

Roads and Traffic Authority

Pacific Highway Upgrade -
Oxley Highway to Kempsey
Aboriginal Heritage Working Paper

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4. Environmental context

4.1 Study area

The study area encompasses the Proposal and has an average width of approximately 150 metres and a total length of approximately 37 kilometres. The study area is considerably wider than the requirements for the construction of the Proposal and was surveyed to account for possible changes to the Proposal design during the development of the concept design and at the detailed design stage. The total area of the study area, which was subject to detailed field investigation, measures approximately 562 hectares or 5.62 square kilometres.

4.2 Proposal context

The Proposal commences approximately 700 metres north of the Oxley Highway interchange, tying in with the existing dual carriageways to the south and continues northwards to tie in at Stumpy Creek with the dual carriageways of the proposed Kempsey to Eungai Pacific Highway upgrade. At the northern end of the Proposal, the eastern service road would extend approximately 320 metres further to the north of Stumpy Creek to tie in with the proposed Kempsey to Eungai upgrade. The majority of the Proposal would require duplication of the existing highway. Two main sections of the Proposal would deviate from the alignment of the existing highway. These are in the vicinity of the Hastings River and the Wilson River. The existing highway would be retained wherever possible for use as a service road or local road connection.

The study area commences at its southern end approximately 700 metres north of the existing intersection of the Pacific Highway and the Oxley Highway, in a section of existing dual carriageway. It follows the existing alignment of the Pacific Highway north for approximately 4 kilometres to Fernbank Creek. A broader study area was assessed in this locality to account for the proposed Sancroix Road traffic arrangement. This southernmost section of the study area encompasses gently undulating low hills near their junction with the Hastings River floodplain.

At Fernbank Creek, the Proposal deviates to the west of the existing Pacific Highway for approximately 2 kilometres across the Hastings River and its floodplain, part of the low-lying coastal plain.

The narrow coastal plain has accumulated through progressive infilling with sediment, both marine sands and colluvial and fluvial deposits derived from the adjacent hills, accompanied by the formation of coastal barriers during the Holocene period. Deglaciation and melting of ice sheets occurred rapidly as temperatures rose during the termination of the last glacial maximum, from about 18,000 years ago. Post-glacial sea levels rose quickly (about 1 metre per 100 years) up to 8000 years before present (where present is defined as the year 1950 AD), before slowing, but continued to rise above their present level at least 7000 years ago. The sea level probably remained between 1.5 and 2.2 metres above the present level until around 3600 years ago.

After about 3600 years before present, a rapid decline in the sea level of approximately 1 metre occurred, although until 1500 years before present (where present means the year 1950 AD) the sea level may still have remained about 1 metre above the present level (Haworth et al 2002, Rowland 1999, Roy and Boyd 1996, Young et al 1993). Infilling with colluvial and fluvial sediments has resulted in the gradual transformation of small estuarine lakes behind the sandy barriers to marshes, brackish lagoons and swamps (for example, Limeburners Creek Nature Reserve, north of the Hastings River and east of the Maria River). More recent changes have also resulted from the activities of non-Aboriginal settlers, including substantial drainage works on the floodplains of the Hastings and Wilson rivers.

On the northern side of the Hastings River the Proposal continues for approximately 1 kilometre across the low, gently undulating coastal hills, before rejoining the alignment of the existing Pacific Highway where a grade separated interchange is proposed at Blackmans Point Road.

Between Fernbank Creek and the proposed grade separated interchange at Blackmans Point Road, the existing highway would be retained as a service road.

The Proposal continues north for approximately 3 kilometres following the alignment of the existing Pacific Highway. Gently undulating coastal hills of low elevation (generally less than 30 metres Australian height datum) are traversed. Cairncross State Forest and Rawdon Creek Nature Reserve are located generally to the east and west of the existing highway.

The Proposal deviates to the east of the existing Pacific Highway for approximately 1.5 kilometres across the low coastal hills within Cairncross State Forest to the Wilson River floodplain.

The Proposal continues north for approximately 5 kilometres across the Wilson River and its extensive floodplain, part of the low-lying coastal plain. The Proposal crosses the Wilson River at the eastern tip of Dalhenty Island, approximately 2 kilometres downstream of the existing highway. The bridge crossing over the Wilson River is likely to require access to Dalhenty Island for bridge construction activities.

North of the Wilson River the Proposal traverses more moderately inclined fringes of the coastal hills, near their junction with the coastal plain, for approximately 1.5 kilometres until it rejoins the existing highway alignment. A half grade separated interchange is proposed at Haydons Wharf Road and consequently the study area was broader in this locality.

The remainder of the study area generally follows the existing alignment of the Pacific Highway north for approximately 19 kilometres to just north of the Maria River at Stumpy Creek. The Proposal includes a deviation to the east and parallel with the existing highway through the Maria River State Forest at the northern end, rejoining the existing highway just south of Maria River. The existing highway bridges across the Maria River would be used for the Proposal.

A number of higher order watercourses are traversed, including Cooperabung Creek, Barrys Creek, Smiths Creek, Pipers Creek and the Maria River, along with their associated small valley flats. The coastal hills tend to be of steeper gradient and higher elevation between Cooperabung Creek and Mingaletta Road, where Cooperabung Hill is traversed. Cooperabung Creek Nature Reserve and Ballengarra State Forest are located in the area north of Cooperabung Hill. North of Mingaletta Road the gradients tend to be gentle or very gentle on the undulating low coastal hills. Elevation above sea level is also lower than in the area between Cooperabung Creek and Mingaletta Road. Maria River State Forest is traversed in the northern part of this section.

4.3 Geology

The underlying geology (as sourced from the Hastings SH 56-14 1:250,000 geological map) is variable along the Proposal and comprises:

- Quaternary alluvial sand, silt, mud and gravel on the floodplains of the Hastings River and Wilson River and around Cooperabung Creek and Smiths Creek.
- Lithic sandstone, siltstone, tuff, shale and limestone of the Carboniferous Byabbara Beds on the low coastal hills at the southern end of the Proposal, from north of the Hastings River to Blackmans Point Road and from north of the Wilson River to Mingaletta Road (Cooperabung Hill).
- Mudstone, siltstone and limestone of the Lower Permian Beechwood Beds on the low hills from Blackmans Point Road to the southern edge of the Wilson River floodplain.
- Pebbly mudstone, conglomerate, lithic sandstone and mudstone of the Lower Permian to Upper Carboniferous Kullatine Formation between about Mingaletta Road and Wharf Road, south of Smiths Creek.
- Mudstone and sandstone of the Lower Permian Warbro Beds in a small section around Wharf Road, south of Smiths Creek and also north of Smiths Creek to Pipers Creek.
- Mudstone and sandstone, with minor conglomerate, of the Lower Permian Kempsey Beds from Pipers Creek to Maria River.

4.4 Vegetation

Vegetation varies along the Proposal, but typically comprises:

- Moist slopes forest across approximately 24 per cent of the study area, particularly at the southern end and between the Wilson River and the northern end.
- Cleared open grassland, including areas of pasture, crops and scattered trees, across approximately 34 per cent of the study area, particularly around the Hastings River and Wilson River floodplains and other areas of rural land use.
- Dry ridgetop forest across approximately 13 per cent of the study area, particularly around crests in the forested areas, most notably in the Cairncross, Ballengarra and Maria River state forests.
- Moist floodplain forest across approximately 9 per cent of the study area, particularly around Blackmans Point Road, Haydons Wharf Road, Smiths Creek and Pipers Creek.
- Moist gully forest across approximately 8 per cent of the study area, particularly around drainage depressions in the Cairncross, Ballengarra and Maria River state forests.
- Minor occurrences of other vegetation communities such as paperbark swamp forest, riparian forest and swamp mahogany / forest red gum swamp forest.

4.5 Land use

Recent, non-Aboriginal land use practices have extensively affected large portions of the study area (refer to Plates 1 to 2). Approximately 103 hectares (18.3 per cent) of the study area has been extensively disturbed by previous earthmoving works and construction (typically associated with the existing Pacific Highway), such that there is negligible potential for any Aboriginal heritage evidence to survive. The forms of recent land use impact and post-depositional processes that have affected the remainder of the study area include:

- Extensive removal of native vegetation, including clearing for rural or residential use and timber harvesting, often followed by regrowth over recent decades or establishment of introduced species.
- Pastoral activities, including fencing, stockyards, livestock agistment, drainage / erosion control works and farm dams.
- Agricultural activities, including tea-tree plantations, vineyards and other crops.
- Rural residential use, including houses.
- Light industrial or commercial use, including plant and buildings.
- Construction, maintenance and use of vehicle tracks and roads.
- Power lines, telecommunications cables, water pipelines and other services.
- Landscaping and other minor earthworks, including borrow pits.
- Recreational use.
- Natural processes such as bioturbation and erosion.

These activities are likely to have adversely affected the integrity and survival of Aboriginal heritage evidence within the study area.



Plate 1



Plate 2

4.6 Landform

The undisturbed portion of the study area (which excludes approximately 103 hectares or 18.3 per cent of the study area that has been extensively disturbed by previous land use such that there is negligible potential for any Aboriginal heritage evidence to survive) traverses eight landform units and four classes of slope (following the definitions of McDonald et al 1984). Simple slopes occupy 43.2 per cent of the undisturbed study area, valley flats 21.5 per cent, drainage depressions 19.4 per cent, spur crests 12.3 per cent, flats 2.6 per cent, ridge crests 0.7 per cent and hillocks and river banks less than 0.2 per cent each. Level-very gentle gradients (less than 1°45′) comprise 41.9 per cent of the undisturbed study area, gentle gradients (greater than 1°45′ and less than 5°45′) 49.4 per cent, moderate gradients (greater than 5°45′ and less than 18°) 7.5 per cent and steep gradients (more than 18°) 1.2 per cent.

4.7 Archaeological terrain units

The undisturbed study area can also be subdivided into 18 different archaeological terrain units or environmental contexts. These are discrete, recurring areas of land for which it is assumed that the Aboriginal land use and resultant heritage evidence in one location may be extrapolated to other similar locations. Environmental contexts were defined on the basis of two environmental variables:

- Firstly, *landform element* (following the definitions of McDonald et al 1984) (ridge crest, spur crest, simple slope, drainage depression, etc).
- Secondly, *class of slope* (following McDonald et al 1984) (level to very gently inclined; gently inclined, etc).

The predominant environmental contexts are (as a percentage of the undisturbed study area):

- Gentle simple slope (31.7 per cent).
- Level-very gentle valley flat (21.5 per cent).
- Gentle drainage depression (11 per cent).
- Level-very gentle drainage depression (7.6 per cent).
- Gentle spur crest (6.6 per cent).
- Moderate simple slope (6.4 per cent).
- Level-very gentle spur crest (5.3 per cent).
- Level-very gentle simple slope (4.2 per cent).
- Level-very gentle flat (2.6 per cent).

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