



East Seaham Road, East Seaham

Aboriginal Due Diligence Assessment

FINAL REPORT

Prepared for Port Stephens Council

28 January 2025

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Glossary

ACHA	Aboriginal Cultural Heritage Assessment
ADDA	Aboriginal Due Diligence Assessment
AHIMS	Aboriginal Heritage Information Management System
Biosis	Biosis Pty Ltd
DECCW	NSW Department of Department of Environment, Climate Change and Water
EP&A Act	<i>Environmental Planning and Assessment Act 1979 NSW</i>
GSV	Ground Surface Visibility
Heritage NSW	Heritage NSW, NSW Department of Climate Change, Energy, the Environment and Water
LEP	Local Environment Plan
LGA	Local Government Area
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
PAD	Potential Archaeological Deposit
SHI	State Heritage Inventory
Study area	East Seaham Road, East Seaham
The Code	<i>The Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i>

Summary

Biosis Pty Ltd (Biosis) has been commissioned by Port Stephens Council to undertake an Aboriginal Due Diligence Assessment (ADDA) for the proposed upgrades to East Seaham Road, at East Seaham in New South Wales (NSW) (the study area). The project involves the widening of East Seaham Road over a length of 3.6 kilometres. The proposed development will be assessed against Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

An extensive search of the Aboriginal Heritage Information System (AHIMS) databased on 4 December 2024 (Client service ID: 956889) identified [REDACTED] Aboriginal archaeological sites within [REDACTED] kilometres of the study area. None of these sites are located within the study area.

The environmental context of the study area determined that the network of resource bearing freshwater sources associated with Williams River coupled with the topographically sheltered landscape provided an ideal location for long term occupation of local Aboriginal people. Underlying geological units and surrounding floral and faunal resources would have equally contributed to the overall favourability of the study area for long term use. However, due to the extensive disturbance of the study area since the mid-19th century, any evidence of this occupation is unlikely to be intact.

An archaeological investigation of the study area was undertaken on 13 November 2023 by Molly Crissell (Biosis, Heritage Consultant). During the field investigation extensive landscape modification was observed throughout the study area. No new Aboriginal sites or objects were identified, and the study area has been assessed to hold low potential to contain archaeological deposits.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Discovery of unanticipated Aboriginal objects

All Aboriginal objects and Places are protected under the *National Parks and Wildlife Act 1974* (NPW Act). It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW, Department of Climate Change, Energy, the Environment and Water (Heritage NSW). Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

Recommendation 3: Discovery of Aboriginal ancestral remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

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1. Introduction

1.1. Background

Biosis has been commissioned by Port Stephens Council to undertake an ADDA for the proposed project at East Seaham Road, at East Seaham in NSW. The project involves the widening of East Seaham Road over a length of 3.6 kilometres. The proposed development will be assessed against Part 5 of the EP&A Act.

An assessment in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) has been undertaken for the study area in order to inform responsibilities with regards to Aboriginal cultural heritage in the area. In addition to the basic tasks required for a due diligence assessment, an extended background review, as well as an archaeological survey in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b) (the Code) was conducted, in order to adequately map areas of high, moderate and low archaeological potential.

1.2. Location of the study area

The study area is located within the Port Stephens Local Government Area (LGA), Parish of Wilmot, County of Gloucester as show in Figure 1. The study area incorporates approximately 3.6 kilometres of East Seaham Road. It is bound to the east by Wallaroo National Park and to the west by rural lands and residential properties. It encompasses approximately 14.2 hectares of public land currently zoned in majority as RU1 – Primary Production and to a smaller extent as C1 – National Parks and Nature Reserves (Figure 2).

1.3. Planning approvals

The proposed development will be assessed against Part 5 of the EP&A Act. Other relevant legislation and planning instruments that will inform the assessment include:

- NPW Act.
- *National Parks and Wildlife Amendment Act 2010* NSW.
- *Port Stephens Local Environmental Plan 2013* (LEP).
- *Port Stephens Development Control Plan 2014*.

1.4. Scope of the assessment

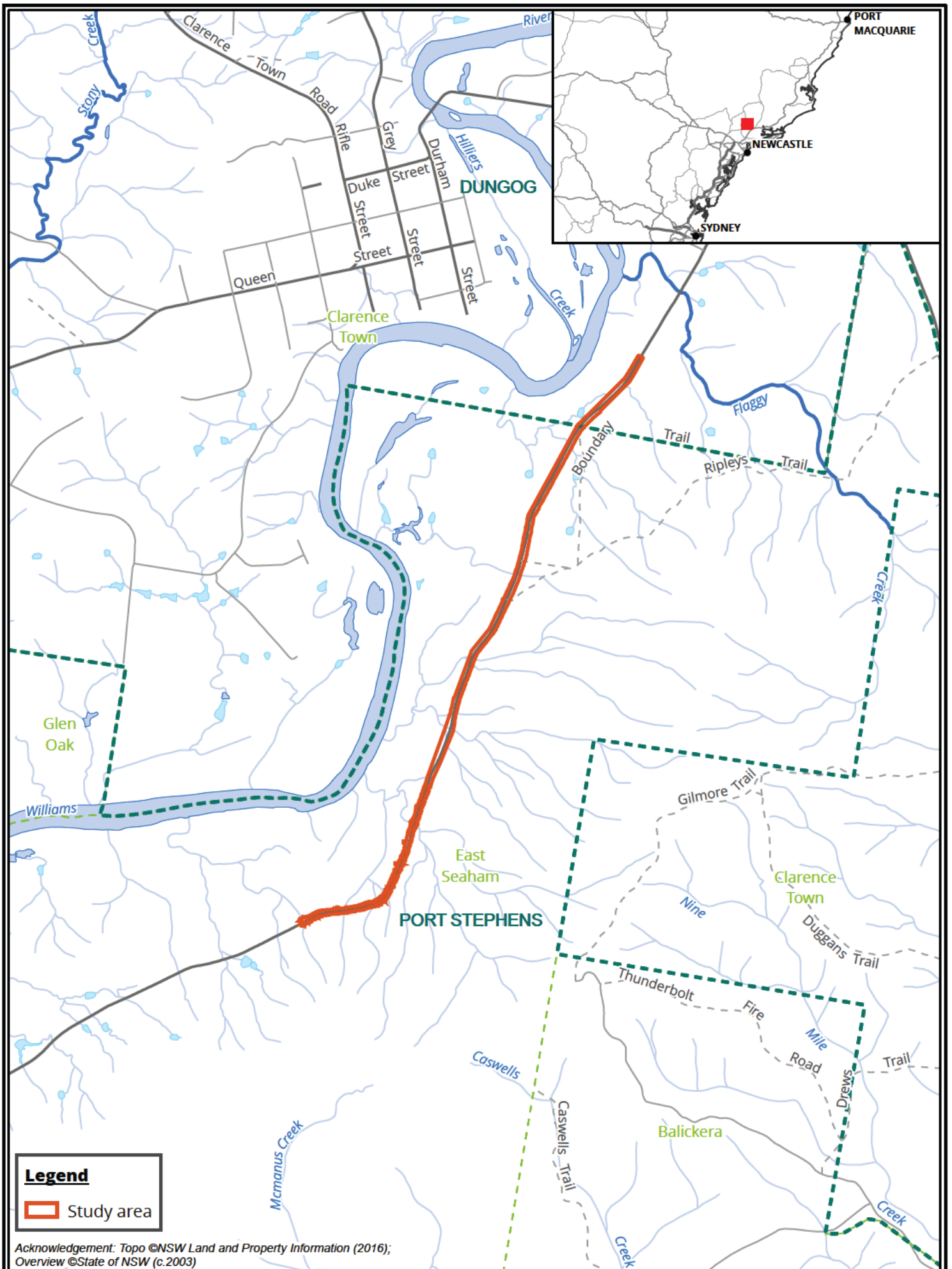
The following is a summary of the major objectives of the assessment:


- Conduct background research in order to recognise any identifiable trends in site distribution and location, including a search of the AHIMS.
- Undertake archaeological survey as per requirement 5 of the Code, with particular focus on landforms with high potential for heritage places within the study area, as identified through background research.
- Record and assess sites identified during the survey in compliance with the guidelines endorsed by Heritage NSW.
- Determine levels of archaeological significance of the study area.

- Make recommendations to mitigate and manage any cultural heritage values identified within the study area.

1.5. Proposed works

Port Stephens Council is proposing to widen and seal the existing gravel road, install safety barriers where required and to provide a clear zone up to 2.5 metres wide. Council anticipates that a significant amount of tree removal will be required to undertake the proposed works. The project length covers Stages 5 and 6 of East Seaham Road and is approximately 3.2 kilometres in length (Figure 3).



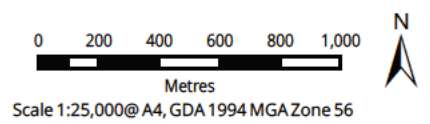
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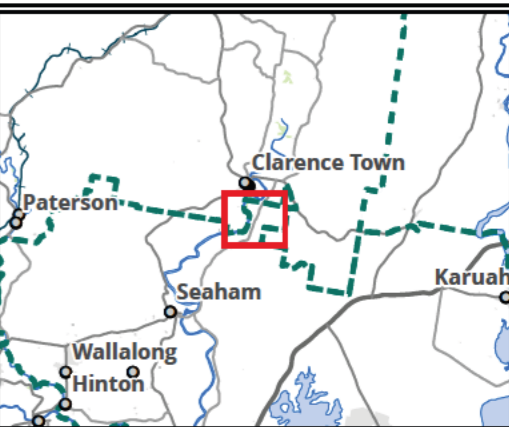
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Figure 1 Location of the study area

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Legend

- Study area
- Lot

Figure 2 Study area detail

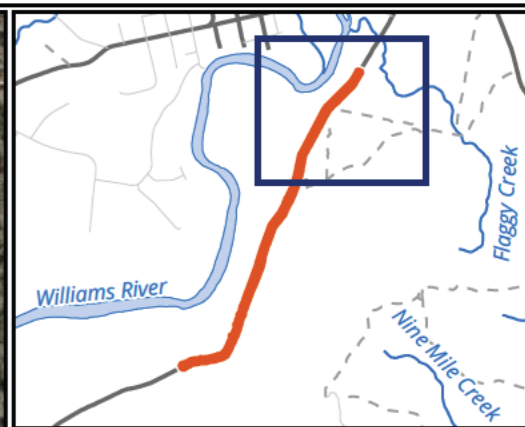
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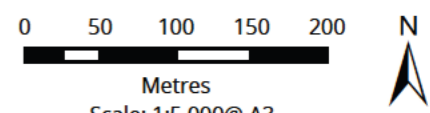
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- Legend**
- Study area
 - Proposed works
 - Lot

Figure 3.1 Proposed works

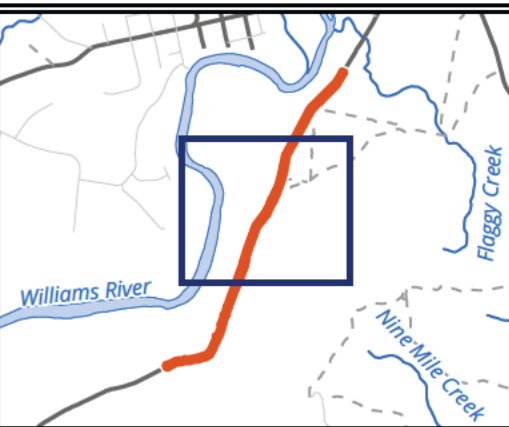


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- Legend**
- Study area
 - Proposed works
 - Lot

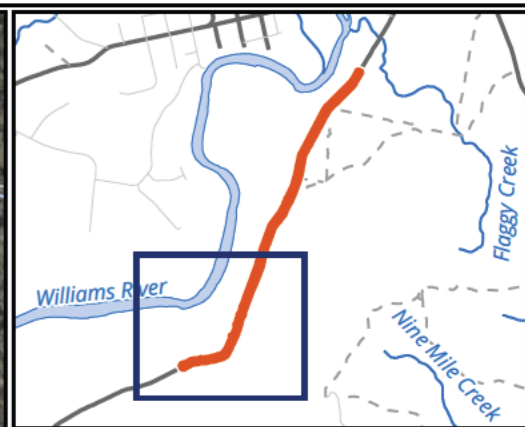
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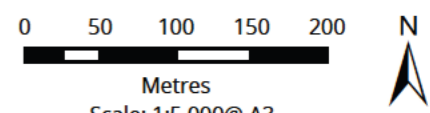


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- Legend**
- Study area
 - Proposed works
 - Lot

Figure 3.3 Proposed works



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2. Desktop assessment

A brief desktop assessment has been undertaken to review existing archaeological studies for the study area and surrounding region. This information has been synthesised to develop some Aboriginal site predictive statements for the study area and identify known Aboriginal sites and/or places recorded in the study area. This desktop assessment has been prepared in accordance with requirements 1 to 4 of the Code.

2.1. Landscape context

It is important to consider the local environment of the study area for any heritage assessment. The local environmental characteristics can influence human occupation and associated land use and consequently the distribution and character of cultural material. Environmental characteristics and geomorphological processes can affect the preservation of cultural heritage materials to varying degrees or even destroy them completely. Lastly, landscape features can contribute to the cultural significance that places can have for people.

2.2. Landforms, geology, hydrology and soils

The study area is located within the North Coast Bioregion, which occupies a total of 5,924,130 hectares of land, 96.1% of which is located within NSW. The bioregion spans from Tweed Heads in the north, to Nelson Bay in the south and is bound by the coastline. It reaches an average of 75 kilometres inland to the Great Escarpment. The eastern extent of the North Coast Bioregion is characterised by a coastal sand barrier, which transitions to low foothills and ranges, ending with steep slopes and gorges associated with the Great Escarpment in the west (NSW Department of Planning and Environment 2016). The study area itself is positioned at the base of foot slopes east of Wallaroo National Park and west of Williams River, though the landforms associated with both have been modified via grading for the creation of East Seaham Road.

The study area is overlapping several geological units made complex due to the association with a dense network of hydrological structures stemming from Williams River. Figure 4 reveals alluvial valley deposits to be located throughout the southern portion of the study area where first and third order tributaries cut through. The geological formations include the Wallaringa Formation which is located in the in the northern most 150 metres of the study area. The Newtown Formation is located from the extent of the Wallaringa Formation to 200 metres south. The Vacy Ignimbrite Member is located from the extent of the Newtown Formation and encompasses approximately 200 metres within the southern extent. Lastly, there is a small portion of the Newtown Formation which is located in the southern 200 metres of the study area. Descriptions of each of these units can be found in Table 1.

Raw materials suitable for artefact manufacture may have been acquired from gravels and cobbles transported within alluvial deposits and quarries from tuff deposits located within the Newtown Formations. Should appropriately sizes outcroppings be available, sandstone associated with the Wallaringa formation has the potential to be associated with grinding grooves due to the availability of free-flowing water throughout the study area surrounds. However, due to the overall level of disturbance present throughout the study area, it is unlikely that such features will be present or intact. The Vacy Ignimbrite Member, being associated with very coarse-grained materials, is not suitably associated with the site types commonly associated with the Port Stephens regions, further detailed in Section 3.3.

Table 1 Geological Units present within the study area (Roberts et al. 1991)

Geological Unit	Description
Alluvial Valley Deposits	Silt, clay, (fluvially deposited) lithic to quartz-lithic sand, gravel
Newtown Formation	Red to purple lithic sandstone, red, purple, or green siltstone, pebble conglomerate with interbedded rhyolitic and rhyodacitic ignimbrite and tuff
Vacy Ignimbrite Member	Red micaceous rhyodacitic ignimbrite (overlain by a) grey micaceous dacitic ignimbrite
Wallinganga Formation	Pink to brown, thickly bedded lithic sandstone, conglomerate and granitoids, minor sandstone

Stream order is recognised as a factor which aids in the development of predictive modelling in Aboriginal archaeology. Predictive models which have been developed for the region tend to favour higher order streams as the locations of campsites, as they would have been more likely to provide a stable source of water and by extension other resources, which would have been used by Aboriginal groups (Dyall 1979, Mary Dallas 1985, Umwelt 2004, AECOM 2014, AECOM 2015, Biosis 2018, Biosis 2021a). Several permanent fresh water sources are located within close proximity to the study area.

The stream order system used for this assessment was originally developed by Strahler (1952). It functions by adding two streams of equal order at their confluence to form a higher order stream, as shown in Photo 1. As stream order increases, so does the likelihood that the stream would be a perennial source of water.

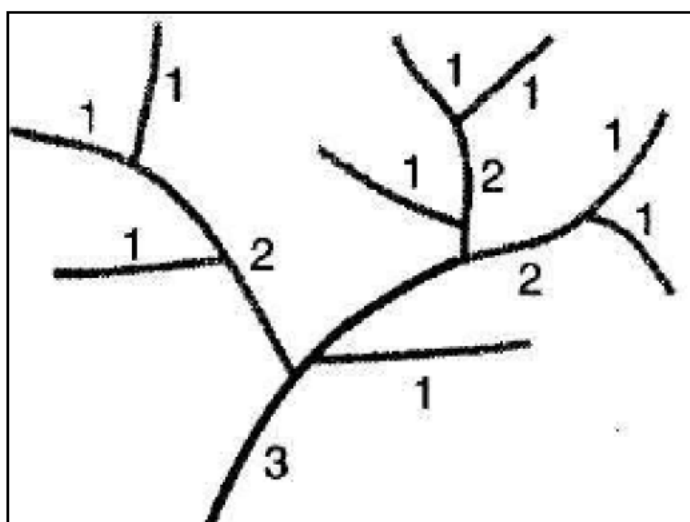


Photo 1 Diagram showing Strahler stream order (Ritter, Kochel, & Miller 1995, p. 151)

The study area and its surrounds are populated by a dense network of streams associated with Williams Rivers, a 7th order waterway which runs mostly parallel to the study area (approximately 200 metres east at its closest point). Thirteen streams (1st order n=9, 3rd order n=3, 2nd order n=1) associated with this main water body consistently bisect the study area throughout its length (Figure 5). The densest population of streams is located towards the south of the study area. The waterways feed the Williams River from the higher elevation landforms that are located to the east of the study area. With such a large water resource located in proximity to the study area, a high-density network of lower order streams and shelter provided by the surrounding landscape, ample resources would have been readily available within the locality. The area would have represented a favourable location for long term occupation.

Soil landscapes have distinct morphological and topological characteristics that result in specific archaeological potential. They are defined by a combination of soils, topography, vegetation and weathering conditions. Soil landscapes are essentially terrain units that provide a useful way to summarise archaeological potential and exposure. The Glen William Variant A and Ten Mile Road soil landscapes are present within the study area (refer to Table 2 and Table 3 descriptions) (Figure 6).

The Glen William Variant A soil landscape, which occupies the majority of the study area, is associated with shallow to moderately deep (70 to 130 centimetres) well to imperfectly drained Yellow Podzolic Soils on foot slopes and, shallow (50 centimetre) well-drained Bleached Loams on volcanics and sediments which are shallow to deep (50 to 250 centimetre) moderately well-drained Brown Podzolic Soils and some imperfectly drained Yellow Podzolic Soils on alluvial terraces (Department of Planning, Industry and Environment 2023a). The depths of the soils associated with foot slopes may be indicative of intact archaeological deposits where soils are relatively undisturbed.

The Ten Mile Road soil landscape is generally associated with moderately deep (55 centimetres) to deep (>200 centimetres) well to imperfectly drained brown soloths, yellow soloths and shallow (<45 centimetres) well drained Bleached Loams/Lithosols (Department of Planning, Industry and Environment 2023b). Given the contact of multiple streams with this landscape within the study area, it can be assumed that any archaeological deposits that may have located within the Ten Mile Road soil landscape will have been subject to movement a redeposition from their original contexts.

Table 2 Glen William erosional soil landscape characteristics (Department of Planning, Industry and Environment 2023a)

Soil material	Description
Gw1- Brown crumbly weakly pedal loam (topsoil – A horizon)	Brown (7.5YR 4/3), brownish black (10YR 3/2), dark brown (10YR 3/4, 10YR 2/3) colour with a loam sandy through clay loam sandy to silty clay loam texture. Weak to moderate structure, 10 to 20 millimetres sub-angular block peds or two to five millimetres crumb peds with rough ped fabric. The topsoil layer is moderately to slightly acidic (pH 5.5 to 6.5). There are a few to abundant fine root inclusions. The exposed condition is occasionally soft but commonly firm to hardsetting with very weak crumbly dry consistence.
Gw2- Weakly pedal brown sandy loam (topsoil- A1 horizon)	Brownish black (10YR 3/2, 7.5YR 3/2) colour with a sandy loam to loam sandy weak texture and structure consisting of 20 to 50 millimetres of sub-angular blocky peds, with occasional massive and earthy rough ped. The A1 layer is moderately to slightly acidic (pH 5.5-6.0). Inclusions within the layer are few sub-angular gravels with common, fine roots. The exposed condition is hardsetting when dry, soft when moist.
Gw3- Bleached dull yellowish brown sandy clay loam (topsoil – A2 horizon)	Dull yellowish brown (10YR 5/3, 10 YR 5/4) to occasionally dark brown (10YR 3/3, 10YR 3/4), few faint orange mottles may occur. Dry colour is commonly bleached light grey (10YR 8/1, 10YR 8/2). The texture consists of light sandy clay loam to fine sandy clay loam or silty clay loam. The structure consists of massive, occasionally weak 20 to 50 millimetres sub-angular blocky peds, which are earthy and occasionally rough peds. The layer is moderately to slightly acid (pH 5.5 to 6.0). Occasionally many gravels occur with very few fine roots. The soil is hardsetting when dry.
Gw4- Brown blocky stiff plastic clay (subsoil – B2 horizon)	Brown (10YR 4/4), yellowish brown (10YR 5/6) to occasionally dull reddish brown (5YR 4/4) or greyish yellow brown (10YR 5/2), occasionally few to common red or brown mottles occur. The texture consists of stiff, plastic, medium to medium heavy clay, occasionally sandy. The structure is strong with 20 to 50 millimetres angular blocky or prismatic peds. The pH of the B2 subsoil is moderately to slightly acidic (pH 5.0-6.0). When exposed, the soil is sticky, with a weak plastic moist consistence with the surface cracking to 50 millimetres with a fine surface ped mulch when dry.
Gw5- Dull yellow orange mottled	Dull yellow orange (10YR 6/4) to brown (10YR 4/6) with few to common distinct orange mottles and common brown staining down root channels. The texture consists of light to

Soil material	Description
prismatic clay (subsoil – B horizon)	medium sandy clay. The structure is moderate to strong and 50 to 100 millimetres primastic or rarely columnar peds, which part to 20 to 50 millimetres angular to sub-angular smooth ped. The pH of Gw5 is moderately to slightly acidic (pH 5.0-6.0) with inclusions of few, fine roots present. The exposed condition of the soil includes surface cracking to 20 millimetres, surface sealing when dry with very firm to moderately strong dry consistence.

Table 3 Ten Mile Road soil landscape characteristics (Department of Planning, Industry and Environment 2023b)

Soil material	Description
Tm1- Weakly pedal brown sandy loam (topsoil – A1 horizon)	Brownish black (10YR 3/2) to dark brown (10YR 3/3, 7.5YR 3/3) colour with a loamy sand to loam sandy texture. The structure is weak, 5 to 10 millimetres, sub-angular blocky peds which may part from 20 to 50 millimetres sub-angular blocky peds with rough occasionally earth peds. The pH is slightly acidic at pH 6.0. The inclusions include very few to few rounded to sub-angular gravels to cobbles with common to many fine roots (<1 millimetres) roots. The exposed condition is hardsetting when dry and soft when moist.
Tm2- Bleached sandy loam (topsoil – A2 horizon)	Greyish yellow brown (10YR 5/2, 10YR 6/2 and 10YR 4/2) to dull yellowish brown (10YR 5/3) or dull yellow orange (10YR 6/4) moist, dull yellow orange (10YR 7/2, 10YR 7/3) or light grey (10YR 8/1) commonly when dry. The texture consists of sandy loam, through light sandy clay loam to sandy clay loam. The structure consists of massive to occasionally weak 50 to 100 millimetre sub-angular block peds. The fabric of the soil is earthy with occasionally rough peds. The pH of the soil is slightly to moderately acid (pH 6.0 to 5.0). The inclusions include few to many rounded to angular gravels and cobbles with occasionally few charcoal fragments occurring and few, fine to medium (<2 to 5 millimetre) roots. The exposed condition is hardsetting when dry.
Tm3- Brown dense medium clay (subsoil – B horizon)	Brown (10YR 4/4) to dull yellowish brown (10YR 5/3, 10YR 5/4) or yellowish brown (10YR 5/6), few to common red mottles may occur. The texture is light to medium to medium clay with coarse sand grains, occasionally sandy clay. The structure consists of moderate 20 to 50 millimetres or 10 to 20 millimetres prismatic or sub-angular blocky peds which part to 10 to 20 millimetres angular blocky or polyhedral peds. Occasionally, 50 to 100 millimetres sub-angular blocky or prismatic peds occur. The pH is slightly to moderately acid (pH 6.5 – 5.0). The inclusions consist of very few to many gravels and occasionally cobbles, with few 1 to 5 millimetre roots with slow to moderate permeability. The exposed condition consists of slightly to moderately sticky and labile when moist and tough when dry with surface sealing and moderate rill erosion in batter.

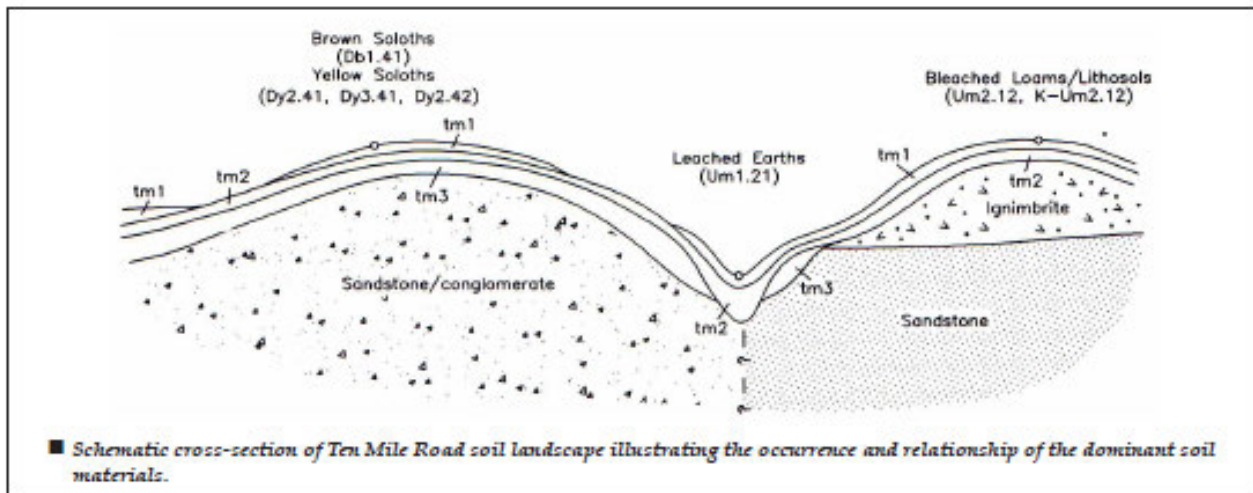
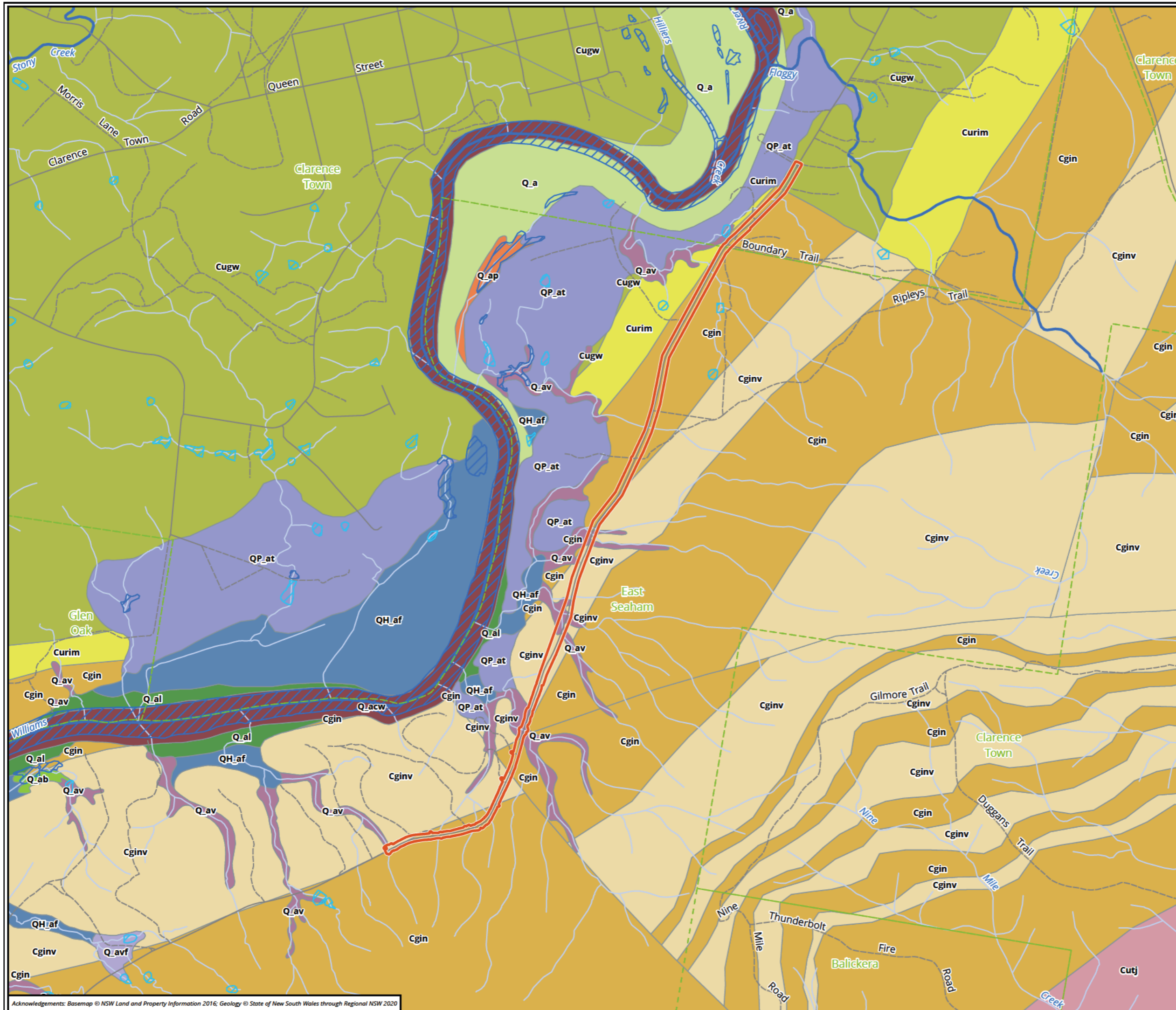
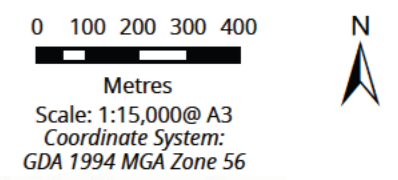


Photo 2 Schematic cross-section of Ten Mile Road soil landscape illustrating the occurrence and relationship of the dominant soil materials (Department of Planning, Industry and Environment 2023b).



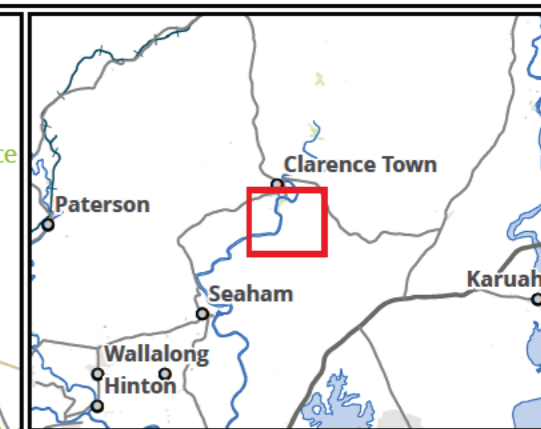
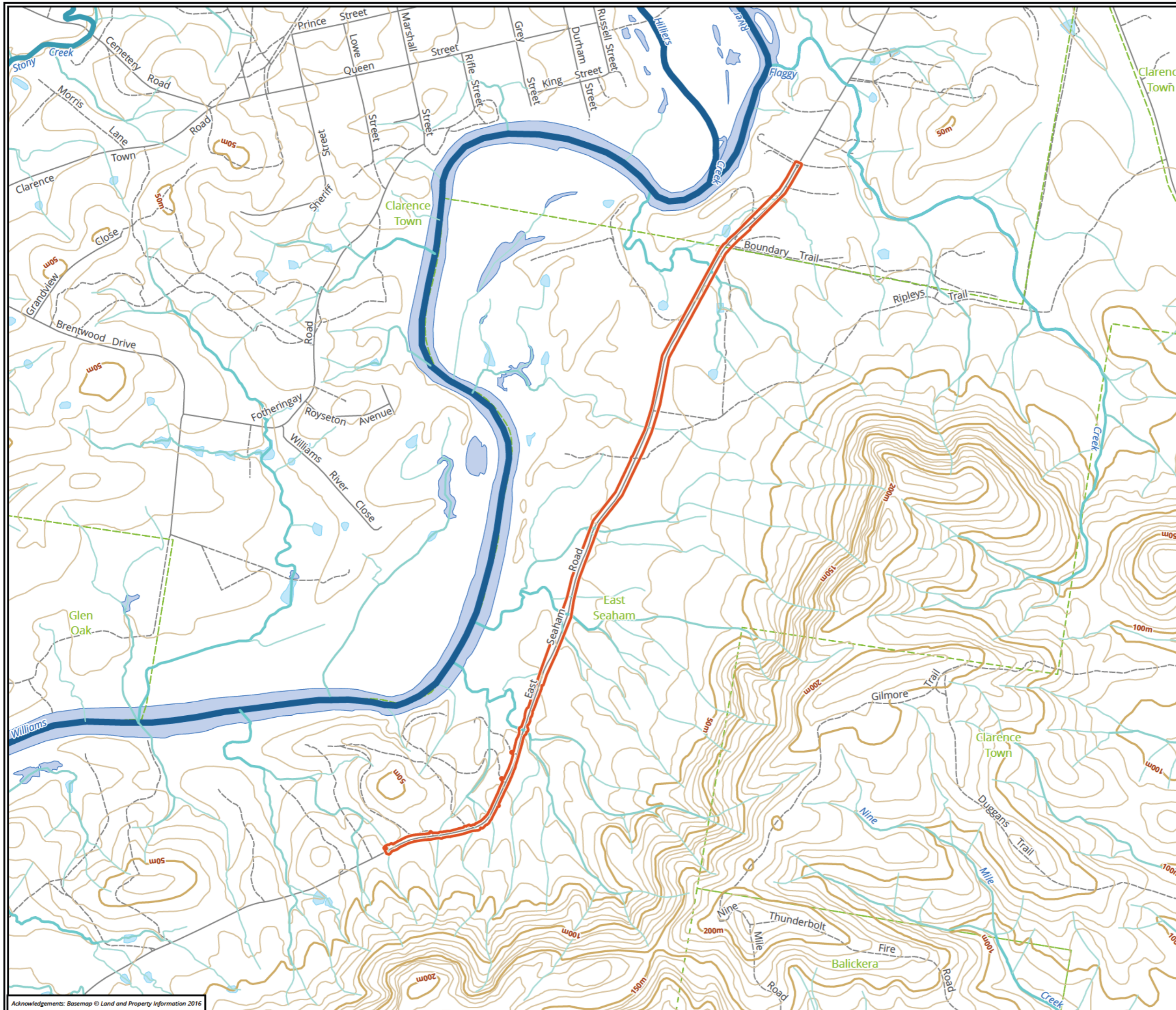
- Legend**
- Study area
 - Geological units**
 - Cgin, Newtown Formation
 - Cginv, Vacy Ignimbrite Member
 - Cugw, Wallaringa Formation
 - Curim, Martins Creek Ignimbrite Member
 - Cutj, Mount Johnstone Formation
 - QH_af, Alluvial floodplain deposits
 - QP_at, Alluvial terrace deposits
 - Q_a, Alluvium
 - Q_ab, Alluvial backswamp deposits
 - Q_acw, Alluvial channel deposits - subaqueous
 - Q_al, Alluvial levee/overbank deposits
 - Q_ap, Alluvial palaeochannel deposits
 - Q_av, Alluvial valley deposits
 - Q_avf, Alluvial fan deposits

Figure 4 Geological units in the vicinity of the study area



Matter: 39631, Date: 03 November 2023,
 Prepared for: MC, Prepared by: JB, Last edited by: jbeckius
 Location: P:\39600s\39631\Mapping\
 39631_ADDA_EastSeahamRd,
 Layout: 39631_ADDA_F4_Geology

Acknowledgements: Basemap © NSW Land and Property Information 2016; Geology © State of New South Wales through Regional NSW 2020



- Legend**
- Study area
 - Contour (10m)
- Strahler Order**
- 1
 - 2
 - 3
 - 5
 - 7

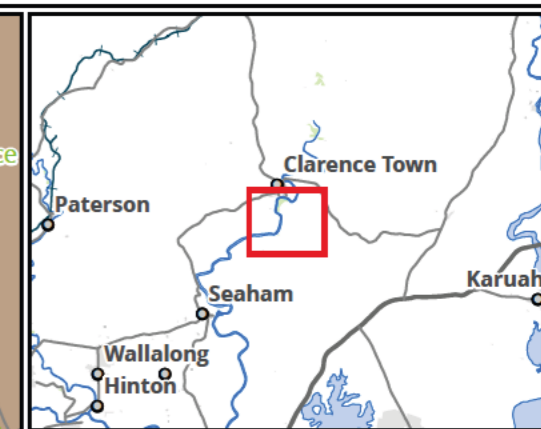
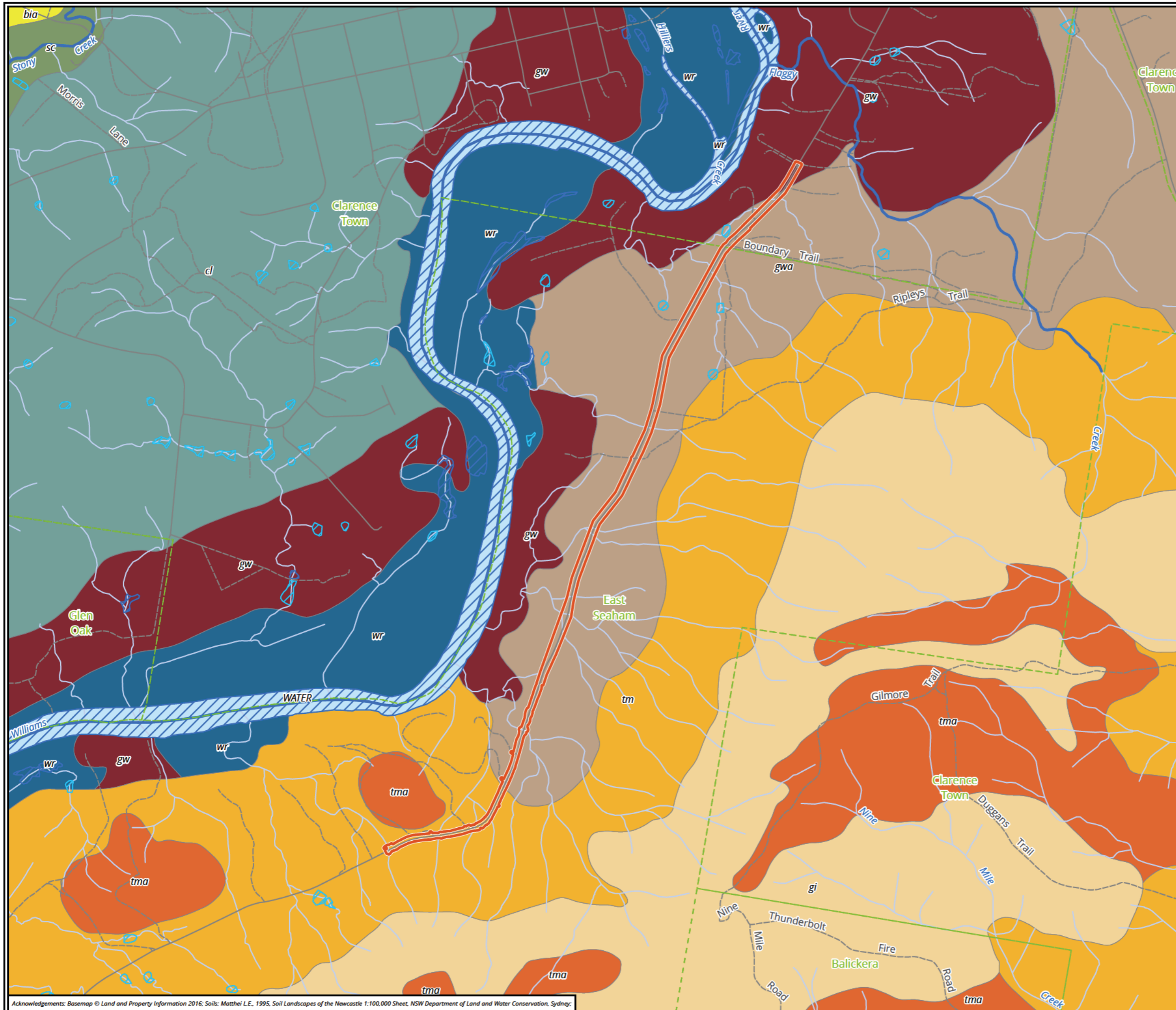
Figure 5 Hydrology and topography in the vicinity of the study area

0 100 200 300 400
 Metres
 Scale: 1:15,000@ A3
 Coordinate System:
 GDA 1994 MGA Zone 56



Matter: 39631, Date: 03 November 2023,
 Prepared for: MC, Prepared by: JB, Last edited by: jbeckius
 Location: P:\39600s\39631\Mapping\
 39631_ADDA_EastSeahamRd,
 Layout: 39631_ADDA_F5_Hydrology

Acknowledgements: Basemap © Land and Property Information 2016



Legend

- Study area
- Soil landscape units**
- bia - BIRDSVIEW variant a
- cl - CLARENCETOWN
- gi - GILMORE HILL
- gw - GLEN WILLIAM
- gwa - GLEN WILLIAM variant a
- sc - SANDY CREEK
- tm - TEN MILE ROAD
- tma - TEN MILE ROAD variant a
- WATER - WATER
- wr - WILLIAMS RIVER

Figure 6 Soil landscapes in the vicinity of the study area

0 100 200 300 400
 Metres
 Scale: 1:15,000@ A3
 Coordinate System:
 GDA 1994 MGA Zone 56



Matter: 39631, Date: 03 November 2023,
 Prepared for: MC, Prepared by: JB, Last edited by: jbeckius
 Location: P:\39600s\39631\Mapping\
 39631_ADDA_EastSeahamRd,
 Layout: 39631_ADDA_F6_Soils

Acknowledgements: Basemap © Land and Property Information 2016; Soils: Matthei L.E., 1995, Soil Landscapes of the Newcastle 1:100,000 Sheet, NSW Department of Land and Water Conservation, Sydney;

2.3. Flora and fauna

The wider Port Stephens region includes distinct ecological zones, including open forest and open woodland, with riparian vegetation extending along many of the watercourses. Each ecological zone hosts a different array of floral and faunal species, many of which would have been utilised according to seasonal availability. Aboriginal inhabitants of the region would have had access to a wide range of avian, terrestrial and aquatic fauna and repeated firing of the vegetation would have opened up the foliage allowing ease of access through and between different resource zones.

Plant resources were used in a variety of ways. Fibres were twisted into string, which was used for many purposes, including the weaving of nets, baskets, and fishing lines. String was also used for personal adornment. Bark was used in the provision of shelter; a large sheet of bark being propped against a stick to form a gonyah (Department of Planning, Industry and Environment 2020).

Vegetation species associated with the Ten Mile Road soils landscape include Spotted Gum *Eucalyptus maculata*, White Mahogany *E. acmenoides*, White Stringybark *E. globoidea*, Grey Ironbark *E. paniculata*, Forest Red Gum *E. tereticornis*, Grey Gum *E. punctata*, Tea-tree *Leptospermum spp.*, Smooth-barked Apple *Angophora costata*, Red Bloodwood *Eucalyptus gummifera* and Black She-Oak *Allocasuarina littoralis*. The Glen William landscape is associated with Spotted Gum *Eucalyptus maculata*, Grey Ironbark *E. paniculata*, Broad-leaved Ironbark *E. fibrosa*, Red Ironbark *E. siderophloia*, Thin-leaved Stringybark *E. eugenioides*, Tea-tree *Leptospermum polygalifolium*, Wattle *Acacia irrorate*, Smooth-barked Apple *Angophora costata*, Narrow-leaved Ironbark *E. crebra*, Forest Oak *Allocasuarina torulosa*, Spotted Gum *E. maculata* and Tallowwood *E. microcorys*. Due to the level of clearing that has been undertaken, mature vegetation which may hold evidence for resource gathering is unlikely to be present within the study area.

As well as being important food sources, animal products were also used for tool making and fashioning a myriad of utilitarian and ceremonial items. For example, tail sinews are known to have been used to make fastening cord, while 'bone points', which would have functioned as awls or piercers, have been identified in the archaeological record. Animals such as Brush-tailed Possums were highly prized for their fur, with possum skin cloaks worn fastened over one shoulder and under the other. Kangaroo teeth were incorporated into decorative items, such as head bands (Attenbrow 2002).

Animal species that have been commonly observed with the study area and the surrounds include the Red-necked Wallaby *Notamacropus rufogriseus*, Common Brushtail Possum *Trichosurus vulpecula*, Swamp Wallaby *Wallabia bicolor*, Koala *Phascolarctos cinereus* and Short Beaked Echidna *Tachyglossus aculeatus*. Australian Magpie *Gymnorhina tibicen*, Kookaburra *Dacelo novaeguineae*, Grey Fantail *Rhipidura albiscapa*, Superb Fairy-wren *Malurus cyaneus*, and Australian Raven *Corvus coronoides* are amongst the most frequently observed avian species. Reptilian species such as the Lace Monitor *Varanus varius*, Eastern Brown Snake *Pseudonaja textilis*, Snake-necked Turtle *Chelodina longicollis*, and Common Bearded Dragon *Pogona barbata* have been frequently observed within five kilometres of the study area (Atlas of Living Australia 2023).

2.4. Land use history

Historical aerial imagery allows for modern developments and land use to be identified within the study area. The Stage Heritage Inventory (SHI) listing of East Seaham Road (LEP #15, Department of Planning and Environment 2023) indicates the current alignment to be reflective of New Line Road, which linked Raymond Terrace, Seaham and Clarence Town. This road was constructed between 1840-1860 with the original proposed alignment being depicted in an 1830's parish maps (Photo 3). Mentions of East Seaham Road in the written record do not appear until 1926 where reference is made to nearby maintenance in the Dungog Chronicle and Gloucester Advertiser (The Dungog Chronicle and Gloucester Advertiser, 1926). Reference to

the road in this article indicates the realignment of the original Newline Road had occurred prior to this. The alignment of the road appears to have shifted between 1914 and 1958, which may be indicative of the transition of the road from New Line Road to East Seaham Road (Photo 4). The 1958 imagery depicts East Seaham Road in its current alignment and further modification to the road structure cannot be observed from 1958 (Photo 5). The SHI listing does note that the road has been subject to upgrades in the 1980s and most recently in 2015 (Department of Planning and Environment 2023). These works have involved upgrading the gravel and sealing portions of the road, and later adding to the surface structure. Areas surrounding the study area appear to have also remained unchanged since the mid-20th century with the exception of the installation of electrical powerlines through Wallaroo National Park, parallel to the study area (Photo 6, Photo 7 and Photo 8).



Photo 3 Map depicting proposed road between Dungog and Maitland, 1939 (Source: NSW Land Registry Services)



Photo 4 1914 Parish Map (Source: NSW Land Registry Services)



Photo 5 1958 Aerial Imagery of the study area (depicted in orange) (Source: NSW Spatial Services)



Photo 6 1974 Aerial Imagery of the study area (depicted in orange) (Source: NSW Spatial Services)



Photo 7 1984 Aerial Imagery of the study area (depicted in orange) (Source: NSW Spatial Services)



Photo 8 2001 Aerial Imagery of the study area (depicted in orange) (Source: NSW Spatial Services)

3. Aboriginal context

3.1. Ethnohistory and contact history

Our knowledge of Aboriginal people and their land-use patterns and lifestyles prior to European contact is mainly reliant on documents written by non-Aboriginal people. These documents are affected by the inherent bias of the class and cultures of their authors, who were also often describing a culture that they did not fully understand - a culture that was in a heightened state of disruption given the arrival of settlers and disease. Early written records can, however, be used in conjunction with archaeological information and surviving oral histories from members of the Aboriginal community in order to gain a picture of Aboriginal life in the region.

Despite a proliferation of Aboriginal heritage sites there is considerable ongoing debate about the nature, territory and range of pre-contact Aboriginal language groups in the greater Hunter region. These debates have arisen largely because, by the time colonial diarists, missionaries and proto-anthropologists began making detailed records of Aboriginal people in the late nineteenth century, pre-European Aboriginal groups had been broken up and reconfigured by European settlement activity. The following information relating to traditional boundaries of the Worimi is based on such early records.

It is well accepted that the study area is located within the traditional lands of the Worimi people (Dean-Jones 1990, p. 64). According to Tindale, the Worimi territory extends from north of the Hunter River to Forster near Cape Hawke, along the coastline, encompassing Port Stephens and stretching inland close to Gresford, and as far south as Maitland (Tindale 1974, p. 201). However, Enright recounts that Worimi people occupied the 'Country' "bounded by the seashore from the Manning as far south as Norah Head and possibly to the Hawkesbury". The territory then supposedly extended as far west as Barrington Tops, which was visited in the summer months (Enright 1933, p. 161).

According to Sokoloffnov (1977, p. 16), the territories of the Worimi were established to include a variety of habitats rich in raw materials and food resources. Trade, intermarriage, and the sharing of ceremonial places were central to the Worimi nation's interaction with neighbouring tribal groups, such as the Awabakal, Kamilaroi, Guringai, Wanaruah, and other tribes within the region.

Little is known about the size of the population of the Worimi tribe within Port Stephens before European settlement; however, it is agreed that numbers declined rapidly after contact (Dean-Jones 1990, p. 68). Sources from the early 1800s to the 1840s vary in their estimates, from 120 within a single camp, to 500 Worimi individuals within the Port Stephens Area in 1837 (refer to Dean-Jones 1990, p.68). Threkeld reports that by 1839, the population of the Awabakal people around the Lake Macquarie area, to the south of Worimi territory had declined to as low as 20 (in Dean-Jones 1990, p.68). Exposure to diseases introduced by European settlers, the destruction of food resources, and instances of hostile relations between Europeans and the Worimi and Awabakal people would have contributed significantly to this decline.

The earliest account of contact between Europeans and the Worimi is recorded by David Collins. It was reported that five convicts who had escaped from Parramatta in 1790 were shipwrecked at Port Stephens. The convicts lived among the Worimi for 5 years until they were recaptured (Bramble 1981). Following this, a small garrison of soldiers was established in the 1820's at a place now known as Soldiers Point, located 20 kilometres north-east of the study area, to aid in the recapture of convicts who had escaped from Port Macquarie.

Bramble (1981) accounts that relations between escaped convicts and local tribes were good natured, and signified the introduction of products of European civilisation. Colonel Paterson upon exploring the Hunter

region in 1801, commented upon the possible use of European axes by Aboriginal tribes, and perhaps convicts who lived among them, to cut down trees (in Bramble 1981). This introduction to European resources would have led to the establishment of more fruitful relations between the Aboriginal people of the Hunter region and European penal authorities, in aiding in the recapture of escaped convicts.

Hostile relations between Europeans and the Worimi tribes of Port Stephens seemed to have originated from early interactions with timber-getters exploiting good quality cedar along the coastal regions of NSW. Accounts of hostilities between timber-getters and the Aboriginal people in the region are recorded from as early as 1804 (Bramble 1981). Dawson, having arrived in Newcastle in 1825 after free-settlement was made available in the Hunter region in 1820, comments upon the hostile relations which existed between European timber-getters and the Worimi Tribe of Port Stephens. This consequently set a precursor to relations between Europeans or white settlers and local tribes within the Port Stephens Area (Dawson 1831, in Bramble 1981):

“The timber-cutting parties... were the first people who came in contact with the natives in the neighbourhood of the sea; and as they were composed of convicts and other people not remarkable either for humanity or honesty, the communication was not at all to the advantage of the poor natives, or subsequently to the settlers who succeeded those parties. The consequence of the behaviour of the cedar getters was, that the natives inflicted vengeance upon almost every white man they came in contact with, and as convicts were frequently running away from the penal settlement of Port Macquarie to Port Stephens ...numbers of them were intercepted by the natives and sometimes detained whilst those who fell into their hands and escaped with life, were uniformly stripped of their clothes.”

3.2. Regional context

A number of Aboriginal cultural heritage investigations have been conducted for the broader Hunter Valley region from Rutherford to Port Stephens. Models for predicting the location and type of Aboriginal sites with a general applicability to the Maitland region and thus relevant to the study area have also been formulated, some as a part of these investigations and others from cultural heritage investigations for relatively large developments.

Resource Planning Pty Ltd (1992) prepared a report for RZM Pty Ltd detailing the results of an archaeological investigation of a dune adjacent to Moffats Swamp that had previously been mined for its mineral sand by RZM Pty Ltd (located approximately 20 kilometres south-east of the study area). A number of artefacts had been identified prior to the report within the reject pile of material dredged up from the base of the dune. Artefacts were also noted at the base of the dune. The stone artefacts comprised of a range of raw materials considered to be closely relatable to other sites within the Newcastle Bight Area, such as white tuff, silcrete, yellow mudstone, pink mudstone/tuff, quartz, quartzite, and chert. It was recommended that RZM Pty Ltd apply for to National Parks and Wildlife Services for a permit for Consent to Destroy. The permit was approved with the condition that salvage work be carried out.

Resource Planning Pty Ltd (1993) carried out subsurface testing for RZM Pty Ltd within a series of large vegetated dune crests located at Moffats Swamp, Medowie, where heavy mining for titanium minerals was intended. Two stone artefact scatters were identified (MS2 and MS3). MS2 was assessed and considered not to be of any danger of destruction from dredge mining. MS3 on the other hand was at risk, and Resource Planning Pty Ltd advised RZM Pty Ltd to apply for a permit for Consent to Destroy, so that artefacts from the site might be salvaged in a controlled manner.

Dagg (1996) completed an archaeological assessment of the proposed Rutherford industrial estate, approximately 27 kilometres south-west of the current study area. Dagg's survey located a total of eight

artefact sites and three potential archaeological deposits (PADs). Dagg's assessment noted that the absence of other site types was due to the absence of appropriate environmental features, including sandstone formations and mature trees. The artefact scatters were largely bounded by the edges of areas of exposure rather than a lack of artefacts, and it was considered that sub-surface investigation would show these boundaries to be arbitrary, and that the concentration of artefacts extended over larger areas.

All but one of the identified sites were located within 50 metres of an unnamed tributary of Stony Creek, and artefact concentrations on the surface ranged between 1 and 66. The dominant raw material type in the assemblage was silcrete, with flaked pieces being the dominant artefact type.

Umwelt (1997, 1998) undertook subsurface investigations for the proposed Rutherford Industrial Estate, following on from the 1996 assessment conducted by Dagg. A total of five PADs were investigated by the two assessments. Excavations were conducted on KS9 and KS10 (sites adjacent to unnamed tributaries). A total of 41 artefacts were recovered from both areas, with predominant raw materials of mudstone, silcrete, and quartz. Artefact types included retouched flakes, flakes, broken flakes and flaked pieces. Excavations at KS1, KS4, and KS6 recovered 458 artefacts from areas adjacent to waterlines or drainage plains, with mudstone and silcrete dominant materials.

Umwelt (1999) investigated the Aboriginal archaeological potential of the site of the proposed sewage reticulation works, in Sutton Park Estate, Medowie located approximately 15 kilometres south-east of the study area. No Aboriginal sites or objects were identified during the archaeological survey of the 25 kilometre sewage pipeline corridor. Consultation with Aboriginal community members suggested that the area would have been considered 'unattractive' for occupation, particularly when in comparison with the nearby dune field. No further archaeological investigations were recommended.

Mary Dallas Consulting Archaeologists (2008) undertook a partial salvage excavation of an Aboriginal site at Aberglasslyn, approximately 25 kilometres south-west of the current study area. The site was identified as a part of testing undertaken by Mary Dallas Consulting Archaeologists in 2007 and was located approximately 100 metres above the edge of Oakhampton Swamp, suggesting that the site represented adjacent usage. A total of 1,111 artefacts were recovered from the excavations, giving an average density of 23.64 artefacts per metre square. It was noted that the stratigraphic integrity of the deposits was high, with clear horizons observed.

South East Archaeology (2008) undertook salvage excavations 25 kilometres south-west of the study area along an unnamed tributary of Stony Creek, in advance of sewerage upgrades in the area. The works took place within the 'Heritage Green' area assessed by Dagg (1996) and Umwelt (Umwelt 1997, 1998). The salvage took the form of surface salvage, mechanical trench excavation along the alignment, with hand dug test pits being placed in areas of higher potential.

Background presented by South East Archaeology suggested that Aboriginal occupation was largely focussed within 100 metres of water courses in the area, particularly Stony Creek and its tributaries. The favoured stone materials included silcrete and tuff, and the discard of backed artefacts occurred on site, but it was uncertain if these were manufactured on site. There was no firm statement about how the site was used, with the archaeological evidence possibly representing occupation from a variety of circumstances from transitory movement to the congregation of larger groups. Excavations occurred along an unnamed tributary of Stony Creek.

Over 80% of the excavated assemblage was comprised of silcrete, with another 13% consisting of tuff, and low frequencies of other materials such as volcanic, quartz, chert, quartzite, petrified wood, and acidic volcanic. The assemblage was dominated by complete flakes, flake portions, and lithic fragments, with very low frequencies of other artefact types occurring. Despite perceived high levels of ground disturbance,

excavations at the [REDACTED] site yielded a high density of artefacts in relatively *in situ* deposits. This shows that even in areas where the ground disturbance is high, there is potential for deposits with research potential to exist. Based on the results, a model of occupation was created for the area. It suggested that in the vicinity of the study area, occupation was focused on the zones within 100 metres of water courses, particularly Stony Creek and its higher order tributaries (with excavations taking place along a second order tributary of the creek). Occupation was considered to take the form of short-term temporary encampments, and potentially for the procurement of food or transitory movement.

McCardle (2009) undertook an Aboriginal archaeological assessment encompassing an area approximately 30 kilometers south-west of the study area. The purpose of this investigation was to identify any areas of indigenous cultural heritage value in order to determine potential impacts to the area and to develop management strategies. Background research for the project developed a general model for occupation in the area which, in conjunction with the local context of the site, provided specific statements about the nature of occupation in the study area. McCardle made the following broad statements about the Central Lowlands region:

a wide variety of site types are represented in the study area with open campsites and isolated artefacts by far the most common. Lithic artefacts are primarily manufactured from mudstone and silcrete with a variety of other raw materials also utilised but in smaller proportions. Site numbers and artefact volumes are greatest within close proximity to water. There appears to be a secondary peak in site numbers and artefact volumes at distances over 100 metres from water creek lines. Crest/ridges and slopes are the most archaeologically sensitive landforms. (McCardle Cultural Heritage 2009, p. 19)

McCardle noted that site numbers peaked within 50 metres of water, then again over 100 metres from water, with relatively few sites being identified between 50 and 100 metres from water. McCardle also noted that all grinding groove sites were identified within 50 metres of water, as water sources are important in the grinding process. Low numbers of other site types were present in the area, making predictive statements relating to them unreliable. It was predicted that assemblages would be from the mid to late Holocene (owing to the age of the soils, with the A horizon dating to the Holocene). Sites were expected to be dominated by silcrete and mudstone. It was noted that these statements were affected by past disturbances, particularly those associated with human activity (ploughing and grazing). This disturbance also meant that surface manifestations of sites were no indicator of subsurface deposits. The survey identified 10 artefact sites (seven artefact scatters and three isolated finds) and three PADs. All sites were identified in close proximity to water sources, and the PADs were created to encompass a 20 or 50 metre buffer around the water courses in the study area.

Umwelt (2018) undertook an Archaeological Technical Report for Health Infrastructure for the new Maitland Hospital (the study area) located approximately 25 kilometres south-west of the current study area. An archaeological survey was undertaken, the survey identified that the project area had been subject to high levels of historic and modern disturbances including bulk topsoil stripping and removal. The archaeological survey did not re-identify the previously recorded isolated find located within the project area (AHIMS 38-4-1684/NMH1) and did not identify any Aboriginal cultural heritage materials/object or areas of archaeological potential. The area was assessed as having low archaeological potential and low archaeological significance.

Biosis (2019) conducted an Aboriginal and historical archaeological constraints assessment for 31-33 Bourke Street, Maitland, located approximately 6.5 kilometres north-west of the study area. Research identified that the site was located within a residual soil landscape, thus holding the potential to contain intact archaeological deposits. It was noted that predictive modelling conducted for the assessment area indicated that Aboriginal archaeological sites are frequently located within flat, elevated landform units in close proximity to water, and other natural resources such as flora and fauna and raw stone material. Aboriginal sites and objects have been recorded previously in low lying areas within the Maitland region; however, they

are generally situated within close proximity to secondary landforms such as crests, ridgelines, and spurs, and are within close proximity to lower order tributaries of the Hunter River. However, previous archaeological assessments identified high levels of flooding in the assessment area and high level of disturbance from development. No further investigation was recommended.

Biosis (2023a) undertook an ADDA on behalf of Turner and Townsend Pty Ltd in response to the proposal for the installation of a car park at Maitland Health Campus located approximately 25.7 kilometres south-west of the current study area. The assessment was conducted upon land that has been subject to significant modification in which most natural soils have been removed, buried, or otherwise significantly disturbed. The visual inspection concluded that no further investigation was required as no Aboriginal heritage values were detected, and it was determined the degree of impact that had been inflicted upon the assessment area removed any likelihood of subsurface deposits being found in the assessment area.

Biosis (2018, 2021b) completed two Aboriginal Cultural Heritage Assessments (ACHA) for 530 Raymond Terrace Road, Thornton, located approximately 21 kilometres south-west of the study area. 530 Raymond Terrace Road, Thornton had been previously assessed by Hamm (2004), and McCardle (2010). Hamm (2004) identified [REDACTED] sites within the assessment area, including [REDACTED] artefact scatters and [REDACTED] isolated finds. A search of the AHIMS register also indicated that [REDACTED]. However, a review of the site card for [REDACTED], confirmed that the site is not located within the assessment area. During the field investigations [REDACTED] previously unrecorded Aboriginal heritage sites were recorded within the assessment area. [REDACTED]

[REDACTED] Following the results of the field investigations, a test excavation program was undertaken. The test excavation program identified [REDACTED]. The ACHAs recommended that an AHIP be obtained for sites [REDACTED]

[REDACTED]. If impacts were unable to be avoided, further archaeological assessment would be required for [REDACTED]

Biosis (2020) completed an ADDA for 23 John Renshaw Drive, Black Hill, located approximately 25 kilometres south-west of the study area. Background research conducted as part of this assessment found that artefact sites and PADs are typically located upon crests, slopes with gradients of less than 10 degrees, and well drained topographies within close proximity to fresh water sources or swamp lands. A field investigation identified [REDACTED] artefact site [REDACTED]

[REDACTED]. Areas of low, moderate and high archaeological potential were also identified across the assessment area. Areas of low archaeological potential were observed to have undergone previous ground disturbance or were located within landforms not commonly associated with the presence of Aboriginal sites (drainage depressions, swamp lands). Areas of moderate archaeological potential were identified upon slopes with gradients of less than 10 degrees, where surface artefact sites had been previously recorded throughout the assessment area. Areas of high archaeological potential were attributed to elevated flats and crests within close proximity to fresh water sources and resource gathering zones. Based upon the results of predictive modelling previously undertaken within the region, it was anticipated that areas of high archaeological potential are more likely to contain intact subsurface archaeological deposits that represented foci points for Aboriginal occupation. Areas of moderate archaeological potential will likely contain lower density artefact scatter sites that represent transient activities associated with resource gathering and movement through the assessment area.

Biosis (2023b) undertook an ACHA on behalf of Loxford Project Management Pty Ltd for a proposed residential development 35 kilometres west of the current study area. A total of 42 test pits were excavated across the site. Soils varied from shallow to moderately deep. Soils within the upper slopes and crests were moderately deep, well preserved, and stony in nature with higher levels of gravel inclusions upon the crest. Soils within the lower slopes/creek banks were sandy, and deep where low levels of erosion and geomorphological impacts had occurred. Test excavations identified [REDACTED]

[REDACTED] The results of the assessment are considered to be consistent with predictive modelling for the local region which found that artefact sites are the most common site type and are likely to consist of either isolated finds or artefact scatters made of tuff or silcrete (South East Archaeology Pty Ltd 2008, McCardle 2009, McCardle 2022).

3.3. Local context

Brayshaw & Associates Consultant Archaeologists (1983) conducted an archaeological investigation of a proposed hard rock quarry site, approximately [REDACTED] kilometres south of the study area. It was predicted that stone arrangements, quarries, open sites and scarred trees could be expected at the site. However, the rock outcropping as well as the distance from permanent water meant this site would not have a large concentration of stone artefacts. The dry gullies and local bedrock provided an unlikely environment for grinding grooves. Few mature trees were present within the assessment area which could be presented features associated with culturally modified trees. From the survey, marked trees were found outside of the proposed development which indicated a trail.

EMM (2013) conducted an ACHA for the proposed Gloucester pipeline realignment, with reference to the ACHA prepared by AECOM in 2009. The realignment runs north to south approximately 2 kilometres west of the study area. The AECOM report identified [REDACTED] Aboriginal sites – open camp sites, low density artefact scatters, isolated finds, scarred trees and a previously recorded bora ground, as well as areas of PAD across the approved corridor. It was predicted in the report by EMM that stone artefact sites will be the most likely sites to occur in the vicinity of the pipeline alignment, typically within 100 metres of watercourses. The survey did not identify any specific values, sites, objects, or PADs.

Ecological (2016) conducted an environmental constraints assessments on the study area in order to determine the impacts associated with widening East Seaham Road on behalf of Port Stephens Council. The study determined the risk of impacts to artefact scatters to be medium due to the proximity of Williams River to the study area. PADs, scarred trees and axe grinding grooves were determined to be low as their likelihood of occurrence was concluded to be limited.

McCardle Cultural Heritage (2017) conducted an Indigenous Heritage Impact Assessment for the proposed hard rock quarry located off Italia road, Balickera, approximately 5 kilometres south-east of the study area. The predictive model of the site determined there is high potential for isolated finds and artefact scatters to be located along Seven Mile Creek and moderate potential near the other drainage lines that run through the assessment area. The remainder of the assessment area had low potential due to distance from reliable water and landforms that are steep slopes.

Myall Coast Archaeological Services (2020) conducted various ACHAs to inform the proposed development of the Kings Hill Urban Release Area, located approximately 8.5 kilometres south of the study area. Caves and rock shelter sites were located within the assessment area which was not transferred across to electronic databases before the survey. The elevated ridgeline connecting the highest points within the Kings Hill urban

release area is of extremely high Aboriginal Heritage significance, as well as the associated ridgeline, the wetlands and connectivity to the Williams River. The rest of the urban release area was not considered significance.

3.3.1. Identified Aboriginal archaeological sites

An extensive search of the AHIMS database was conducted on 4 December 2024 (Client service ID: [REDACTED]). The search identified [REDACTED] Aboriginal archaeological sites within a 13.5 kilometre search area, centred on the study area (Table 4). None of these registered sites are located within the study area (Figure 7). The mapping coordinates recorded for these sites were checked for consistency with their descriptions and location on maps from Aboriginal heritage reports where available. These descriptions and maps were relied upon where notable discrepancies occurred.

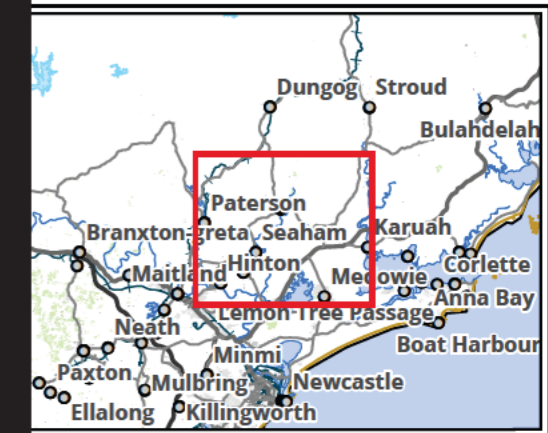
It should be noted that the AHIMS database reflects Aboriginal sites that have been officially recorded and included on the list. Large areas of NSW have not been subject to systematic, archaeological survey; hence AHIMS listings may reflect previous survey patterns and should not be considered a complete list of Aboriginal sites within a given area.

Table 4 AHIMS site type frequency within the vicinity of the study area

Site type	
Artefact	
PAD	
Modified Tree (Carved or Scarred)	
Grinding Groove	
Burial	
Ceremonial Ring (Stone or Earth)	
Stone Arrangement	
Stone Quarry	
Shell	
Art (Pigmented or Engraved)	
Aboriginal Ceremony and Dreaming	
Total	

A simple analysis of the Aboriginal cultural heritage sites registered within [REDACTED] kilometre of the study area indicates that the dominant site type is artefacts sites, representing 45.65% (n=42), followed by PAD representing 21.73% (n=20), modified trees at 9.78% (n=9) and grinding grooves [REDACTED]

[REDACTED]



Legend

- Study area
- AHIMS

NOT TO BE MADE PUBLIC

Figure 7 AHIMS within the vicinity of the study area



Kilometers
 Scale: 1:105,000@ A3
 Coordinate System:
 GDA 1994 MGA Zone 56



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 Prepared for: MC, Prepared by: JB, Last edited by: spanter
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3.3.2. Predictive statements

A series of predictive statements have been formulated to broadly predict the type and character of Aboriginal cultural heritage sites likely to exist throughout the study area and where they are more likely to be located.

These statements are based on:

- Local and regional site distribution in relation to landform features identified within the study area.
- Consideration of site type, raw material types and site densities likely to be present within the study area.
- Findings of the ethnohistorical research on the potential for material traces to present within the study area.
- Potential Aboriginal use of natural resources present or once present within the study area.
- Consideration of the temporal and spatial relationships of sites within the study area and surrounding region.

Based on this information, a series of predictive statements have been developed, indicating the site types most likely to be encountered during the survey and subsequent sub-surface investigations across the present study area (Table 4). The definition of each site type is described firstly, followed by the predicted likelihood of this site type occurring within the study area.

Table 5 Aboriginal site prediction statements

Site type	Site description	Potential
Flaked stone artefact scatters and isolated artefacts	Artefact scatter sites can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.	Moderate: Stone artefact sites have been previously recorded in the region on level, well-drained topographies near reliable sources of fresh water. Due to the level of disturbance of the study area it is unlikely artefacts will be detected within the roadway, though the potential for artefacts to be present in the immediate surrounds as surface finds is moderate.
PADs	Potential sub surface deposits of cultural material.	Low: Sufficiently undisturbed areas and appropriately structured landforms are not present within the study area to be associated with PAD sites.
Modified trees	Trees with cultural modifications	Low: Some scarred trees have been observed within the surrounding locality however, not within the study area. The vegetation within the study area consists of a mix of regenerating and mature native vegetation. Therefore, there is low potential for this site type to occur in the study area.
Grinding grooves	Grooves created in stone platforms through ground stone tool manufacture.	Low: The geology is generally suited to this site type, though suitable horizontal sandstone rock outcrops are not available within the study. The likelihood of this site type being present in the study area is low.

Site type	Site description	Potential
Ceremonial Ring (Stone or Earth)	Raised earth ring(s) associated with ceremony	Low: Due to ongoing disturbance within the study area since the mid-19th century, sufficiently undisturbed areas are not present within the study area to host evidence of ceremonial rings.
Stone arrangements	Areas containing stones placed in a certain way to form circles, semi-circles, lines and routes. Smaller stones are used to keep larger ones in place. Sometimes used to identify ceremonial grounds or boundaries.	Low: Due to ongoing disturbance within the study area since the mid-19th century, sufficiently undisturbed areas are not present within the study area to host evidence of stone arrangements.
Shell middens	Deposits of shells accumulated over either singular large resource gathering events or over longer periods of time.	Low: Shell midden sites have not been recorded within the vicinity of the study area. There is a low potential for shell middens to be located in the study area due to the level of disturbance within the study area.
Quarries	Raw stone material procurement sites.	Low: There is no record of any quarries being within or surrounding the study area. Sufficient outcroppings are also not available within the study area for it to have been utilised as a quarry site.
Burials	Aboriginal burial sites.	Low: No burials have been recorded within proximity of the study area.
Rock shelters with art and / or deposit	Rock shelter sites include rock overhangs, shelters or caves, and generally occur on, or next to, moderate to steeply sloping ground characterised by cliff lines and escarpments. These naturally formed features may contain rock art, stone artefacts or midden deposits and may also be associated with grinding grooves.	Low: The sites will only occur where suitable sandstone exposures or overhangs possessing sufficient sheltered space exist. These outcroppings do not occur in the study area and therefore, the potential for this site type to occur is considered low.
Aboriginal Ceremony and Dreaming sites	Such sites are often intangible places and features and are identified through oral histories, ethnohistoric data, or Aboriginal informants.	Low: There are currently no recorded mythological stories for the study area.
Post-contact sites	These are sites relating to the shared history of Aboriginal and non-Aboriginal people of an area and may include places such as missions, massacre sites, post-contact camp sites and buildings associated with post-contact Aboriginal use.	Low: There are no post-contact sites previously recorded in the study area and historical sources do not identify one.
Aboriginal Places	Aboriginal Places may not contain any 'archaeological' indicators of a site but are nonetheless important to Aboriginal people. They may be places of cultural, spiritual or historic significance. Often, they are places tied to community history and may include natural features (such as swimming and fishing holes), places where Aboriginal political events commenced or particular buildings.	Low: There are currently no recorded Aboriginal historical associations for the study area.

4. Archaeological investigation

An archaeological investigation of the study area was undertaken on 13 November 2023 by Molly Crissell (Biosis, Heritage Consultant). The survey sampling strategy, methodology and a discussion of results are provided below.

4.1. Archaeological survey aims

The principle aims of the survey were to:

- Undertake a systematic survey of the study area targeting areas with the potential for Aboriginal heritage.
- Identify and record Aboriginal archaeological sites visible on the ground surface.
- Identify and record areas of Aboriginal archaeological sensitivity.

4.2. Survey methods

The survey was conducted on foot. Recording during the survey followed the archaeological survey requirements of the Code and industry best practice methodology. Information that recorded during the survey included:

- Aboriginal objects or sites present in the study area during the survey.
- Survey coverage.
- Any resources that may have potentially been exploited by Aboriginal people.
- Landform elements, distinguishable areas of land approximately 40m across or with a 20m radius (CSIRO 2009).
- Photographs of the site indicating landform.
- Ground surface visibility (GSV) and areas of exposure.
- Observable past or present disturbances to the landscape from human or animal activities.
- Aboriginal artefacts, culturally modified trees or any other Aboriginal sites.

Where possible, the identification of natural soil deposits within the study area was undertaken. Photographs and recording techniques were incorporated into the survey including representative photographs of survey units, landform, vegetation coverage, GSV and the recording of soil information for each survey unit were possible. Any potential Aboriginal objects observed during the survey were documented and photographed. The location of Aboriginal cultural heritage and points marking the boundary of the landform elements were recorded using a hand-held Global Positioning System and the Map Grid of Australia (94) coordinate system.

4.3. Constraints to the survey

With any archaeological survey there are several factors that influence the effectiveness (the likelihood of finding sites) of the survey. The factors that contributed most to the effectiveness of the survey within the study area were the reduced visibility from the extensive grass coverage on the northern and southern portion due to the vegetated shoulders of the East Seaham Road. Ground disturbances which reduced the

effectiveness of the survey included the pre-existing gravel road which ran throughout the corridor of the study area.

4.4. Visibility

In most archaeological reports and guidelines visibility refers to GSV, and is usually a percentage estimate of the ground surface that is visible and allowing for the detection of (usually stone) artefacts that may be present on the ground surface (DECCW 2010b). Overall, visibility varied within the study area and ranged from low to moderate (0 to 50%) (Photo 9 to Photo 13). The changes in visibility throughout the study area were attributed to the gravelled road as well as the variation in vegetation within the road corridors. This varied from dense tree vegetation and grass coverage to cleared areas associated with shoulders, driveways, and culverts.

Within the southern portion of the study area, the road itself consists of a gravelled road which displays minimal GSV (5-20%) and was obscured by ground disturbances (Photo 9). The road corridor is heavily vegetated with trees. Small, cleared road shoulders portray higher visibility and cleared areas within the road corridor of the southern portion are mostly associated with access to residential properties.

GSV remained the same for the central portion of the study area (Photo 10). The road continued to consist of a gravel road, however it was less densely tree lined in comparison to the southern portion due to the powerlines and services. Cleared shoulders are also visible due to access to residential properties and access to Wallaroo Nature Reserve. There is also a cleared access road on the eastern side of the road corridor which provides access to the cleared area in which pylons exist which runs parallel to Wallaroo National Park. GSV within this area was moderate (10-50%) in areas subjected to high levels of ground disturbances and vegetation clearance in the central portions of the study area (Photo 11).

The northern portion of the study area exhibits the highest level of visibility due to the high amount of cleared vegetation due to the existing powerlines and services on the eastern side of the road (Photo 12). GSV within the northern portion was low to moderate (10-50%) with higher areas of GSV due to the high levels of ground disturbance and vegetation clearance. The western road corridor remains heavily tree lined except for some cleared areas which exhibit dense grass coverage, cleared shoulders, driveways or culverts (Photo 13).



Photo 9 Southern portion of East Seaham Road, facing east depicting 20% visibility of the study area



Photo 10 Central portion of East Seaham Road, facing north depicting 20% GSV associated with middle portion of road



Photo 11 Central section of East Seaham Road, facing south east depicting 50% GSV due to cleared shoulder



Photo 12 Northern section of East Seaham Road, facing north west depicting 30% GSV due to road and grass coverage



Photo 13 Northern portion of East Seaham Road, portraying a culvert located in the road corridor displaying 10% GSV

4.5. Exposure

Exposure refers to the geomorphic conditions of the local landform being surveyed and attempts to describe the relationship between those conditions and the likelihood the prevailing conditions provide for the exposure of (buried) archaeological materials. Whilst also usually expressed as a percentage estimate, exposure is different to visibility in that it is in part a summation of geomorphic processes, rather than a simple observation of the ground surface (Burke & Smith 2004, p. 79, DECCW 2010b).

Overall, the study area displayed limited areas of exposure, ranging between 0–10% on the road corridors. The central section of the study area had the highest levels of exposure, due to ground disturbances from the pre-existing exposed gravel road (Photo 14). In the shoulders on the boundary of the road, exposure was minimal (0–5%) and was limited by areas that were densely vegetated (Photo 15).



Photo 14 Moderate exposure (10%) associated with vehicular use, facing north



Photo 15 0% exposure associated with road shoulder, dense vegetation coverage and leaf litter, facing north

4.6. Disturbances

Disturbance in the study area is associated with natural and human agents. Natural agents generally affect small areas and include the burrowing and scratching in soil by animals, such as wombats, foxes, rabbits and

wallabies, and sometimes exposure from slumping or scouring. Disturbances associated with human action generally cover large sections of the land surface. The agents associated with human disturbance include the construction of roads and associated landscaping and utilities.

Disturbance levels within the study area were assessed during the visual inspection. Levels of disturbance were categorised through an inspection of the ground surface, landforms, and aerial imagery. Disturbance levels within the study area have been categorised according to the following criteria:

- High disturbance—the landform has been heavily disturbed and all natural soil horizons have been displaced or removed, these areas are unlikely to contain Aboriginal cultural material.
- Moderate disturbance—the landform has undergone disturbances to a certain degree, but the extent and nature of these disturbances cannot be fully quantified. Aboriginal cultural material may be present within these locations but is unlikely to be *in situ*.
- Low disturbance—the landform has not been significantly disturbed and is highly likely to contain intact soil horizons. Aboriginal cultural material if present is likely to be *in situ*.

The study area has experienced varying levels of disturbance over time. The majority of the study area has been subjected to extensive native vegetation clearance for the construction of East Seaham Road. East Seaham Road consists of a highly modified gravel road with 0.2- to 0.5-metre-wide shoulders. Vegetation within the road shoulder consists of modified and disturbed ground vegetation. Beyond the shoulder extent, these areas of vegetation vary throughout the road alignment (approximately 6 metres wide, but of varying width). There are cleared and regenerating vegetation areas associated with the development of culverts, powerlines and other infrastructure such as services and residential development.

Disturbance throughout the study area would have impacted both surface and subsurface deposits. Soils at locations of vegetation clearing experience higher levels of displacements and re-deposition in shallow layers. The development of East Seaham Road involved the modification of the landform for utilities, sewer, water and electricity which are visible throughout the study area (Photo 16, Photo 17, Photo 18). Disturbance of this nature is characterised as high. The excavation undertaken to construct the road would have displaced the soils and thus completely disturbed that region resulting in high disturbance levels. Disturbances of this nature would likely result in the limited preservation of intact archaeological deposits in subsurface layers.



Photo 16 Example of drainage structures located throughout the study area, photo taken facing south-east



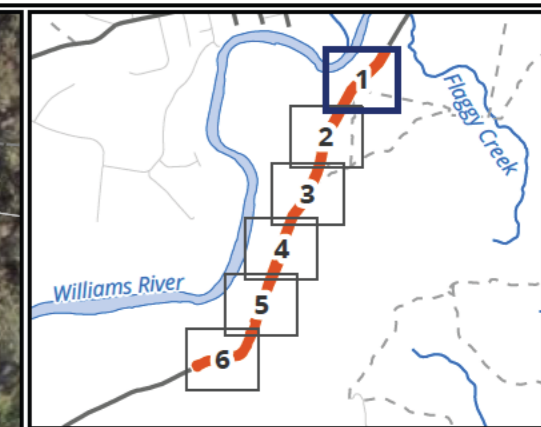
Photo 17 Example of drainage structures located throughout the study area; photo taken facing north-east



Photo 18 Disturbance associated with electricity installation and fence line; photo taken facing north



Photo 19 Disturbance associated with road grading and construction; photo taken facing east



- Legend**
- Study area section
 - Lot
- Disturbances**
- Cleared vegetation
 - Culvert
 - 1
 - 2
 - Extent of works
 - Batter
 - Communications
 - 6
 - Culvert
 - Culvert
 - Culvert

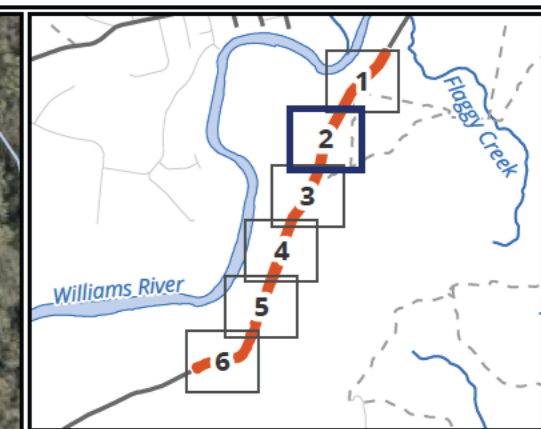
Figure 8.1 Disturbances



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- Legend**
- Study area section
 - Lot
- Disturbances**
- Cleared vegetation
 - 1
 - 2
 - Extent of works
 - Batter
 - Communications
 - 6
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 - Culvert
 - Culvert

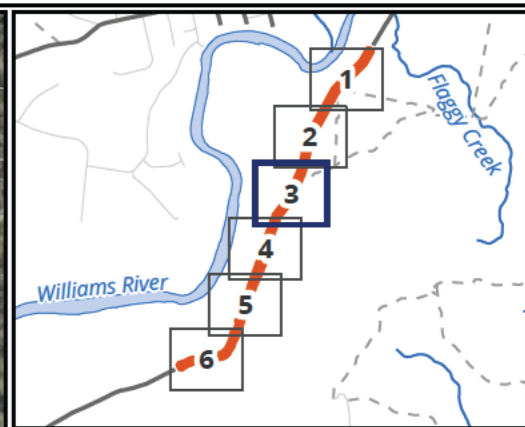
Figure 8.2 Disturbances



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- Legend**
- Study area section
 - Lot
- Disturbances**
- Culvert
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 - 2
 - Extent of works
 - Batter
 - Communications
 - 6
 - Culvert
 - 9
 - Culvert

Figure 8.3 Disturbances

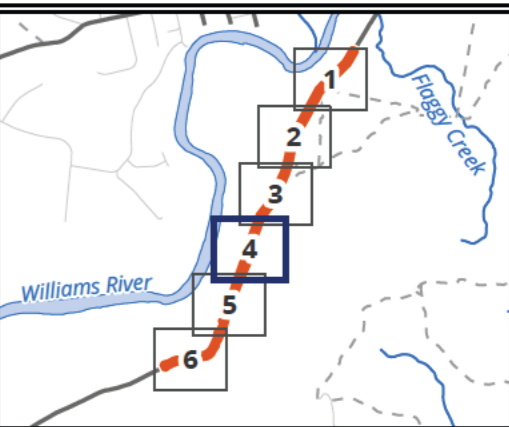
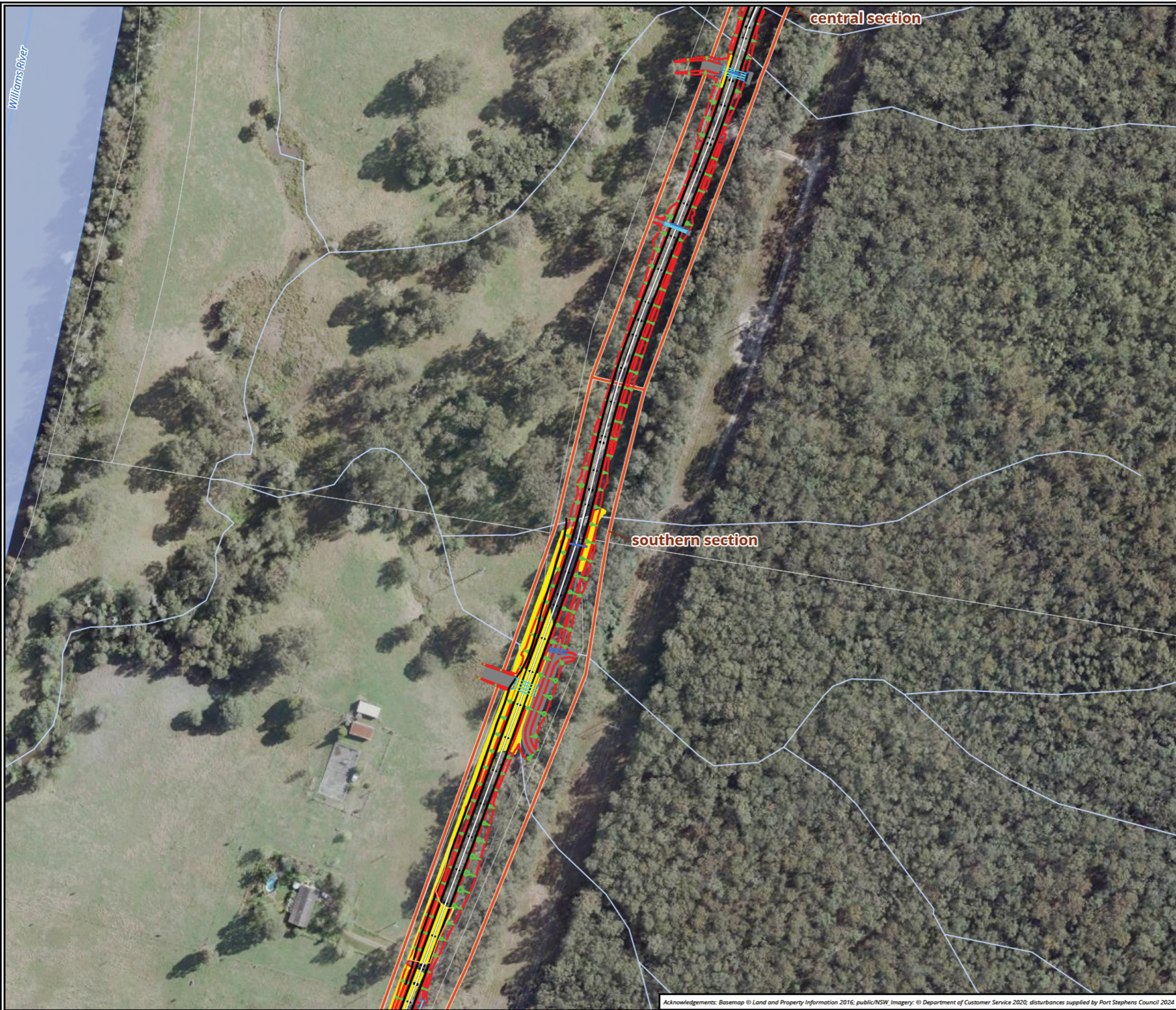


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Legend

- Study area section
- Lot

Disturbances

- Cleared vegetation
- Culvert
- 1
- 2
- Extent of works
- Batter
- Communications
- 6
- Culvert
- Culvert
- 9
- 10
- 11
- Culvert

Figure 8.4 Disturbances

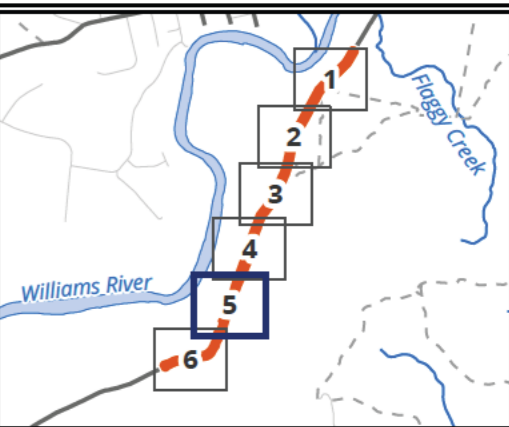
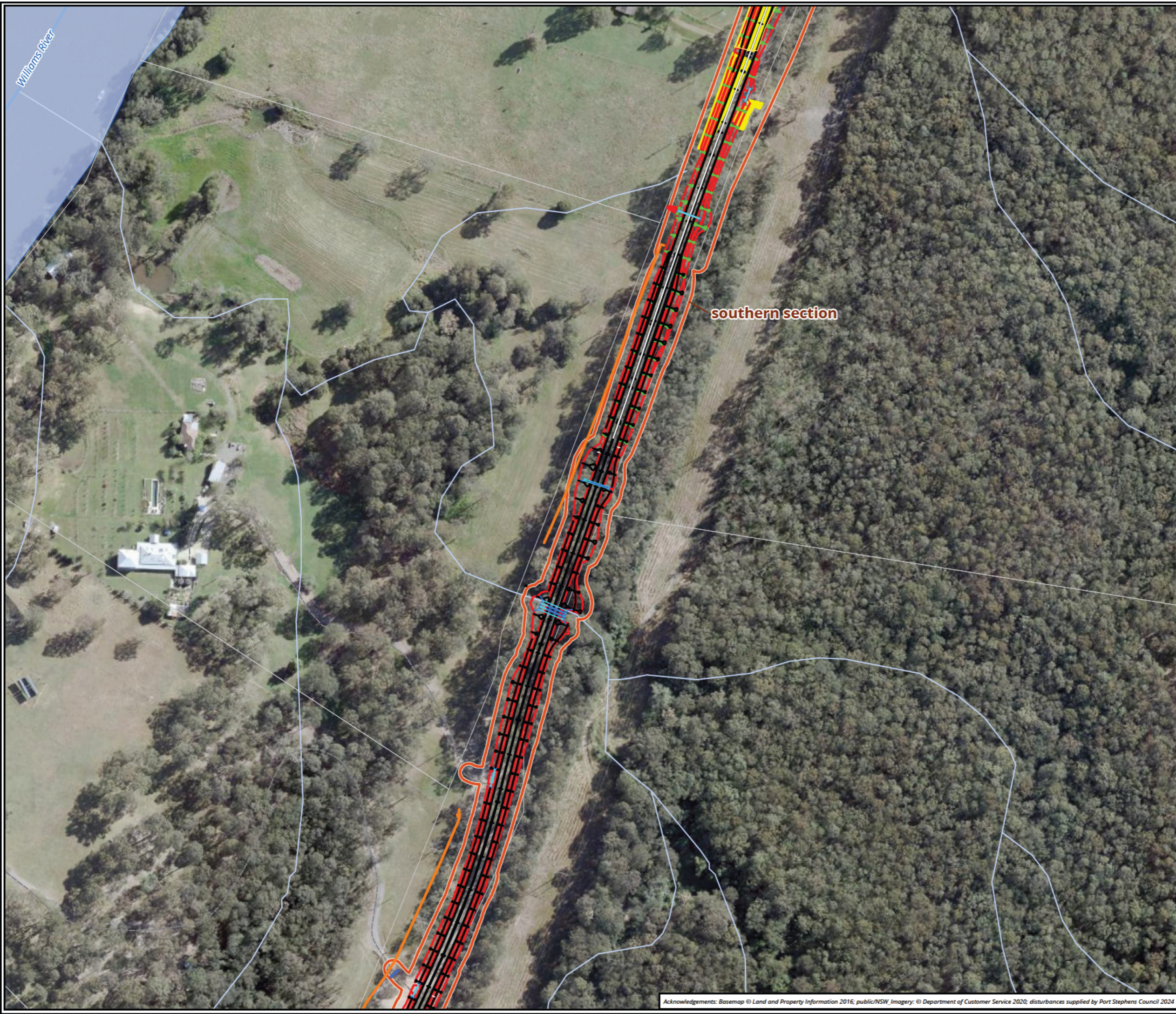


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- Legend**
- Study area section
 - Lot
- Disturbances**
- Cleared vegetation
 - Culvert
 - 1
 - 2
 - Extent of works
 - Batter
 - Communications
 - 6
 - Culvert
 - Culvert
 - 10
 - Telstra
 - Culvert

Figure 8.5 Disturbances

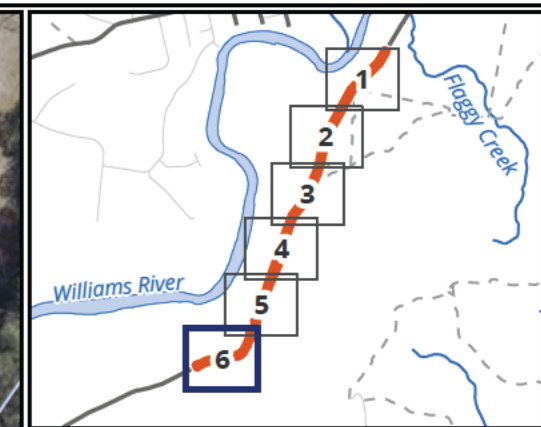


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- Legend**
- Study area section
 - Lot
- Disturbances**
- Culvert
 - 1
 - 2
 - Extent of works
 - Communications
 - 6
 - Culvert
 - Telstra
 - Culvert

southern section

Figure 8.6 Disturbances



Metres
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4.7. Investigation results and discussion

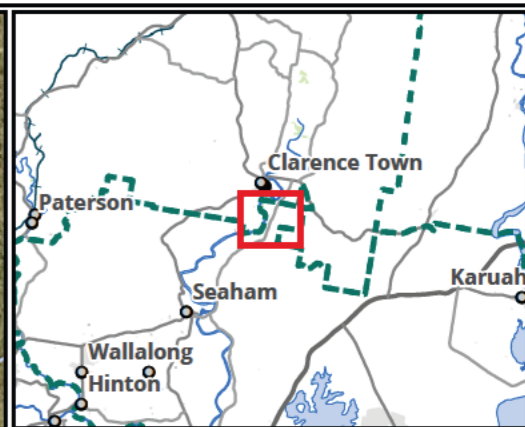
The archaeological investigation consisted of [REDACTED] across the entire study area. The results in the field investigation have been summarised below and transect locations are provided in Figure 8.

Background research has indicated that the study area is situated within an ideal location for the procurement of resources that would have allowed for long term occupation. The proximity of Williams River, and the associated freshwater streams that bisect East Seaham Road indicate that fresh water, aquatic and terrestrial resources would have been in abundance and accessible on a perennial basis. The positioning of the study area at the foothills of the higher elevation ranges in the adjacent national park provides sufficient shelter from the elements, which further add to the desirable nature of the study area. Geologically, raw materials suitable for the manufacture of stone tools and for grinding groove sites are present in the Newtown Formation and Wallaringa Formation respectively. The deeper soils, particularly the majority occupying Glen William landscape, are likely to have retained evidence of this occupations.

Past archaeological investigations have determined that proximity to water and intensity of occupation area is intrinsically linked, with South East Archaeology (2008) and McCardle (2009) demonstrating that occupation zones tend to be located within 100 metres of waterlines. Further to this, Biosis' (2019) investigation in the Maitland locality revealed flat elevated landforms in proximity to natural resources were frequently associated with archaeological sites. The study area is located parallel to the Williams River, a 7th order waterway which runs mostly parallel to East Seaham Road. At its closest point, the Williams River is located 200 metres west of the study area. The study area is also bisected by 13 water courses which feed into the Williams River. The highest population of these water courses are identified within the southern portion of the study area which is located within an undulating landscape. However, with such a large water resource located in proximity to the study area, there is a higher likelihood for Aboriginal sites to exist within 100 metres of the Williams River.

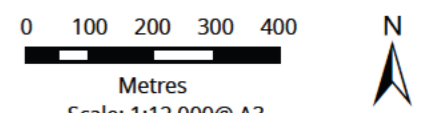
Field investigations and land use history; however, have revealed East Seaham Road to have been subject to continuous and intensive disturbance since at least the 1860s. These disturbances have involved vegetation clearance of land within the road corridors, landform modification and levelling of the landscape along the length of the study area, which have each contributed to the overall disturbance of the archaeological record that may have been preserved in the upper soils. The field investigation indicates that these disturbances range between less than a metre and up to four metres laterally and up to a metre vertically with the installation of drainage systems, electrical poles, fence lines and road grading. As the area of proposed works have been highly disturbed by historical land clearing, and the construction of the road and services there is low archaeological potential. Furthermore, the impact area of the proposed works exists within the footprint of current disturbances.

During the archaeological survey, no Aboriginal sites or objects were identified. While the environmental context of the study area is reflective of an area that may have been intensively occupied, the continuous and extensive disturbance associated with the construction and maintenance of East Seaham Road has likely destroyed any material evidence relating to site use. As such, the study area is considered to hold low archaeological potential.



- Legend**
- Study area
 - Lot
 - Survey tracks
- Archaeological potential**
- Low

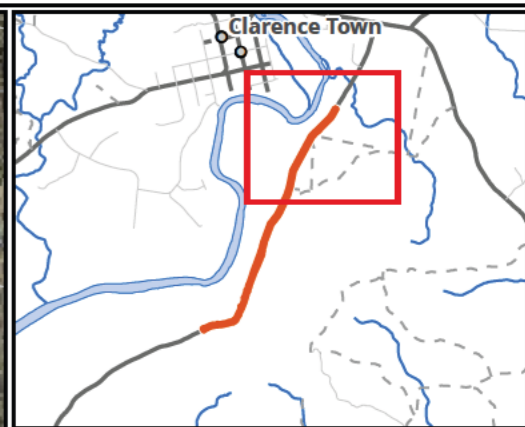
Figure 9 Survey effort and results



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- Legend**
- Study area
 - Lot
 - Survey tracks
- Archaeological potential**
- Low

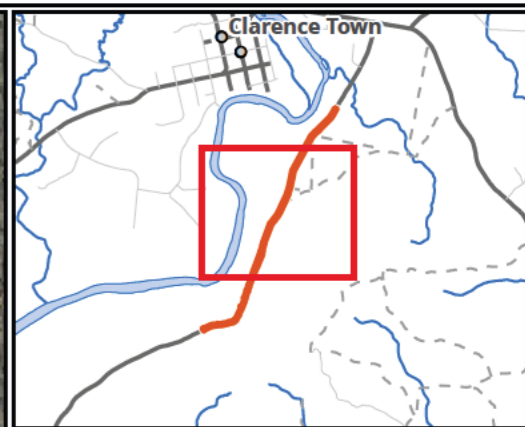
Figure 9.1 Survey effort and results

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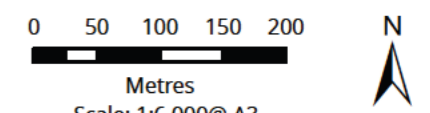
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- Legend**
- Study area
 - Lot
 - Survey tracks
- Archaeological potential**
- Low

Figure 9.2 Survey effort and results

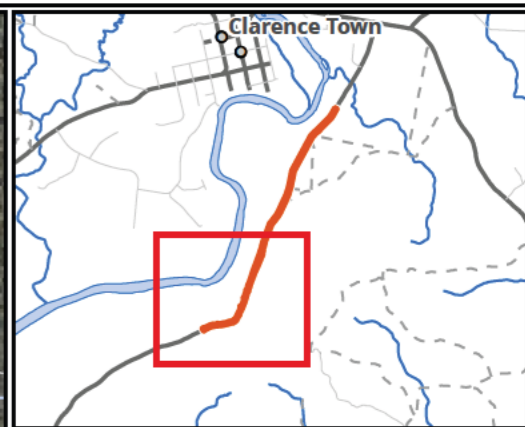
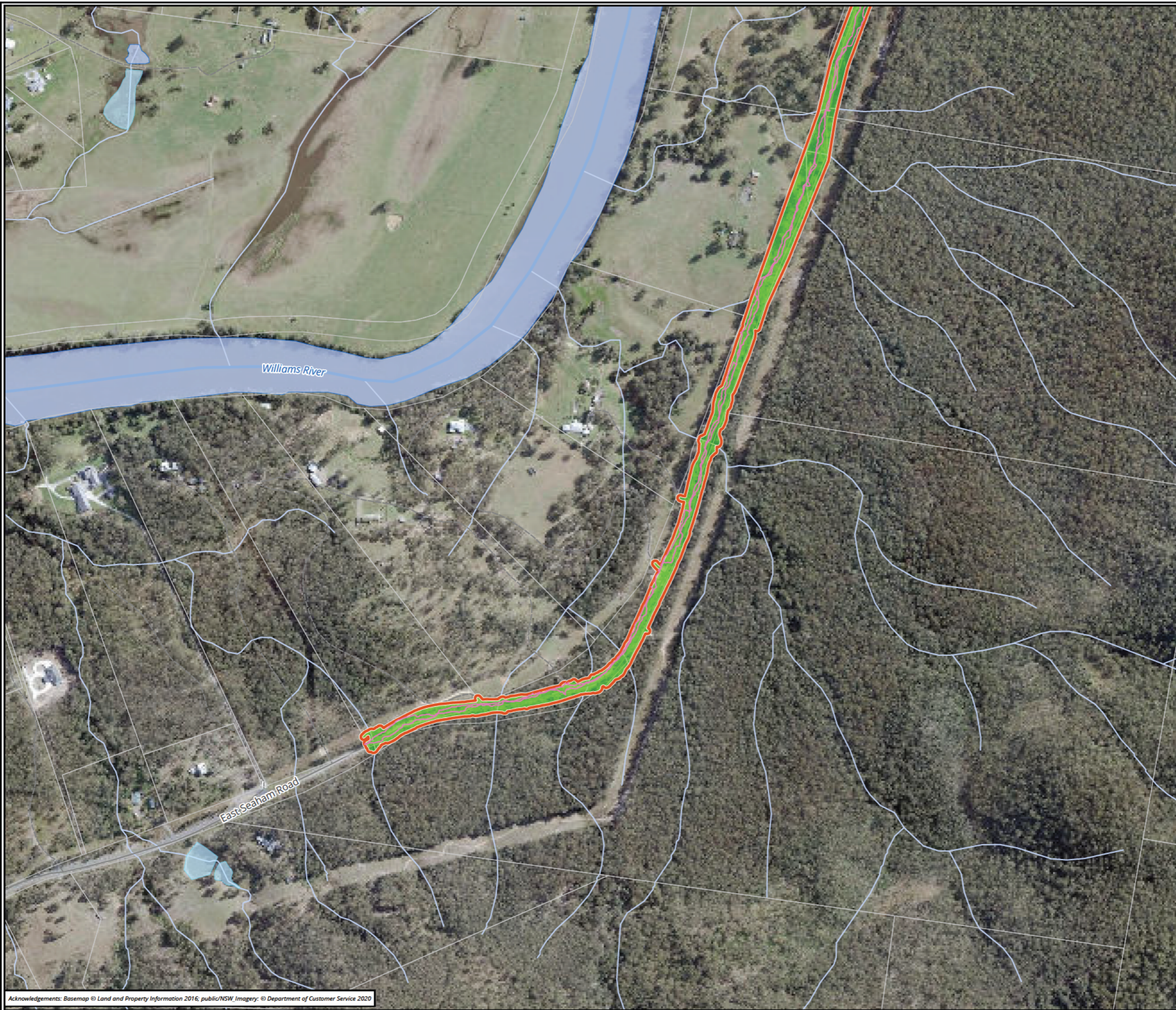


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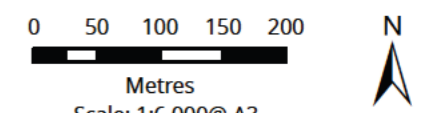
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- Legend**
- Study area
 - Lot
 - Survey tracks
- Archaeological potential**
- Low

Figure 9.3 Survey effort and results



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5. Conclusions and recommendations

5.1. Conclusions

This assessment has determined that there is low potential for Aboriginal sites to be located within the study area, and the field investigation carried out by Biosis did not identify any new archaeological sites. The results of the assessment are also demonstrated in the due diligence flowchart provided by the Code (Figure 9).

5.2. Recommendations

The following management recommendations have been developed relevant to the study area and influenced by:

- Predicted impacts to Aboriginal cultural heritage.
- The planning approvals framework.
- Current best conservation practise, widely considered to include:
 - Ethos of *The Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance, 2013*.
 - The Code.

Prior to any impacts occurring within the study area, the following is recommended:

Recommendation 1: No further archaeological assessment is required

No further archaeological work is required in the study area due to the entire study area assessed as having low archaeological potential.

Recommendation 2: Discovery of unanticipated Aboriginal objects

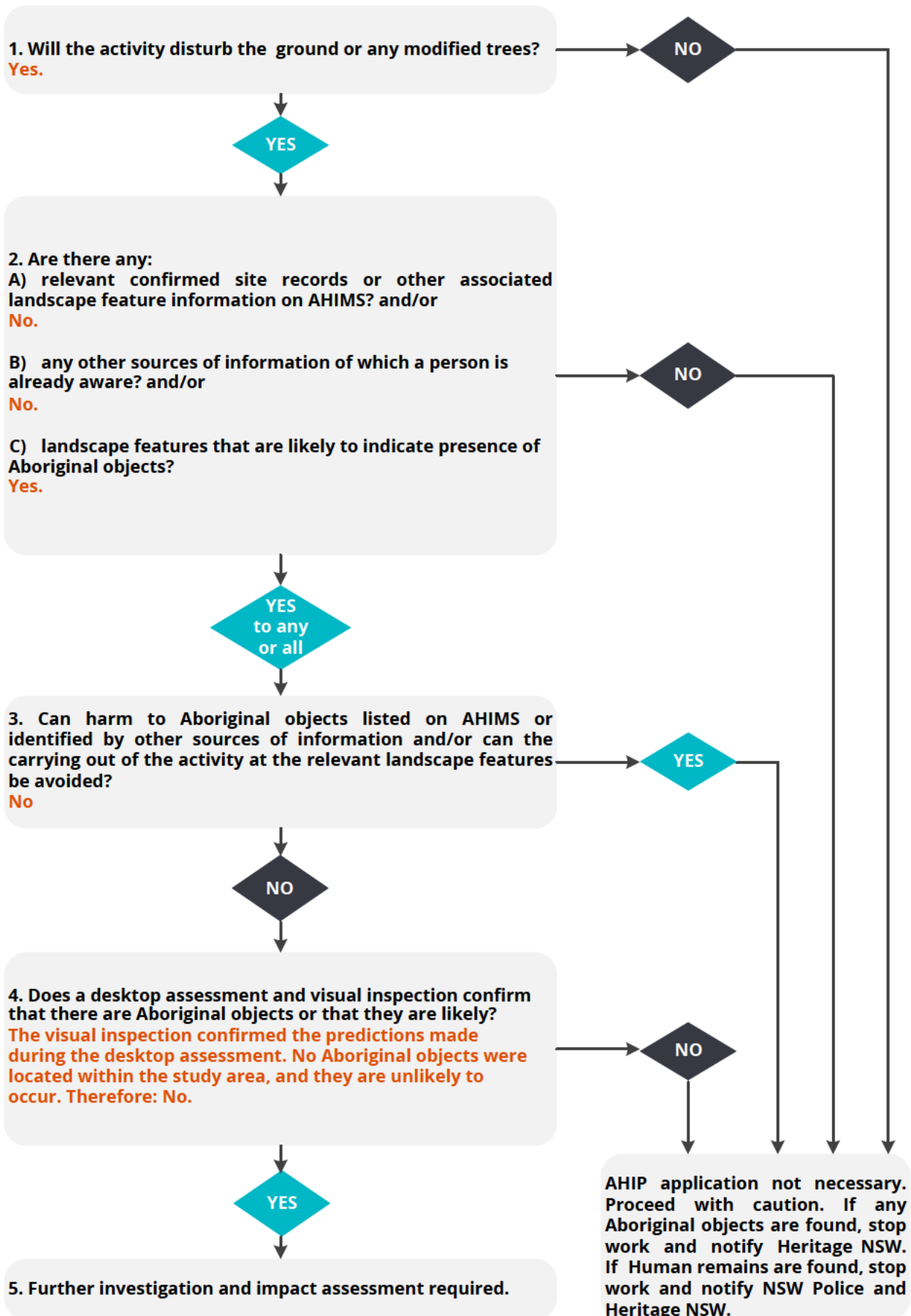
All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by Heritage NSW. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object, the archaeologist will provide further recommendations. These may include notifying Heritage NSW and Aboriginal stakeholders.

Recommendation 3: Discovery of Aboriginal ancestral remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity, you must:

1. Immediately cease all work at that location and not further move or disturb the remains.
2. Notify the NSW Police and Heritage NSW' Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
3. Not recommence work at that location unless authorised in writing by Heritage NSW.

Figure 10: Due Diligence Flow Chart



References

AECOM 2014. Hydro Aluminium Smelter Site and Associated Buffer Land Aboriginal Cultural Heritage Assessment,.

AECOM 2015. Former Hydro Aluminium Smelter Aboriginal Cultural Heritage Assessment,.

Atlas of Living Australia 2023. East Seaham Road: All Species List, Atlas of Living Australia, accessed 22 November 2023, https://biocache.ala.org.au/explore/your-area#-32.5989|151.7878|12|ALL_SPECIES.

Attenbrow V 2002. Sydney's Aboriginal Past: Investigating the archaeological and historical records, University of New South Wales Press Ltd, Sydney.

Biosis 2018. Aboriginal Cultural Heritage Assessment: 530 Raymond Terrace Road, Thornton, NSW., Report prepared for Thornton Brentwood. Authors: Keevers-Eastman. A, Vella. A and Gooley. T, Biosis Pty Ltd, Newcastle, NSW. Project no. 27532.

Biosis 2019. 31-33 Bourke Street, Maitland: Aboriginal and Historical Archaeological Constraints Assessment, Report prepared for Heritage 21. Authors: Vella, M. Butcher Biosis Pty Ltd, Newcastle. Project no. 30281.

Biosis 2020. Aboriginal Due Diligence Assessment: 23 John Renshaw Drive, Black Hill, NSW, Report prepared for de Witt Consulting. Authors: M Lucas and A Keevers-Eastman, Biosis Pty Ltd, Newcastle. Project no. 30996.

Biosis 2021a. 1 Westgate Avenue and 32 Honeymyrtle Street, Thornton: Aboriginal Cultural Heritage Assessment, Report prepared for Land Link Property. Authors: Vella.A, Keevers-Eastman.A, Biosis Pty Ltd, Newcastle, NSW. Project no.33608.

Biosis 2021b. 1 Westgate Avenue and 32 Honeymyrtle Street, Thornton: Archaeological Report, Report prepared for Land Link Property. Authors: Vella.A, Keevers-Eastman.A, Biosis Pty Ltd, Newcastle, NSW. Project no.33608.

Biosis 2023a. Aboriginal Due Diligence Assessment: Maitland Health Campus Car Park Project, Turner & Townsend Pty Ltd. Maitland, NSW.

Biosis 2023b. Regrowth, Kurri Kurri Precinct 1: Addendum Aboriginal Cultural Heritage Assessment, Report prepared for McCloy Group on behalf of Loxford Management Pty Ltd. Authors: Mills, H, Garabedian, C, Allen, C, Keevers-Eastman A. Biosis Pty Ltd, Newcastle, NSW. Project no. 37208.

Bramble CW 1981., Relations between Aborigines and White Settlers in Newcastle and the Hunter District 1804-1841 with special reference to the influence of the penal establishment, Dissertation submitted as part of the requirements for the degree of Bachelor of Letters in History, University of New England.

Brayshaw and Associates 1983. Archaeological Investigation of a proposed quarry site at Mt Seaham NSW,.

Burke H & Smith C 2004. The Archaeologist's Field Handbook, 1st edn, Allen and Unwin, Sydney, NSW.

CSIRO 2009. Australian soil and land survey field handbook, 3rd edn, CSIRO Publishing & National Committee on Soil and Terrain, Collingwood, Victoria.

- Dagg, L 1996. Archaeological Assessment, proposed Industrial Subdivision, West Rutherford, NSW. Report to Hill Top Planners Pty Ltd.,.
- Dean-Jones P 1990. Newcastle Bight Aboriginal Sites Study, NSW National Parks and Wildlife Service, and National Estate Grants Committee.
- DECCW 2010a. Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales, Department of Environment, Climate Change and Water, Sydney NSW.
- DECCW 2010b. Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW, Department of Environment and Climate Change, Sydney NSW.
- Department of Planning and Environment 2023. Road Alignment, State Heritage Inventory - Heritage NSW.
- Department of Planning, Industry and Environment 2023a. 'Glen William in Soil Landscapes of Central and Eastern NSW - v2.1', <https://www.environment.nsw.gov.au/Salis5app/resources/spade/reports/9232gw.pdf>.
- Department of Planning, Industry and Environment 2023b. 'Ten Mile Road in Soil Landscapes of Central and Eastern NSW - v2.1', accessed 9 May 2023, <https://environment.nsw.gov.au/Salis5app/resources/spade/reports/9232tma.pdf>.
- DPIE 2020. 'Soil Landscapes of Central and Eastern NSW',.
- Dyall L 1979. Report on Aboriginal Relics in Area of Proposed Smelter at Farley, N.S.W. Report to Alumax of Australia Pty Ltd.,.
- EcoLogical 2016. East Seaham Road widening, East Seaham, Port Stephens Council.
- EMM Consulting 2013. Gloucester Pipeline Realignment Aboriginal Cultural Heritage Assessment, AGL.
- Enright WJ 1933. 'Further Notes on the Worimi', Mankind: 161-2.
- Hamm G 2004. Archaeological assessment of Lot: 20 DP: 10419 Raymond Terrace Road Thornton North, Maitland Council, Report to A.V. Randell.
- Jones P 1986. Sites 38-4-121, 38-4-123, 38-4-124 and 38-4-125 reported to NPWS, Found during reconnaissance for undergraduate work.
- Mary Dallas 1985. Report on Archaeological Investigation at Farley Downs, N.S.W. Report to Scott, Crisp, Cashmere & Partners on behalf on the Hunter Valley Development Company.,.
- Mary Dallas Consulting Archaeologists 2008. Aboriginal Archaeological Excavation Partial Salvage of AB Campsite 1 (AHIMS # 38-8-0866) at Oakhampton Road, Aberglasslyn, NSW., Report to Pulver Cooper Blacklet Pty Ltd on behalf of Stockland Developments Pty Ltd.
- McCardle Cultural Heritage 2009. West Rutherford Indigenous Archaeological Assessment. Report to ADW Johnson Pty Ltd.,.
- McCardle Cultural Heritage 2010. Thornton North Lot 20: Indigenous Archaeological Assessment, For Paradigm Planning and Development Consultants Pty Ltd.
- McCardle Cultural Heritage 2017. Eagleton Quarry.,.

McCardle Cultural Heritage 2022. Regrowth, Kurri Kurri - Precinct 1. Aboriginal Cultural Heritage Assessment. Report to Loxford Project Management Pty Ltd.,.

Myall Coast Archaeological Services 2020. Summary of Archaeological Studies and Findings, Kings Hill Urban Release Area,.

NSW Department of Planning and Environment 2016. The North Coast Bioregion, Boregions of NSW - vh 14 North Coast, <https://www.environment.nsw.gov.au/resources/nature/nswNorthCoast.pdf>.

'Port Stephens Shire', 1926., Dungog Chronicle and Gloucester Advertiser.

Resource Planning Pty Ltd 1992. Investigation of Archaeological site at ML 1070 and ML 1078, Moffats Dune, Newcastle Bight,.

Resource Planning Pty Ltd 1993. Archaeological Testing of the RZM Pty Ltd Plant 9 Planned Sand Mine Adjacent to Moffats Swamp, Richardson Road, Medowie, ML 1067, RZM Pty Ltd.

Ritter DF, Kochel RC, & Miller JR 1995. Process Geomorphology, Wm. C. Brown.

Roberts J, Lennox M, Chapman J, & Engel B 1991. 'Dungog 1:100 000 Geological Sheet 9233',.

Sokoloffnov B 1977. The Worimi: Hunter-gatherers at Port Stephens,.

South East Archaeology Pty Ltd 2008. Hunter Water Corporations Maitland No. 14 Wastewater Upgrade Stage 1 – Salvage of Aboriginal Objects (DECC Permit #2807). Report to Hunter Water Corporation,.

Strahler A 1952. 'Hypsometric (area-altitude) analysis of erosional topology', Geological Society of America Bulletin, 63, 11: 1117–42.

Tindale NB 1974. Aboriginal Tribes of Australia: The Terrain, Environmental Controls, Distribution, Limits and Proper names, Australian National University, Canberra.

Umwelt 1997. Archaeological Assessment, Subsurface Investigations of PAD 2 and 3, Rutherford Industrial Estate, West Rutherford, NSW. Report to Hill Top Planners Pty Ltd,.

Umwelt 1998. Archaeological Assessment, Sub-surface Investigation of KS1, KS4 and KS6, Rutherford Industrial estate, West Rutherford, NSW. Report to Hill Top Planners Pty Ltd,.

Umwelt 1999. Report of the Surface Investigations of Aboriginal Heritage: Site of Proposed Sewerage Reticulation Works, Sutton Park Estate, Medowie, NSW., Hunter Sewage Project.

Umwelt 2004. Archaeological Survey and Assessment of the Proposed Industrial Estate at the Royal Newcastle Aero Club, Rutherford NSW. Report to Royal Newcastle Aero Club Joint Venture,.

Umwelt 2018. New Maitland Hospital Aboriginal Technical Report. Report for Health Infrastructure NSW,.

