appear that the intention of this Act is to provide national baseline protection for Aboriginal places and objects where State legislation is absent. It is not to exclude or limit State laws (s7(1)). Should State legislation cover a matter already covered in the Commonwealth legislation, and a person contravenes that matter, that person may be prosecuted under either Act, but not both (s7(3)).

The Act provides for the preservation and protection of all Aboriginal objects and places from injury and/or desecration. A place is construed to be injured or desecrated if it is not treated consistently with the manner of Aboriginal tradition or is or likely to be adversely affected (s3).

STATE

It is incumbent on any land manager to adhere to state legislative requirements that protect Aboriginal Cultural heritage. The relevant legislation is NSW includes but is not limited to the summary below.

National Parks and Wildlife Act 1974 (NPW Act)

The NPW Act provides statutory protection for all Aboriginal heritage, places and objects (not being a handicraft made for sale), with penalties levied for breaches of the Act. This legislation is overseen by the Office of Environment and Heritage (OEH), and specifically the Chief Executive (formerly the Director-General) of OEH. Part 6 of this Act is the relevant part concerned with Aboriginal objects and places, with Section 86 and Section 90 being the most pertinent. In 2010, this Act was substantially amended, particularly with respect to Aboriginal cultural heritage requirements. Relevant sections include:

Section 86

This section now lists four major offences:

(1) A person must not harm an object that the person knows is an Aboriginal object;

(2) A person must not harm and Aboriginal object;

(3) For the purposes of s86, “circumstances of aggravation” include:

  (a) The offence being committed during the course of a commercial activity; or

  (b) That the offence was the second or subsequent offence committed by the person;

(4) A person must not harm or desecrate an Aboriginal place.

Offences under s86 (2) and (4) are now strict liability offences, i.e., knowledge that the object or place harmed was an Aboriginal object or place needs to be proven. Penalties for all offences under Part 6 of this Act have also been substantially increased, depending on the nature and severity of the offence.

Section 87

This section now provides defences to the offences of s86. These offences chiefly consist of having an appropriate Aboriginal Heritage Impact Permit (AHIP), not contravening the conditions of the AHIP or demonstrating that due diligence was exercised prior to the alleged offence.

Section 87A & 87B

These sections provide exemptions from the operation of s86; Section 87A for authorities such as the Rural Fire Service, State Emergency Services and officers of the National Parks & Wildlife Service in the performance of their duties, and s87B for Aboriginal people performing traditional activities.

Section 89A

If a person knows of the location of an Aboriginal object or place that has not been previously registered and does not advise the Director-General (now Chief Executive) of that object or place within a reasonable period of time, then that person is guilty of an offence under this Section of the Act.

Section 90

This section authorises the Director-General (now Chief Executive) to issue and AHIP.

Section 90A-90R

These sections govern the requirements relating to applying for an AHIP. In addition to the amendments to the Act, OEH have issued three new policy documents clarifying OEH's requirements with regards to Aboriginal archaeological investigations: *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010, Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW and Code of Practice for Archaeological Investigations in NSW*. The Consultation Requirements formalise the consultation with Aboriginal community groups into four main stages, and includes details regarding the parties required to be consulted, advertisements inviting Aboriginal community groups to participate in the consultation process, requirements regarding the provision of methodologies, draft and final reports to the Aboriginal stakeholders and timetables for the four stages. The Due Diligence Code of Practice sets out the minimum requirements for investigation, with particular regard as to whether an AHIP is required. The Code of Practice for Archaeological Investigation sets out the minimum requirements for archaeological investigation of Aboriginal sites.

Aboriginal Heritage Impact Permits (AHIP)

OEH encourages consultation with relevant Aboriginal stakeholders for all Aboriginal Heritage Assessments. However, if an Aboriginal Heritage Impact Permit (AHIP) is required for an Aboriginal site, then specific OEH guidelines are triggered for Aboriginal consultation.

Aboriginal Cultural Heritage Consultation Requirements for Proponents

In 2010, the Aboriginal Cultural Heritage Consultation Requirements for Proponents (ACHCRs) were issued by OEH (12 April 2010). These consultation requirements replace the previously issued Interim Community Consultation Requirements (ICCR) for Applicants (Dec 2004). These guidelines apply to all AHIP applications prepared after 12th April 2010; for projects commenced prior to 12th April 2010, transitional arrangements have been stipulated in a supporting document, Questions and Answers 2: Transitional Arrangements.

The ACHCRs 2010 include a four stage Aboriginal consultation process and stipulate specific timeframes for each state. Stage 1 requires that Aboriginal people who hold cultural information are identified, notified and invited to register an expression of interest in the assessment. Stage 1 includes the identification of Aboriginal people who may have an interest in the project area and hold information relevant to determining the cultural significance of Aboriginal objects or places. This identification process should draw on reasonable sources of information including: the relevant OEH EPRG regional office, the relevant Local Aboriginal Land Council(s), the Registrar of Aboriginal Owners, Aboriginal Land Rights Act (1983), the Native Title Tribunal, Native Title Services Corporation Limited, the relevant local council(s), and the relevant

catchment management authority. The identification process should also include an advertisement placed in a local newspaper circulating in the general location of the project area. Aboriginal organisations and/or individuals identified should be notified of the project and invited to register an expression of inters (EoI) for Aboriginal consultation. Once a list of Aboriginal stakeholders has been compiled from the EoI's, they need to be consulted in accordance with ACHCR's Stages 2, 3 and 4.

Environmental Planning & Assessment Act 1979 (EP&A Act)

This Act regulates a system of environmental planning and assessment for New South Wales. Land use planning requires that environmental impacts are considered, including the impact on cultural heritage and specifically Aboriginal heritage. Within the EP&A Act, Parts 3, 4 and 5 relate to Aboriginal heritage.

Part 3 regulates the preparation of planning policies and plans. Part 4 governs the manner in which consent authorities determine development applications and outlines those that require an environmental impact statement. Part 5 regulates government agencies that act as determining authorities for activities conducted by that agency or by authority from the agency. The National Parks & Wildlife Service is a Part 5 authority under the EP&A Act.

In brief, the NPW Act provides protection for Aboriginal objects or places, while the EP&A Act ensures that Aboriginal cultural heritage is properly assessed in land use planning and development.

Heritage Act 1977

This Act protects the natural and cultural history of NSW with emphasis on non-indigenous cultural heritage through protection provisions and the establishment of a Heritage Council. Although Aboriginal heritage sites and objects are primarily protected by the *National Parks & Wildlife Act* 1974, if an Aboriginal site, object or place is of great significance, it may be protected by a heritage order issued by the Minister subject to advice by the Heritage Council.

Other legislation of relevance to Aboriginal cultural heritage in NSW includes the *NSW Local Government Act* 1993. Local planning instruments also contain provisions relating to indigenous heritage and development conditions of consent.

Appendix 2

AHIMS

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : PR136555 Mannering

Client Service ID : 284239

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-7-0131	Summerland Point;	AGD	56	366820	6332970	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-7-0138	Bonny Boy Gully;	AGD	56	366820	6332970	Open site	Valid	Shell : -, Artefact : -	Midden	1846
	Contact	**Recorders**	Helen Brayshaw					**Permits**		
45-7-0144	Windemere Ck 1;	AGD	56	363000	6334600	Open site	Valid	Shell : -, Artefact : -	Midden	2237,102219
	Contact	**Recorders**	Anne Lloyd					**Permits**		
45-7-0154	M7 Fishery Point	AGD	56	366050	6334500	Open site	Valid	Shell : 2, Artefact : -	Midden	2685
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Kerry Navin,Umwelt (Australia) Pty Limited					**Permits**	597	
45-7-0157	M10 Casuarina Point Reserve	AGD	56	366300	6334990	Open site	Valid	Shell : -, Artefact : -	Midden	2685
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Kerry Navin					**Permits**	597	
45-7-0158	M11;Lakeview Road, Bardens Bay;	AGD	56	363500	6334110	Open site	Valid	Shell : -, Artefact : -	Midden	2685,102219
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Kerry Navin					**Permits**	598	
45-7-0159	M12;Bulgonia Road, Bardens Bay;	AGD	56	363950	6334850	Open site	Valid	Shell : -, Artefact : -	Midden	2685,102219
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Kerry Navin					**Permits**	611	
45-7-0166	M8;Dandaraga Road, Sugar Bay;	AGD	56	365300	6334500	Open site	Valid	Shell : -, Artefact : -	Midden	2685
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Kerry Navin					**Permits**		
45-7-0167	M9;Camp Brightwaters;	AGD	56	363500	6334880	Open site	Valid	Shell : -, Artefact : -	Midden	2685,102219
	Contact	**Recorders**	Mary Dallas Consulting Archaeologists,Kerry Navin					**Permits**		
45-7-0176	Gwandalan;	AGD	56	367200	6333300	Open site	Valid	Shell : -, Artefact : -	Midden	2465,102129
	Contact	**Recorders**	Tom Griffiths					**Permits**		
45-7-0178	Hembula Creek - Scarred Tree 1&2;HC-ST 1&2;	AGD	56	366800	6330400	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Mr.Gavin Newton					**Permits**		
45-7-0179	Black Neds Point;	AGD	56	365150	6331450	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0181	Chain Valley Bay 1	AGD	56	366150	6329600	Open site	Valid	Shell : -, Artefact : -	Midden	101093
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0182	Chain Valley Bay 2;	AGD	56	366120	6330950	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0183	Diamond Drill Pt. North;	AGD	56	368050	6333200	Open site	Valid	Artefact : -, Shell : -	Midden	102129
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0184	Gwandalan;	AGD	56	368500	6331800	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0186	Pt Wolstonecraft 1;	AGD	56	368350	6334200	Open site	Valid	Shell : -, Artefact : -	Midden	

Report generated by AHIMS Web Service on 01/06/2017 for Tessa Boer-Mah for the following area at Datum :GDA, Zone : 56, Eastings : 359000 - 369000, Northings : 6325500 - 6335500 with a Buffer of 0 meters. Additional Info : assessment. Number of Aboriginal sites and Aboriginal objects found is 79

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0189	Sandy Beach 1;	AGD	56	364950	6331450	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	L.M Nelson					**Permits**		
45-7-0207	The Hole 1 (TH1)	AGD	56	361820	6329800	Open site	Valid	Artefact : -	Open Camp Site	3697,101093
	Contact	**Recorders**	Kerry Navin,Mr.Kelvin Officer,P Saunders					**Permits**		
14-7-0149	Gwandalan	AGD	56	368000	6333300	Open site	Valid	Shell : -, Artefact : -	Midden	102129
	Contact	**Recorders**	Tom Griffiths					**Permits**		
45-3-3179	B11	AGD	56	359563	6325450	Open site	Valid	Artefact : -		100541,100863,101093
	Contact	**Recorders**	Therin Archaeological Consulting					**Permits**		
45-3-3186	BR10	AGD	56	359612	6326462	Open site	Valid	Artefact : -		100541,100863,101093
	Contact	**Recorders**	Michael Therin					**Permits**		
45-7-0234	Sinshine Park , Sunshine	AGD	56	365895	6335284	Open site	Valid	Potential Archaeological Deposit (PAD) : 3		
	Contact	**Recorders**	Umwelt (Australia) Pty Limited					**Permits**		
45-7-0249	PAD 1 - Munmorah	AGD	56	363200	6325900	Open site	Valid	Potential Archaeological Deposit (PAD) : -, Artefact : 7		100751,100944
	Contact T Russell	**Recorders**	Heritage Concepts,J Czastka					**Permits**	2780,2781	
45-7-0250	PAD 2 - Munmorah	AGD	56	363175	6325350	Open site	Valid	Potential Archaeological Deposit (PAD) : -, Artefact : 8		100751,100944
	Contact	**Recorders**	Heritage Concepts,Mr.Jakub Czastka					**Permits**	2780,2781	
45-7-0251	PAD 3 - Munmorah	AGD	56	361000	6326250	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Heritage Concepts,Mr.Jakub Czastka					**Permits**		
45-3-3435	RPS HSO MwP1	AGD	56	359424	6334225	Open site	Valid	Shell : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	RPS Australia East Pty Ltd-Blacktown					**Permits**		
45-7-0290	Gwandalan 1	AGD	56	368088	6329979	Open site	Valid	Shell : -		
	Contact	**Recorders**	Doctor.Tim Owen,ERM Australia Pty Ltd- Sydney CBD					**Permits**		
45-7-0316	RPS Wyee Point 2	GDA	56	362237	6331450	Open site	Valid	Shell : -		
	Contact	**Recorders**	RPS Australia East Pty Ltd -Hamilton,Ms.Laraine Nelson					**Permits**		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : PR136555 Mannering

Client Service ID : 284239

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-7-0293	RPS MP3	GDA	56	365058	6335017	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	RPS Australia East Pty Ltd -Hamilton,Ms.Laraine Nelson					**Permits**		
45-7-0190	Wyee Point	AGD	56	362398	6331810	Open site	Valid	Shell : -, Artefact : -	Midden	102219
	Contact	**Recorders**	L.M Nelson,RPS Australia East Pty Ltd -Hamilton,Ms.Laraine Nelson					**Permits**		
45-7-0291	RPS HSO M1	GDA	56	361555	6331952	Open site	Valid	Shell : -		
	Contact Koompahtoo LALC	**Recorders**	RPS Australia East Pty Ltd -Hamilton,Ms.Laraine Nelson					**Permits**		
45-7-0357	Noamunga CR Midden	GDA	56	368583	6333118	Open site	Valid	Shell : -		
	Contact	**Recorders**	Ms.Sharon Hodgetts					**Permits**		
45-7-0226	K 4 Koompahtoo	AGD	56	360390	6334990	Open site	Valid	Artefact : -	Isolated Find	99218,102219
	Contact	**Recorders**	William Smith					**Permits**		
45-3-3165	K 1 Koompahtoo	AGD	56	359490	6332490	Open site	Valid	Artefact : -	Open Camp Site	99218,102219
	Contact	**Recorders**	William Smith					**Permits**		
45-7-0225	K 3 Koompahtoo	AGD	56	360650	6334900	Open site	Valid	Artefact : -	Isolated Find	99218,102219
	Contact	**Recorders**	William Smith					**Permits**		
45-7-0079	Crangan Bay;Stranger Gully;	AGD	56	368450	6330750	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-7-0001	Morisset Hospital	AGD	56	361550	6332450	Open site	Valid	Shell : -, Artefact : -	Midden	1263,102219
	Contact	**Recorders**	L.M Nelson,A.J Barrett					**Permits**		
45-7-0003	Vales Point;Lake Macquarie;	AGD	56	363738	6331615	Open site	Valid	Shell : -, Artefact : -	Midden	102219
	Contact	**Recorders**	Wyong Shire Council					**Permits**	730	
45-3-1553	Wyee Bay;Ruttleys Road;	AGD	56	362540	6330400	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Val Attenbrow,Glen Morris					**Permits**		
45-7-0262	SJOG 7	GDA	56	364036	6333848	Open site	Valid	Grinding Groove : 6		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
45-7-0263	SJOG 6	GDA	56	364026	6333875	Open site	Valid	Shell : -		
	Contact	**Recorders**	Mrs.Angela Besant					**Permits**		
45-7-0239	MP 1	AGD	56	362100	6334400	Open site	Valid	Potential Archaeological Deposit (PAD) : -		102219
	Contact T Russell	**Recorders**	Mrs.Angela Besant					**Permits**	2115	
45-7-0253	Gwandalan 2	GDA	56	367386	6331169	Open site	Valid	Shell : -		
	Contact	**Recorders**	Doctor.Tim Owen					**Permits**		
45-7-0254	gwanddalan 1	GDA	56	368088	6329979	Open site	Valid	Shell : -		
	Contact	**Recorders**	Doctor.Tim Owen					**Permits**		

Report generated by AHIMS Web Service on 01/06/2017 for Tessa Boer-Mah for the following area at Datum :GDA, Zone : 56, Eastings : 359000 - 369000, Northings : 6325500 - 6335500 with a Buffer of 0 meters. Additional Info : assessment. Number of Aboriginal sites and Aboriginal objects found is 79

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-3-3166	K 2 Koompahtoo	AGD	56	359840	6332530	Open site	Valid	Artefact : -	Isolated Find	99218,102219
Contact	Recorders	William Smith						Permits		
45-7-0255	Trinity Point GG2 (Catherine Hill Bay)	GDA	56	363618	6333664	Open site	Valid	Grinding Groove : -		102219
Contact	Recorders	Mrs.Angela Besant						Permits		
45-7-0256	Trinity Point Scarred Tree 2 (Catherine Hill Bay)	GDA	56	363749	6333815	Open site	Not a Site	Modified Tree (Carved or Scarred) : -		102219
Contact	Recorders	Mrs.Angela Besant,Insite Heritage Pty Ltd,Urban Tree Management						Permits		
45-7-0257	Trinity Point Ochre (Catherine Hill Bay)	GDA	56	363958	6333791	Open site	Valid	Ochre Quarry : -		102219
Contact	Recorders	Mrs.Angela Besant						Permits		
45-7-0258	Trinity Point IF1 (Catherine Hill Bay)	GDA	56	363730	6333744	Open site	Valid	Artefact : -		102219
Contact	Recorders	Mrs.Angela Besant						Permits		
45-7-0338	RPS GWANDALAN IF1	GDA	56	368263	6331126	Open site	Valid	Artefact : 1		
Contact	Recorders	RPS - Echuca						Permits		
45-7-0320	RPS Mannering 1	GDA	56	363449	6331411	Open site	Valid	Shell : 1		
Contact	Recorders	Ms.Laraine Nelson						Permits		
45-7-0321	RPS Mannering 2	GDA	56	363401	6331331	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
Contact	Recorders	Ms.Laraine Nelson						Permits		
45-7-0339	CV 001	GDA	56	364943	6329478	Open site	Valid	Artefact : 1		
Contact	Recorders	Mrs.Rebecca Newell,EMGA Mitchell McLennan						Permits		
45-3-0334	Tiembula Creek Midden;Tiembula Creek;	AGD	56	366730	6330420	Open site	Valid	Shell : -, Artefact : -	Midden	1076
Contact	Recorders	Mary Dallas Consulting Archaeologists						Permits		
45-7-0227	St Johns 1	AGD	56	363680	6333520	Open site	Valid	Artefact : -		100896,102219
Contact	Recorders	Mrs.Angela Besant						Permits	1947	
45-7-0228	St Johns 2	AGD	56	363720	6333820	Open site	Valid	Artefact : -		100896,101024,102219
Contact	Recorders	Mrs.Angela Besant						Permits	1947,3855,3981	
45-7-0230	K3 KOOMPAHTOO	AGD	56	360650	6334900	Open site	Valid	Artefact : -		102219
Contact	Recorders	Stephen Griffen						Permits		
45-7-0080	Mannering Park;	AGD	56	364780	6328890	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	101093
Contact	Recorders	ASRSYS						Permits		

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SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-7-0244	St Johns 3	AGD	56	363560	6333600	Open site	Valid	Artefact : 1		100896,102219,102504
	Contact T Russell	**Recorders**	Mrs.Angela Besant					**Permits**	2845,2846,3864,3981,3984,4115	
45-3-3261	B9, Bushells Ridge	AGD	56	359601	6326537	Open site	Valid	Artefact : 2		
	Contact T Russell	**Recorders**	Michael Therin					**Permits**		
45-3-3263	B8, Bushells Ridge	GDA	56	359931	6325584	Open site	Valid	Artefact : 1		
	Contact T Russell	**Recorders**	Michael Therin					**Permits**		
45-7-0268	CV-04-09	GDA	56	368381	6331136	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0269	CV-06-09	GDA	56	368061	6328867	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0270	CV-07-09	GDA	56	367043	6331305	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0271	CV-08-09	GDA	56	366587	6330975	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0272	CV-09-09	GDA	56	366650	6330868	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0273	CV-10-09	GDA	56	366875	6330868	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0274	CV-12-09	GDA	56	367290	6330372	Open site	Valid	Artefact : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0275	CV-14-09	GDA	56	367468	6330191	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0276	CV-15-09	GDA	56	366304	6329303	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0277	CV-16-09	GDA	56	366335	6329635	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0278	CV-17-09	GDA	56	366273	6329369	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0279	CV-18-10	GDA	56	367003	6333279	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0280	CV-19-10	GDA	56	366988	6333151	Open site	Valid	Shell : 1		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : PR136555 Mannering

Client Service ID : 284239

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0281	CV-20-10	GDA	56	365588	6331434	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0282	CV-21-10	GDA	56	366221	6331192	Open site	Valid	Shell : -		
	Contact	**Recorders**	Mr.Geordie Oakes					**Permits**		
45-7-0344	St Brigids Individual Find 1	GDA	56	367087	6327096	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Ms.Sharon Hodgetts					**Permits**	3704	
45-7-0363	Woods Point Repatriation site	GDA	56	362530	6333367	Open site	Valid	Burial : 1, Modified Tree (Carved or Scarred) : 1		
	Contact Doctor.User Test	**Recorders**	Ms.Mary Temple (nee Ghosn)					**Permits**		

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Appendix D – TransGrid Easement Guidelines

TransGrid Easement Guidelines

Third Party Development

Background

TransGrid acquires Transmission Line (**TL**) and cable easements to provide adequate clearance along the route of a TL for construction and maintenance work and to preserve certain property rights in perpetuity. These easements also ensure no work or other activity is undertaken under or near a TL or cable that could create an unsafe situation either for persons or for the security of the TL or cable.

The TL or cable easement area and its ongoing maintenance are control measures that cannot be compromised. Easements are established to prevent and mitigate against the following electrical safety risks:

- Infringement of electrical safety clearances e.g. due to an activity or vegetation growth;
- Electrical Induction e.g. due to parallel conducting materials;
- Step and touch potentials under fault conditions e.g. due to lightning or bushfire;
- Failure of structures or line equipment e.g. due to third party vehicle or plant impact;
- Transfer off easement of dangerous voltages, e.g. by services installed within the easement area; and
- Blowout of a conductor under high wind (or blow in of vegetation) e.g. into an adjacent structure.

TransGrid's paramount concern is the safety of people and property. TransGrid is also bound to maintain its infrastructure efficiently and cost effectively. The TL and cable easements, along with the accesses, have been designed to facilitate effective operational maintenance.

Development Approval Process

The *Environmental Planning and Assessment Act 1979* may empower Local Councils to act as the consent authority for development applications. In these situations, a Development Application (DA) is prepared and submitted to the Local Council for development consent.

The *State Environmental Planning Policy (Infrastructure) 2007* (SEPP), which commenced on 1 January 2008, requires Local Councils to consult with Electricity Network Operators before granting development consent for proposals that might adversely affect:

- existing electricity infrastructure; and
- easements for electricity purposes, even if no infrastructure has yet been constructed in the easement.

The Local Council must take into consideration any comments made by the Electricity Network Operator who has 21 days to respond to any written notification of a DA received by Council. Council must take into consideration any comments provided by the Electricity Network Operator before it determines any DA. TransGrid's initial response may be a request for additional information to assess a development that seeks to encroach or is immediately adjacent to our easements and infrastructure. Such a request is likely to then be forwarded to the applicant.

The party submitting the development application is required to consult with TransGrid in accordance with the *State Environmental Planning Policy (Infrastructure) 2007* (**SEPP**); the *NSW Occupational Health and Safety Act 2000*; the WorkCover NSW *'Work Near Overhead Power Lines'* Code of Practice 2006, and; the WorkCover NSW *'Work Near Underground Assets'* Guide 2007.

TransGrid Approval

The statutory approval authority should obtain a written approval from TransGrid for all proposed activities within an easement area in accordance with regulation 45 of the *SEPP.*

It is recommended that the development proponent consult with TransGrid prior to lodging a DA, so the proposed development may be assessed relative to TransGrid's easements and infrastructure within the specific locality. Statutory notification pursuant to regulation 45 of the SEPP may not always provide an adequate response time for TransGrid to assess any development proposed within or immediately adjacent to our easements and infrastructure. Therefore, it is considered to be in the best interests of any development proponent to thoroughly consult and attempt to resolve all and any issues with TransGrid prior to submitting a DA. In consulting with TransGrid prior to submitting the DA, the following information must be provided.

1. Detailed specifications and plans drawn to scale and fully dimensioned, showing property boundaries and other relevant information. Survey plans must clearly identify TransGrid's easements; any high voltage transmission infrastructure located therein (including stanchions); and horizontal clearances;

2. Three dimensional CAD file of the development, preferably in 3D-DXF format; and

3. TransGrid will also require an *Impact Assessment* of the development on TransGrid's infrastructure and associated interests (including easements). Details of how any adverse impacts will be managed, mitigated or resolved must also be provided. The *Impact Assessment* form is contained in **Appendix A** of these guidelines.

Upon receipt of the abovementioned documentation, TransGrid will assess the proposed development in relation to its impact on TransGrid infrastructure, easements and means of access. For complicated proposals the consultation process will be comprehensive and the proponent should allow sufficient time for this process prior to lodgement of a DA (see *Timeframes* below).

General Development Proposal Guidelines

1. Prohibited Activities and Encroachments

A number of activities and encroachments are not permitted within the easement area. These are detailed in the "TransGrid Easement Guide" contained in **Appendix B** of these guidelines.

Any *Development Proposal* should be designed in such a way that:

- It does not involve the listed activities, nor introduce the identified encroachments; and
- Does not encourage other parties to undertake such activities or introduce such encroachments in the future.

2. Development

The Development Proposal should be planned taking into consideration the policy of "*prudent avoidance*" as identified by The Right Honourable Harry Gibbs Report (*Inquiry into Community Needs and High Voltage Transmission Line Development*).

This report placed recommendations on the design of new TL's having regard to their proximity to houses, schools, work sites and the like and is equally valid when considering new developments proposed in proximity to existing powerlines and associated easements.

The policy not only considers electrical safety risks it also takes into consideration Electric and Magnetic Field (EMF). The EMF strength rises from the easement edge to beneath the conductors and the most practical way to achieve *prudent avoidance* is to keep any development entirely outside the easement area.

If it is desired to place any part of a development within an easement the proponent shall, in conjunction with the *Development Proposal*, undertake an *Impact Assessment* (see **Appendix A**) to be provided to TransGrid that covers the changes in risk and mitigation measures proposed. General development requirements are listed in **Appendix C**.

Relocating Infrastructure and Interruption to Transmission

The development proponent will be liable for any costs involved in any agreed relocation of TransGrid infrastructure as part of any proposed development. Depending on how the development proposes to encroach on TransGrid's easement, an earthing study and earthing modifications may be required at the developer's expense. Further, the developer will also be liable for any costs and penalties incurred as a consequence of interruptions to TransGrid's transmission operations arising from the development, whether planned or inadvertent.

Post Construction Compliance Statement

The Development Proposal, as provided to TransGrid, must include as-built plans compliant with TransGrid's drawing management system of the final construction where approval of an encroachment is granted. The as-built drawings must be accurate, scaled and display distances/measurements, demonstrating compliance to the agreed plans and implementation of agreed control measures.

Timeframes

TransGrid will respond to a Local Council notification of a proposed development within 21 days as required in the SEPP, however that response may not be an approval (or disapproval). If the Development Proposal does not meet the requirements of these Guidelines, or in the event further detailed engineering analysis is required, TransGrid may require the Development Proposal to be revised and resubmitted or additional information will be sought.

Developers are advised to consider TransGrid's requirements early in the process as discussed and not as an afterthought that could result in project delays, including the future demolition of any prohibited construction works. To this extent, development proponents and their consultants are encouraged to contact and meet with TransGrid in the preliminary planning and design stages of the development in order to establish what restrictions and prohibitions apply and what, if any conditional encroachments can be accommodated.

Further Assistance

For any further development enquiry assistance please contact the Enquiries Services Coordinator:

Enquiries Services Coordinator	Telephone	(02) 9620 0104
	Mobile	0427 094 860
TransGrid Community Liaison Group	Phone	1800 222 537
	Email	community@transgrid.com.au
	Website	www.transgrid.com.au

Appendix A - Development Proposal Impact Assessment

Details of the Development

Street Address	
Land and Title References	
Encroachment and/or Proximity to Easement	
Development Proposal's Clearances to TransGrid's high voltage infrastructure	
Detailed plans of development attached	

Safety

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Are ground levels being changed within or in the vicinity of the easement? If so, by how much?	
Is any part of the development proposed within 30m of a transmission line structure or guy? If so, how close to the structure/guy?	
Will the development increase earth potential rise risk? (If unsure please consult with TransGrid Enquiries Services Coordinator.)	
Will the development contain metallic structures or services in the easement?	
Will the development result in voltages being transferred off the easement or bring remote earths onto the easement? (If unsure, please consult with TransGrid's Enquiries Services Coordinator.)	
Are public spaces or recreational areas proposed within or adjacent to the easement?	
Will the development encourage people to congregate and/or spend time within the easement or immediately adjacent thereto?	
Are structures with a height greater than 2.5m proposed on the easement?	
Will an Elevated Work Platform (EWP) be required to maintain any structures within the easement?	
Is infrastructure proposed that is a fire hazard, or that would encourage the storage or use of flammable material on the easement?	
Is infrastructure proposed that would require emergency workers (such as fire fighters) to come near, or their equipment to come onto or near high voltage conductors?	

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Will the easement or the nature of the land in the vicinity of the easement, be altered in any way that would encourage prohibited encroachments to occur within the easement?	
Will access around any TransGrid structure be altered preventing EWPs, crane or other plant access? (Required for TransGrid maintenance purposes.)	
Will the development introduce other risks to maintenance staff when working within the easement?	
Will access to the easement be altered that would introduce risks to TransGrid personnel including, although not limited to, asset inspectors or patrol staff?	

Operations

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Have any ground level developments been proposed (including roads, driveways, parking lots and turning bays etc) that would expose TransGrid transmission structures and lines to impact risk? (If unsure please consult with the TransGrid Enquiries Services Coordinator.)	
Will the development result in a change in water flows or drainage that could impact on the foundations or structural integrity of any TransGrid structure or guy-wire?	
Are excavations or surface activities proposed that would impact a TransGrid structure's foundations, stability or subterranean earthing systems? (If unsure please consult with the TransGrid Enquiries Services Coordinator.)	

Maintenance

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Have roads, driveways or landscaping been proposed that would prevent or hinder TransGrid maintenance, or increase maintenance costs, for the above or below ground components of the transmission line structure?	
Will access to the easement or within the easement, be obstructed, restricted or altered?	
Have access roads, bridges, crossings and the like been designed to cater for the weight and size of TransGrid maintenance plant (EWPs and Cranes)?	
Does the development encourage the placement of obstructions that would prevent access for routine or emergency works?	

Development Design & Construction

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Has the development been designed so that during the construction phase TransGrid is not restricted from undertaking normal maintenance and inspection activities?	
Has the development been designed so that during the construction phase prohibited activities or encroachments are not required in the easement area?	
Has the design health and safety risk assessment complied with the following WorkCover NSW instruments: • '*Work Near Overhead Power Lines*' Code of Practice 2006; and/or • *'Work Near Underground Assets'* Guide 2007?	

TransGrid's Rights

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Are TransGrid's existing access rights preserved, pursuant to the terms of the easement?	
Will TransGrid be exposed to new or higher maintenance costs (e.g. landscaping or other development changes impacting easement access, use and maintenance)?	
Does a new deed of easement need to be negotiated by the development proponent?	

Preservation of Easement for Access

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Will TransGrid's *Easement for Access* be affected?	
Does a new *Easement for Access* need to be arranged by the development proponent, including to supersede an existing registered right of carriageway?	

Appendix B - Prohibited encroachments and activities

TransGrid will use its powers under the Electricity Supply Act, involve WorkCover or take other legal action as required to prevent or halt prohibited activities.

1. Transmission Lines

Activities and encroachments that are **prohibited** within a Transmission Line (TL) Easement include, but are not limited to *(Note 2)*, the following:

- The construction of houses, buildings, substantial structures, or parts thereof.
- The installation of fixed plant or equipment.
- The storage of flammable materials, corrosive or explosive material.
- The placing of garbage, refuse or fallen timber.
- The planting or cultivation of trees or shrubs capable of growing to a height exceeding 4 metres.
- The placing of obstructions within 20 metres of any part of a transmission line structure or supporting guy-wire.
- Camping or the permanent parking of caravans or other camping vehicles.
- Public spaces or recreational areas which encourage people to spend time within or congregate within the easement.
- The parking or storage of flammable liquid carriers or containers.
- The installation of site construction offices, workshops or storage compounds.
- Flying of kites or wire-controlled model aircraft within the easement area.
- Flying of any manned aircraft or balloon within 60m of any structure, guy-wire or conductor.
- Flying of remote controlled or autonomous aerial devices (such as UAVs) within 60m of any structure, guy-wire or conductor.
- Placing any obstructions on access tracks or placed within the easement area that restricts access.
- Any vegetation maintenance (such as felling tall trees) where the vegetation could come within the Ordinary Persons Zone – refer to the WorkCover NSW '*Work Near Overhead Power Lines*' - Code of Practice 2006'.
- Any substantial excavation within 15 metres of a pole or supporting guy-wire or guy foundation or within 20 metres of a tower
- The climbing of any structure (any development that encourages or facilitates climbing will not be permitted).
- Any change in ground levels that reduce clearances below that required in AS7000.
- The attachment of any fence, any signage, posters, or anything else, to a structure or guy-wire.

  Note: Interference to electricity infrastructure is an offence under the *Electricity Supply Act 1995*.
- The movement of any vehicle or plant between the tower legs, within 5m of a structure, guy-wire or between a guy-wire and the transmission pole.

  Note: Any damage to electricity infrastructure is an offence under the Electricity Supply Act 1995.
- The storage of anything whatsoever within the tower base or within 10m of any tower leg.
- Any structure whatsoever that during its construction or future maintenance will require an Accredited person to access.

  Note: The final structure may meet AS7000 clearances, but may be accessible (e.g. by EWP) by Ordinary Persons within the Ordinary Persons Zone.
- Any work that generates significant amounts of dust or smoke that can compromise the TL high voltage insulation.
- The erection of any structure in a location that could create an unsafe situation work area for TransGrid staff.
- Burning off or the lighting of fires.

- Any activity (including operation of mobile plant or equipment having a height when fully extended exceeding 4.3 metres) by persons not Accredited or not in accordance with the requirements of the WorkCover NSW 'Work Near Overhead Power Lines' Code of Practice 2006 that is within (Note 1):
  - 3m of an exposed 132kV overhead power line
  - 6m of an exposed 220kV or 330kV overhead power line
  - 8m of an exposed 500kV overhead power line

  Note: Distances quoted are to the design conductor position (i.e. maximum sag and blowout)

The following activities <u>may possibly</u> be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- Temporary parking of caravans and other large vehicles in the outer 3m of the easement area, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of flagpoles, weather vanes, single post signs, outdoor lighting, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of non-electric agricultural fencing, yards and the like.

  Note: Fencing that exceeds 2.5 metres in height or that impedes access would not be approved.
- The erection of metallic fencing less than 2.5 metres in height providing that it is earthed, located more than 20 metres from any part of a transmission line structure or supporting guy and greater than 4 metres of the vertical projection of the overhead conductors.
- The erection of electric fencing provided that the height of the fencing does not exceed 2.5 metres and provided that the fence does not pass beneath the overhead conductors.

  Note: Approval may be given for a portable electric fence to pass underneath the conductors provided that it is supplied from a portable battery-powered energiser that is located remotely from frequented areas. Where it is necessary for a permanent electric fence to pass beneath the overhead conductors, or where an extensive permanent electric fencing system is installed in proximity to a transmission line certain additional safety requirements will be required.
- The installation or use of irrigation equipment inside the easement.

  NOTE: An irrigation system will not be approved if it is capable of coming within 4 metres of the overhead conductors; exceeds 4.3 metres in height; consists of individual sections of rigid or semi-rigid pipe exceeding 4.3 metres; is capable of projecting a solid jet of water to within 4 metres of any overhead conductors; requires fuel to be stored within the easement; and/or requires an outage of the transmission line for it's operation.
- The installation of low voltage electricity, telephone, communication, water, sewerage, gas, whether overhead, underground or on the surface.

  Note: Services that do not maintain standard clearances to the overhead conductors that are within 15 metres from the easement centre-line, 20 metres from any part of a transmission line supporting structure or are metallic and within 30 metres of any part of a structure will not be approved. TransGrid may impose additional conditions or restrictions on proposed development.
- The installation of high voltage electricity services, subject to there being no practicable alternative and provided the standard clearances are maintained to the supporting structures.

  Note: Where extensive parallels are involved certain additional safety requirements may be imposed by TransGrid, depending on the particular case and engineering advice.
- Swimming pools, subject to TransGrid's strict compliance criteria.

  Note: Above ground pools will not be approved. In-ground pools will not be approved if there is a practicable alternative site clear of the easement area. If there is no practical alternative site, in-ground

pools including coping will not be approved if it encroaches more than 4.5 metres, or is less than 30 metres away from a transmission line structure. A site specific assessment by TransGrid is required.

- Detached garages, detached carports, detached sheds, detached stables, detached glass houses, caravans, site containers, portable tool sheds, pergolas and unroofed verandahs attached to residences on the outer 3 meters of the easement only.
- Prefabricated metal (garden) sheds. TransGrid approved sheds must be earthed.

  Note: Sheds exceeding 2.5 metres in height, with a floor area exceeding 8m², encroaching more than of up to 3 metres or within 30 metres of any part of a transmission line structure will not be approved. Connection of electric power will not be approved.
- Single tennis courts.

  Note: Tennis courts that hinder access are for commercial use or do not provide adequate clearances shall not be approved.
- Subdivisions. See ***Appendix C*** requirements.
- Roads, carparks, cycleways, walking tracks and footpaths on the outer part of the easement or as a thoroughfare across the easement, subject to horizontal and vertical clearances. Restrictions and other conditions on consent may also apply. These will not be approved when located within:
  - 20 metres of any part of a transmission line structure
  - 10 metres of the centre-line of a transmission line 132kV and below
  - 17 metres of the centre-line of a transmission line above 132kV

  Note: Roads and pathways that cross the transmission line as a thoroughfare may be permitted. Where it is proposed that a road passes within 30 metres of a transmission structure or supporting guy, TransGrid may refuse consent or impose restrictions and other conditions on consent. Where a road passes within 30 metres of a transmission structure or supporting guy, the structure's earthing system may require modification for reasons including, but not limited to, preventing fault currents from entering utility services which may be buried in the road. The option of raising conductors or relocation of structures, at the full cost to the proponent, may be considered.
- Excavation – subject to restriction criteria.

  Note: Substantial excavations located within 20 metres of any part of a steel tower or pole structure and exceeding a depth 3 metres will not be approved.
- Quarrying activities, earthworks, dam or artificial lake construction.
- Mining. Approval would be based on the merits of the proposal and any related circumstances.
- Use of explosives.

Note 1: An encroachment or activity that is located outside the prohibited distance of the infrastructure but still within the easement will not necessarily be permitted. It will generally need to be addressed in the Impact Assessment and remains subject to TransGrid prior consent.

Note 2: The above list is not exhaustive and if there is any uncertainty as to whether an activity or encroachment is acceptable within an easement, please contact TransGrid. TransGrid may impose additional conditions or restrictions on proposed development.

2. Cables

The location of TransGrid's subterranean infrastructure and associated easements includes, but is not limited to, beneath private freehold and strata land as well as public roadways and railways etc. All development proposed within immediate proximity of TransGrid's subterranean infrastructure, including high voltage cables, stratum tunnels and conduits, must undertake a *Dial Before You Dig* search of any land where development is proposed, including roads adjoining a development site where subterranean services are proposed to be installed. The activities listed below are prohibited within cable easements:

- The storage of flammable liquids or explosives
- The planting or cultivation of trees or shrubs with extensive root systems
- The construction of houses, buildings or substantial structures
- The installation of fixed plant or equipment
- The placing of garbage, refuse or fallen timber
- Boring directly over the cable lay (eg. the installation of fencing or safety railing)
- The raising or lowering of existing ground surface levels
- Any excavation within 2m of an underground cable.

The following activities may be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- Parking of vehicles

  Note: Parking will be prohibited if the surface is not capable of supporting the vehicles likely to be parked, risking the crushing of the cable/ducts or erosion of the ground

- The operation of mobile plant and equipment

  Note: Such operations will be prohibited if the surface is not capable of supporting the vehicles likely to be parked, whereby risking the crushing of the cable/ducts or erosion of the ground

- The erection of structures spanning the easement
- Excavation
- Concrete driveways
- The installation of metallic pipes, fences, underground or overhead cables and services
- Road-boring within approved distances of a high voltage cable.

Where TransGrid's prior written consent has been granted to undertake work near an easement and related subterranean infrastructure, including the tunnels and conduits that accommodate our high voltage transmission line cables, all works must be undertaken in accordance with the WorkCover NSW 'Work Near Underground Assets' Guide 2007. Further, all development works must comply with the TransGrid guidelines for subterranean infrastructure referring to the document titled "*Requirements for Working In the Vicinity of TransGrid Underground Cables".*

Appendix C - General Requirements for Developments and Subdivisions

The following list of current general requirements is provided for your information. It should be noted that the list is not exhaustive and, where there is any doubt concerning a particular activity within the easement area advice should be sought from TransGrid.

1. Completed Works

The completed works shall provide for the following considerations:

- A safe unobstructed working platform shall be preserved around the transmission line structures for access by EWP, cranes as well as other large plant and equipment. No obstructions of any type shall be placed within 30 metres of any part of a transmission line structure.
- Roads, streets etc (including kerb to property boundaries) and intersections shall not be located within 30 metres of any TL structure.
- Developments must meet the clearances requirements set out in AS7000 between their finished level and the conductor at its maximum operating temperature.
- Proposed roadway locations shall also take into consideration any street lighting requirements to ensure that statutory clearance requirements are followed. The design clearances should include future maintenance safety issues. TL outages will not be provided for street light maintenance. Access to the TL and its structures shall be available at all times for TransGrid plant and personnel. In this regard a continuous and unobstructed access way shall be retained along the easement.
- Where fences are required for security purposes access gates will be installed in an agreed location and a TransGrid lock will be fitted.
- Application of “prudent avoidance” in relation to electric and magnetic fields should always be observed.
- No increase in earth potential rise risks.
- All underground services installed more than 20 metres but within 30 metres of a TL structure shall be non-metallic. Utility services (including street lighting), whether above or below ground, shall not be installed without prior written approval of TransGrid.
- Excavation work or other alterations to existing ground levels shall not be carried out within the easement area without the prior approval of TransGrid. Approval will not normally be granted for such work within 20 metres of any supporting structure.
- Boundaries for new subdivided properties should not be located within the easement.
- Fenced boundaries for all new properties in the subdivision shall not be within 30 metres of any TL structure.
- A “Restriction-as-User” (88B Instrument) shall be placed on the titles of any created lots that may become affected by a TL easement. Any proposed activity within an easement area will require the prior written approval of TransGrid (appropriate wording will be advised when required).
- Any proposed development must not impact on TransGrid’s costs of inspecting, maintaining or reconstruction of the transmission lines.
- In order to comply with its statutory responsibilities to maintain adequate clearance between the conductors and any forms of vegetation, TransGrid maintains its easements as follows:
  - Tall growing species likely to infringe safe clearances are to be removed regardless of existing height at time of construction.
  - Trees likely to fall onto conductors or towers are also to be removed whether on the easement or off the easement (ref. Sec 48 of the Electricity Supply Act 1995).

- Shrubs and other vegetation of lower mature height within the easement will be reduced and managed, generally by slashing with ground level retained.
- Vegetation management will aim to reduce available fuel and subsequent bushfire risks in accordance with NSW Rural Fire Service Bush Fire Environmental Assessment Code that sets out the requirements for hazard reduction strategies such as Asset Protection Zones and Strategic Fire Advantage Zones.
- Removed vegetation will be mulched or chipped and removed from site or retained on site in accordance with owner/stakeholder requirements.
- Other works considered necessary in order to provide a safe working environment for maintenance staff, contractors and for the property owner/manager will be undertaken.

Proposed vegetation plantings, such as Riparian corridors, within the transmission line easements shall be compatible with the above maintenance requirements and must consider on-going vegetation control.

2. Construction

During construction, the development plans shall also provide for the following considerations:

- Vehicles, plant or equipment having a height exceeding 4.3 metres when fully extended shall not be brought onto or used within the easement area without prior TransGrid approval.
- Where temporary vehicular access or parking (during the construction period) is within 16 metres of a transmission line structure, adequate precautions shall be taken to protect the structure from accidental damage. Plans need to be submitted to TransGrid for prior approval.
- The easement area shall not be used for temporary storage of construction spoil, topsoil, gravel or any other construction materials.

3. Costs

The Developer shall bear all costs of any specialist design studies, TransGrid supervision, reconstruction or modification of the transmission line and its components, including consultation and design required to maintain clearances due to proposed ground level changes; road crossings within the easement; or due to any damage to the TL arising from the development.

Example of the Required Working Platform for Transmission Tower Maintenance

Appendix E – NSW heritage search

Search for NSW heritage

Return to search page where you can refine/broaden your search.

Statutory listed items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into three sections.

- **Section 1** - contains Aboriginal Places declared by the **Minister for the Environment** under the National Parks and Wildlife Act. This information is provided by the Heritage Division.
- **Section 2** - contains heritage items listed by the **Heritage Council of NSW** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act. This information is provided by the Heritage Division.
- **Section 3** - contains items listed by **local councils** on Local Environmental Plans under the Environmental Planning and Assessment Act, 1979 and **State government agencies** under s.170 of the Heritage Act. This information is provided by local councils and State government agencies.

Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.

Your search did not return any matching results.

Section 2. Items listed under the NSW Heritage Act.

Your search did not return any matching results.

Section 3. Items listed by Local Government and State Agencies.

Your search returned 1 record.

Item name	Address	Suburb	LGA	Information source
Bulk Store Building	464 Rutleys Road	Mannering Park	Wyong	LGOV

There was a total of 1 records matching your search criteria.

Key:
LGA = Local Government Area
GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study, LGOV = Local Government, SGOV = State Government Agency.
Note: While the Heritage Division seeks to keep the Inventory up to date, it is reliant on State agencies and local councils to provide their data. Always check with the relevant State agency or local council for the most up-to-date information.

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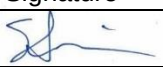
2218991-96902/https://projects.ghd.com/OC/Newcastle/cccmanneringparkshar/Delivery/Documents/2218991-REP-001 Mannering Park Shared Pathway Feasibility Study - Final Report.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	David Morrison	Steve Jamison		Steve Jamieson		11/07/2017

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