

Appendices

Appendix A – Secretary’s environmental assessment requirements

Office of the Secretary

Mr Ashley Jagoe
Manager – Major Projects
Liveable City Solutions
Sydney Water Corporation
PO Box 399
Parramatta NSW 2124

14/16555

Dear Mr Jagoe

Thank you for your correspondence date 30 September advising the Department of changes to the proposed modification 4 of the Picton Sewerage Scheme.

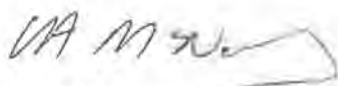
The Department has reviewed the proposed changes and has revised the Secretary's Environmental Assessment Requirements to account for the reduced scope of works. Please find attached a copy of the revised Secretary's Environment Assessment Requirements for the preparation of an Environmental Assessment for the modification.

The revised Secretary's Environment Assessment Requirements have been prepared based on the information you have provided to date. Please note that under section 75W(3) of the *Environmental Planning and Assessment Act 1979*, the Secretary may alter these requirements at any time. If you do not submit an Environmental Assessment for the modified project within two years you must consult the Department prior to submitting an Environmental Assessment.

If your project is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation. It is your responsibility to contact the Department of the Environment to determine if an approval under the EPBC Act is required for your project (<http://www.environment.gov.au> or 6274 1111).

Should you have any further enquiries, please contact Belinda Scott, Infrastructure Branch, at the Department on (02) 9228 6472.

Yours sincerely



Carolyn McNally
Secretary

17.11.14

Encl. Secretary's Environmental Assessment Requirements for Modification 4 of Picton Sewage Treatment Plant

Secretary's Environmental Assessment Requirements

Section 75W(3) of the *Environmental Planning and Assessment Act 1979*

Application number	1997-01-15 MOD 4
Project	Project Modification: • Amplification of sewage treatment plant.
Location	The proposed modification is located at the Picton Sewerage Scheme near Remembrance Drive Picton in the Wollondilly Shire Council area.
Proponent	Sydney Water Corporation
Date issued	November 2014
Expiry date	November 2016
General requirements	The modification Environmental Assessment (EA) must include: ▪ an executive summary; ▪ a detailed description of the proposed modification including construction methods, location and alignment of project components, operation details including any changes to existing operations, including system capacity, treatment technology and water quality standards, wet weather event management and interfaces with existing infrastructure, energy requirements and any staging; ▪ consideration of any relevant statutory provisions including the objects of the <i>Environmental Planning and Assessment Act 1979</i> and permissibility; ▪ an assessment of the environmental impacts of the proposed modification, with particular focus on the key assessment requirements specified below; ▪ a draft Statement of Commitments detailing measures for environmental mitigation, management and monitoring for the project; ▪ justification for the proposed modification with consideration of the environmental, social and economic benefits and impacts; and ▪ certification by the author of the Environmental Assessment that the information contained in the Assessment is neither false nor misleading.
Key issues	The EA must include assessment of the following key issues: Strategic Justification – the EA must: ➤ clearly outline the strategic context of the proposed modification, having regard to existing and future development in the area and relevant government policies and strategies; ➤ describe the need for and objectives of the proposed modification, including its relevance to the overall wastewater scheme for the area; alternatives considered (both alignments and technologies), and an assessment and justification of the environmental costs and

	benefits of the proposed modification relative to alternatives. Water Quality - include an assessment of water quality impacts taking into account applicable NSW Government policies including applicable the NSW Aquifer Inference Policy. The assessment is to consider impacts: • arising from the construction of new sewerage infrastructure and changes to operation of the treatment plant. • include management measures to prevent, monitor or minimise water quality impacts to surface water and groundwater. Ecological Impacts – include a flora and fauna assessment consistent with the <i>Draft Guidelines for Threatened Species Assessment</i> (DEC and DPI, 2005): • taking into consideration impacts on any threatened species, populations, ecological communities; and • details of how flora and fauna impacts would be managed including, where relevant, consideration of offsets in accordance with the <i>NSW Biodiversity Offsets Policy for Major Projects 2014</i>. Aboriginal Heritage – include an assessment of the potential impact on Aboriginal heritage values/items and proposed mitigation measures in accordance with the <i>Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation</i> (DEC, 2005). Non Indigenous Heritage – include an assessment of the potential impact on non-indigenous heritage values/items and proposed mitigation measures, consistent with the <i>NSW Heritage Manual</i>. Where impacts to State or local non-indigenous heritage items are proposed, a statement of heritage significance must be included for these items and measures identified to mitigate and manage impacts. Human Health – the Environmental Assessment must identify any change to risk to human health, including mitigation measures and management to ensure appropriate standards are met. Odour –include an assessment of the odour impacts associated with construction and changes to operation respectively. The odour analysis shall be undertaken in accordance with the <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (DEC, 2005) and draft <i>NSW Best Practice Odour Guideline Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining</i> (DoP 2010). Noise and Vibration – include an assessment of noise and vibration impacts during construction and operation and in a cumulative context with existing development. The assessment must consider the following guidelines, as relevant: <i>Interim Construction Noise Guidelines</i> (DECC 2009) and <i>Road Noise Policy</i> (DECCW 2011), <i>Industrial Noise Policy</i> (EPA, 2000). Traffic and Transport – include an assessment of impacts to the local and regional road and rail network, including direct impacts from
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	construction or operational traffic. The assessment shall include details of the nature/mode of traffic generated and estimated traffic volumes and proposed transport routes. Visual Amenity – include an assessment of changes to visual amenity, with reference to surface components and vegetation removal and include proposed mitigation measures. Hazards and Risk – include an assessment of the hazards and risk including details of the waste handling and disposal of chemicals during construction and operation and identification of management measures associated with operation. Environmental Risk Analysis – notwithstanding the above key assessment requirements, the EA shall include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified, an appropriately detailed assessment of those impacts must be included.
Consultation	You must undertake an appropriate and justified level of consultation with relevant parties during the preparation of the EA, including: ▪ local, State or Commonwealth government authorities and service providers including the Department of Health, the Environment Protection Authority, the Office of Environment and Heritage, the Department of Primary Industries (including the NSW Office of Water), the Sydney Metropolitan Catchment Management Authority, Roads and Maritime Services and Wollondilly Shire Council; ▪ specialist interest groups, including local Aboriginal land councils; and ▪ the local community, including affected landowners. The EA must describe the consultation process, document consultation undertaken and identify any issues raised (including where these have been addressed in the EA).

Appendix B – Flora and fauna search results and assessment of significance

Threatened ecological communities

Community	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
Agnes Banks Woodland in the Sydney Basin Bioregion	EEC		Most remnants occur near Agnes Banks in Penrith LGA, on eastern bank of the Hawkesbury River. Occurs on aeolian sands overlaying Tertiary alluviums. Structure varies from low woodland on higher ridges to sedgeland in low-lying depressions. Characteristic species include <i>Eucalyptus sclerophylla</i> , <i>Angophora bakeri</i> and <i>Banksia serrata</i> .	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	VEEC		Occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium, with known occurrences in the Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith LGAs. Typically on sandy soils and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest (Tozer 2003). Dominated by <i>Eucalyptus parramattensis</i> subsp. <i>parramattensis</i> , <i>Angophora bakeri</i> and <i>E. sclerophylla</i> . A small tree stratum of <i>Melaleuca decora</i> is sometimes present, generally in areas with poorer drainage. It has a well-developed sclerophyllous shrub stratum over a diverse range of forbs.	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	EEC		Occurs on the Cumberland Plain with the most extensive stands in Castlereagh and Holsworthy areas. Smaller remnants in Kemps Creek area and eastern section of the Cumberland Plain. Ranges from open forest to low woodland, with a canopy dominated by <i>Eucalyptus fibrosa</i> and <i>Melaleuca decora</i> along with other species of eucalypt. Dense shrubby understorey of <i>Melaleuca nodosa</i> , <i>Lissanthe strigosa</i> and Fabaceae spp over sparse ground layer of grasses and herbs.	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
Cumberland Plain Woodland in the Sydney Basin Bioregion	EEC	CEEC	Grassy woodlands and forests of the shale hills and plains of the Cumberland Plain and associated transitional communities on shale-gravel soils. Canopy typically dominated by <i>Eucalyptus moluccana</i> , <i>E. tereticornis</i> and/or <i>E. fibrosa</i> . Sparse small tree stratum of young eucalypts and Acacia species and/or shrub layer dominated by <i>Bursaria spinosa</i> may be present. Understorey comprises perennial native grasses, grasslike and non-woody plants.	Predicted to occur within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Nil. Not identified at the site.
Elderslie Banksia Scrub Forest	EEC		Occurs only in the Elderslie area, near Camden, in Sydney's south-west (15 ha in total). Unique as includes plants, such as coastal Banksia and other sandstone region species, which do not occur in the surrounding Cumberland Plain communities. Occurs only on sand deposits on the old terraces deposited by ancient river systems of what is now the Nepean River, and requires deep sand soil to fully regenerate.	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney	EEC	-	Occurs in coastal areas subject to periodic flooding with standing fresh water for at least part of the year. Typically on silts, muds or humic loams below 20 m elevation in low-lying parts of floodplains, alluvial flats, depressions,	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.

Community	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
Basin and South East Corner bioregions			drainage lines, backswamps, lagoons and lakes. Structure and composition varies spatially and temporally depending on the water regime, though is usually dominated by herbaceous plants and has few woody species.		
Moist Shale Woodland in the Sydney Basin Bioregion	EEC		Occurs on clay soils from Wianamatta Shale in the southern half of the Cumberland Plain, and is intermediate between Cumberland Plain Woodland and Western Sydney Dry Rainforest. Similar to Cumberland Plain Woodland but with more mesic shrub understorey. Dominant canopy trees include <i>Eucalyptus tereticornis</i> , <i>E. moluccana</i> , <i>E. crebra</i> and <i>Corymbia maculata</i> . Small trees are also common.	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
O'Hares Creek Shale Forest	EEC		The community occupies about 286 ha within the LGAs of Campbelltown, Wollondilly and Wollongong between the Cataract Special Area and Appin Road to Helensburgh (OEH 2013a). Forms part of a network of vegetation communities that occupy the remnant shales soils that lie above the sandstone plateau. The community is a component of the more broadly occurring Red Bloodwood - Smooth-barked Apple shrubby forest on shale or ironstone of coastal plateau, Sydney Basin community (OEH 2013a).	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	EEC	-	Occurs on flats, drainage lines and river terraces of coastal floodplains where flooding is periodic and soils generally rich in silt, lack deep humic layers and have little or no saline (salt) influence. Occurs south from Port Stephens in the NSW North Coast, Sydney Basin and South East Corner bioregions. Characterised by a tall open canopy layer of eucalypts with variable species composition.	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
Shale Gravel Transition Forest in the Sydney Basin Bioregion	EEC	CEEC (under CPW)	Primarily in the northern section of the Cumberland Plain, also found in Liverpool/Holsworthy, Bankstown, Yennora, Villawood and Kemps Creek areas. Occurs primarily where shallow deposits from ancient river systems overlay shale soils, but also associated with localised concentrations of iron-hardened gravel. Open forest with canopy dominated by <i>Eucalyptus fibrosa</i> , <i>E. moluccana</i> and <i>E. tereticornis</i> , often with small tree layer of <i>Melaleuca decora</i> over a sparse shrub layer. Grades into Cumberland Plain Woodland where the influence of gravel soil declines, and into Cooks River/Castlereagh Ironbark Forest or Castlereagh Scribbly Gum Woodland where gravel deposits are thick.	Predicted to occur within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Nil. Not identified at the site.
Shale/Sandstone Transition Forest	EEC	EEC	Occurs on the edges of the Cumberland Plain where clay soils on shale intergrade with sandstone soils, or where shale caps overlay sandstone. Species composition variable depending on soil influences. Dominant tree species include <i>Eucalyptus tereticornis</i> , <i>E. punctata</i> , <i>E. globoidea</i> , <i>E. eugenioides</i> , <i>E. fibrosa</i> and <i>E. crebra</i> . Areas with a low sandstone influence have an understorey closer to Cumberland Plain Woodland.	Predicted to occur within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Present. Patches of this threatened ecological community occur near the Picton WRP and the Western Dam.
Southern Sydney sheltered	EEC		Restricted to sheltered heads and upper slopes of gullies on transitional	Predicted to occur	Nil. Not identified at the

Community	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
forest on transitional sandstone soils in the Sydney Basin Bioregion			zones where sandstone outcrops may exist, but where soils are influenced by lateral movement of moisture, nutrients and sediment from more fertile substrates in an area bounded by Hurstville, Carss Park, Bundeena, Otford, Stanwell Tops, Darkes Forest, Punchbowl Creek and Menai. Open forest dominated by <i>Angophora costata</i> , <i>Eucalyptus piperita</i> and occasional <i>E. pilularis</i> over scattered subcanopy trees, a diverse shrub layer and well-developed groundcover of ferns, forbs, grasses and graminoids. Variable species composition.	within 10km (OEH, 2013)	site.
Swamp Oak Floodplain forest of the NSW North Coast, Sydney basin and South East Corner Bioregions	EEC	-	Typically occurs below 20m asl on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes on coastal floodplains of NSW. Associated with grey-black clay-loams and sandy loams, saline or sub-saline groundwater. Structure variable from open forests to scrubs or reedlands with scattered trees. Canopy dominated by <i>Casuarina glauca</i> (north of Bermagui) or <i>Melaleuca ericifolia</i> (south of Bermagui). Understorey characterised by frequent occurrences of vines, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.	Predicted to occur within 10km (OEH, 2013)	Nil. Not identified at the site.
Sydney Turpentine-Ironbark Forest	EEC	CEEC	Occurs on the Cumberland Plain, with most remnants in Baulkham Hills, Hawkesbury, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Wollondilly LGAs. Open forest characterised by <i>Syncarpia glomulifera</i> , <i>Eucalyptus punctata</i> , <i>Eucalyptus paniculata</i> and <i>E. eugenoides</i> . Sparse shrub stratum of <i>Pittosporum undulatum</i> and <i>Polyscias sambucifolia</i> .	Predicted to occur within 10km (DotE, 2013)	Nil. Not identified at the site.
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	EEC	EEC	Occurs on plateaus and tablelands between 600-900m asl with loam or clay soils derived primarily from basalt, but may also be derived from mudstones, granites, alluvium and other substrates. Open, variable canopy which may include Ribbon Gum, Narrow-leaved Peppermint, Mountain Gum and Snow Gum, over a sparse shrub layer and dense groundcover of herbs and grass. Community also includes derived native grasslands where trees have been removed.	Predicted to occur within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Nil. Not identified at the site.
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	EEC		Restricted to hilly country where it occurs on clay soils derived from Wianamatta shale on sheltered lower slopes and gullies. Very restricted and occurs mostly in the Razorback Range near Picton. Outlying occurrences at Grose Vale and Cattai. Canopy trees include <i>Melaleuca styphelioides</i> , <i>Acacia implexa</i> and <i>Alectryon subcinereus</i> . Shrub layer includes rainforest species <i>Notolaea longifolia</i> , <i>Clerodendrum tomentosum</i> and <i>Pittosporum revolutum</i> . The shrub layer combines with vines to form dense thickets in sheltered locations.	Predicted to occur within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Nil. Not identified at the site.

Threatened flora species

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence in the study area
<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	Endemic to central eastern NSW, currently known from only 34 locations, many of only 1-5 plants. Grows mainly in heath/ dry sclerophyll forest on sandy soils, prefers open, sometimes slightly disturbed sites such as trail margins, road edges, and in recently burnt open patches. Flowers September to March, and fruit matures in November.	Five records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. No direct or indirect impact on potential habitat likely.
<i>Acacia flocktoniae</i>	Flockton Wattles	V	V	Occurs in the southern Blue Mountains (Mt Victoria, Megalong Valley and Yerranderrie), between 500- 1000m asl in areas with average annual rainfall of 800-1200 mm. Grows in dry sclerophyll forest on low nutrient soils derived from sandstone. Associated species include <i>Acacia stricta</i> and <i>Podolobium ilicifolium</i> .	Predicted to occur within 10km (DotE, 2013)	Unlikely. Study area is located below known preferred elevation.
<i>Acacia pubescens</i>	Downy Wattle	V	V	Occurs mainly in Bankstown-Fairfield-Rookwood and Pitt Town areas, with outliers at Barden Ridge, Oakdale and Mountain Lagoon. Grows on alluviums, shales and shale/sandstone intergrades. Soils characteristically gravely, often with ironstone. Occurs in open woodland and forest, in communities including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. Flowers August to October.	40 records within 10km (OEH, 2013)	Unlikely. Not recorded during the survey and probably outside known distribution
<i>Allocasuarina glareicola</i>			E	Primarily found in Richmond district; although outlier populations exist in Voyager Point, Liverpool (OEH 2013a). Found in open woodland and Castlereagh woodland on lateritic soil.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey and probably outside known distribution
<i>Asterolasia elegans</i>		E	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs, may also occur in the western part of Gosford LGA. 7 known populations. Occurs on Hawkesbury sandstone, commonly amongst rocky outcrops and boulders in sheltered forests on mid- to lower slopes and valleys.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey and probably outside known distribution
<i>Bothriochloa biloba</i>	Lobed Blue-grass		V	Perennial grass, occurs in a variety of grassland and woodland associations. The species has a broad distribution in northern New South Wales, but most records have been from the northern portions of the Brigalow Belt South and Nandewar bioregions. Shows a preference for heavier textured soils, which are favoured for clearing and conversion to cultivation.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey and no suitable habitat present
<i>Caladenia tessellata</i>		E	V	Occurs from Central Coast NSW to southern VIC. Mostly coastal but extends inland to Braidwood in southern NSW. In NSW grows in grassy dry sclerophyll woodland on clay loam or sandy soils, and less commonly in heathland on sandy loam soils.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No appropriate habitat present

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence in the study area
<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V	V	Occurs in coastal areas from East Gippsland to southern Queensland. Habitat preferences not well defined. Grows mostly in coastal heathlands, margins of coastal swamps and sedgeland, coastal forest, dry woodland, and lowland forest. Prefers open areas in the understorey and is often found in association with <i>Cryptostylis subulata</i> and the <i>Cryptostylis erecta</i> . Soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. Flowers November-February.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey, and no indicator species recorded.
<i>Cynanchum elegans</i>	White-flowering Wax Plant	E	E	Occurs from Gerroa (Illawarra) to Brunswick Heads and west to Merriwa in the upper Hunter. Most common near Kempsey. Usually occurs on the edge of dry rainforest or littoral rainforest, but also occurs in Coastal Banksia Scrub, open forest and woodland, and Melaleuca scrub. Soil and geology types are not limiting.	Eight records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey and no suitable habitat present
<i>Darwinia peduncularis</i>		V		Disjunct populations in coastal NSW with isolated populations in the Blue Mountains. Recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. Usually grows in dry sclerophyll forest on hillsides and ridges, on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	Two records within 10km (OEH, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		Occurs from Gosford in the north, Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Grows in a range of sclerophyll forest, scrubs and swamps, most of which have a strong shale soil influence.	89 records within 10km (OEH, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Eucalyptus benthami</i>	Camden White Gum	V	V	Occurs on the alluvial flats of the Nepean River and its tributaries. Known distribution from The Oaks (south) to Grose Wold (north) and Kedumba Valley (west). Two major subpopulations: in Kedumba Valley and Bents Basin State Recreation Area. Occurs in wet open forest on alluvial flats, in well drained alluvial sands and gravels to 1 m deep.	16 records within 10km (OEH, 2013)	Unlikely. Not recorded during the survey and no appropriate habitat present
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>		V	V	Occurs between Moss Vale/Bargo and lower Hunter Valley, with most occurrences in Appin, Wedderburn, Picton and Bargo. Broad habitat range including heath, shrubby woodland and open forest on light clay or sandy soils, and often in disturbed areas such as on the fringes of tracks.	51 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Gyrostemon thesiodes</i>		E		Within NSW, has only ever been recorded at three sites, to the west of Sydney, near the Colo, Georges and Nepean Rivers. The most	One record within 10km (OEH, 2013)	Unlikely. Not recorded during the survey and no

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence in the study area
				recent sighting was of a single male plant near the Colo River within Wollemi National Park. The species has not been recorded from the Nepean and Georges Rivers for 90 and 30 years respectively, despite searches. Grows on hillsides and riverbanks and may be restricted to fine sandy soils.		appropriate habitat present.
<i>Leucopogon exolasius</i>	Woronora Beard-heath	V	V	Occurs along the upper Georges River and in Heathcote NP, Royal NP and is also known from the Blue Mountains along the Grose River. Grows in woodland on sandstone and prefers rocky hillsides along creek banks up to 100 m altitude. Associated species include <i>Eucalyptus piperita</i> and <i>E. sieberi</i> and <i>Pultenaea flexilis</i> , <i>Leptospermum trinervium</i> and <i>Dillwynia retorta</i> .	One record within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Marsdenia viridiflora</i> R. Br. subsp. <i>viridiflora</i> population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas		EP		Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. A climber that grows in vine thickets and open shale woodland.	Recorded within 10km (OEH, 2013)	Unlikely. Study area is outside the distribution of this endangered population.
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	Occurs from Nowra- St Albans and west to the Blue Mountains, with most records in Ku-ring-gai / Berowra and Holsworthy/Wedderburn areas. Mostly grows on broad flat ridgetops, dry ridges and slopes and strongly associated with low nutrient sandy loam soils, sometimes with ironstone. Grows in heath- open forest, often in sandstone ridgetop woodland communities.	Seven records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Pelargonium sp Striatellum</i>	Omeo's Storkbill	E	E	Known from only three locations in NSW, with two on lake-beds on the basalt plains of the Monaro and one at Lake Bathurst. It has a narrow habitat that is usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grasslands or pasture and the wetland or aquatic communities.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey and probably outside known distribution.
<i>Persicaria elatior</i>	Tall Knotweed	V	V	Tall Knotweed has been recorded in the Upper Avon River catchment north of Robertson and Picton Lakes and other locations in NSW. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with	One record within 10km (OEH, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence in the study area
				disturbance.		habitat likely.
<i>Persoonia acerosa</i>	Needle Geebung	V	V	Recorded on central coast and in Blue Mountains, from Mt Tomah to Hill Top (though now believed extinct in Hill Top). Mainly in Katoomba, Wentworth Falls and Springwood areas. Inhabits dry sclerophyll forest, scrubby low woodland and heath on sandstone. Occurs in well-drained soils including sands, laterite and gravels between 550-1000m asl. May occur in disturbed areas eg roadsides.	One record within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Unlikely. Study area is located below known preferred elevation.
<i>Persoonia bargoensis</i>	Bargo Geebung	E	V	Restricted to the western edge of the Woronora Plateau and the northern edge of the Southern Highlands, bounded by Picton, Douglas Park, Yanderra and the Cataract River. Occurs in woodland or dry sclerophyll forest on sandstone and clayey laterite on heavier, well drained, loamy, gravelly soils of Hawkesbury Sandstone and Wianamatta Shale. Tends to occur in disturbed areas e.g. roadsides and trail margins.	179 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Persoonia glaucescens</i>	Mittagong Geebung	E	V	Found between Picton and the Kangaroo Valley. Grows in gravelly well-drained soils in dry sclerophyll woodland or forest on sandstone, from 400 to 650 m asl. Prefers ridgetops, plateaux and upper slopes.	26 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Unlikely. Study area is located below known preferred elevation and does not contain preferred topography.
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	Occurs within the Blue Mountains, Southern Highlands and Sydney coastal regions from Hilltop to Glen Davis and Royal NP to Gosford. Population within the Hills Shire particularly important due to high density of plants. Grows on sandy soils in dry sclerophyll open forest, woodland and heath on sandstone up to 600m above sea level.	Five records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Persoonia nutans</i>	Nodding Geebung	E	E	Occurs from Richmond to Macquarie Fields on the Cumberland Plain. Grows only on aeolian and alluvial sediments in sclerophyll forest and woodland vegetation communities. Largest populations occur in Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland.	One record within 10km (OEH, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Pimelea spicata</i>	Spiked Rice Flower	E	E	Disjunct populations within the Cumberland Plain (from Mount Annan and Narellan Vale to Freemans Reach and Penrith to Georges Hall) and Illawarra (from Mt Warrigal to Gerroa) (DEC 2005). In the Cumberland Plain region, restricted to areas which support or historically supported Cumberland Plain Woodland. Grows on well-structured clay soils derived from Wianamatta Shale. In the Illawarra, grows on variable soils in close proximity to the coast on hills or coastal headlands. Inhabits coastal woodland or grassland with	Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence in the study area
<i>Pomaderris brunnea</i>	Rufous Pomaderris	V	V	emergent shrubs. Mainly occurs in SW Sydney (Wollondilly and Camden LGAs), with other populations in the Hawkesbury-Wollemi region, the New England tablelands and in VIC. In NSW, grows in moist woodland or open forest on clay and alluvial soils on flood plains and creek lines. Near Sydney occurs in open woodland dominated by <i>E. amplifolia</i> with <i>Allocasuarina</i> sp. and <i>Bursaria</i> sp. understorey, or on alluvial flats with eucalypts including <i>E. elata</i> , <i>E. piperita</i> and <i>E. punctata</i> .	23 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	Occurs in western Sydney between Picton and Freemans Reach. Grows in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. Associated vegetation above these rock shelves is sclerophyll forest or woodland on shale or shale/sandstone transition soils.	One record within 10km (OEH 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Not recorded during the survey, although unlikely to be visible at time of survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Pultenaea glabra</i>	Smooth Bush-pea	V	V	In NSW restricted to higher Blue Mountains in the Katoomba-Hazelbrook and Mt Victoria areas. Unconfirmed sightings in Mt Wilson and Mt Irvine areas. Grows in swamp margins, hillslopes, gullies and creekbanks and occurs within dry sclerophyll forest and tall damp heath on sandstone.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No appropriate habitat present.
<i>Rulingia prostrata</i>	Dwarf Kerrawang	E	E	In NSW occurs as individual plants at Penrose State Forest, Rose Lagoon and Tallong, and small populations near the Corang River, and at the Tomago sand beds near Newcastle. Grows on sandy, sometimes peaty soils in a variety of habitats.	24 records within 10km (OEH, 2013)	Possible. Not recorded during the survey. May occur in adjacent native vegetation. No direct or indirect impact on potential habitat likely.
<i>Streblus pendulinus</i>	Siah's backbone		E	Siah's Backbone occurs from Cape York Peninsula to Milton, south-east New South Wales (NSW), as well as Norfolk Island (ATRP 2010; Jessup 2003; The Royal Botanic Gardens and Domain Trust 2011). Siah's Backbone is found in warmer rainforests, chiefly along watercourses. The species grows in well-developed rainforest, gallery forest and drier, more seasonal rainforest.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Not recorded during the survey and no patches of rainforest were recorded on site.
<i>Tetratheca glandulosa</i>		V	V	Restricted to The Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong LGAs. Associated with shale-sandstone transition habitat (shale-cappings over sandstone). Occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils generally shallow, yellow, clayey/sandy loam, commonly with lateritic fragments. Vegetation varies from heath to open forest and is broadly equivalent to Sydney Sandstone	Predicted to occur within 10km (DotE 2013)	Unlikely. Not recorded during the survey and probably outside known distribution.

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Details of record	Likelihood of occurrence in the study area
<i>Thelymitra</i> sp. <i>Kangaloon</i>	Kangaloon Sun-orchid		CE	Ridgetop Woodland community. Only known from three locations near Robertson in the Southern Highlands. Grows in seasonally swampy sedgeland on grey silty clay loam at 600–700 m above sea level. Flowers in late October and early November.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Outside known distribution. No suitable habitat.

Threatened fauna species

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
Birds						
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Widespread but uncommon over most NSW except the northwest. Favours permanent freshwater wetlands with tall dense reedbeds particularly <i>Typha</i> spp. and <i>Eleocharis</i> spp., with adjacent shallow, open water for foraging. Roosts during the day amongst dense reeds or rushes and feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable wetland habitat within the study area. Wetland habitat present is very restricted in area.
<i>Rostratula australis</i>	Australian Painted Snipe	E	V, M	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. Nests on the ground amongst tall reed-like vegetation near water. Feeds on mudflats and the water's edge taking insects, worm and seeds. Prefers fringes of swamps, dams and nearby marshy areas with cover of grasses, lignum, low scrub or open timber.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable wetland habitat within the study area. Wetland habitat present is very restricted in area.
<i>Ninox connivens</i>	Barking Owl	V		Occurs from coast to inland slopes and plains, though is rare in dense, wet forests east of the Great Dividing Range and sparse in higher parts of the tablelands and in the arid zone. Inhabits eucalypt woodlands, open forest, swamp woodlands, and, especially in inland areas, timber along watercourses. Roosts along creek lines in dense, tall understorey foliage (e.g. in <i>Acacia</i> and <i>Casuarina</i>), or dense eucalypt canopy. Nests in hollows of large, old eucalypts. Birds and mammals important prey during breeding. Territories range from 30 to 200 hectares.	Three records within 10km (OEH, 2013)	Likely. Could forage and breed in forests and woodland throughout the study area. No direct or indirect impact on potential habitat likely.
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V		Widespread in NSW, but rarely recorded east of Great Dividing Range except in Richmond and Clarence River areas and scattered sites in the Hunter, Central Coast and Illawarra regions. Mostly in upper levels of drier open forests /woodlands dominated by box and ironbark eucalypts, or less commonly smooth-barked gums,	Eight records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
				stringybarks and tea-treas. Forage over home range of >5 ha. Tend to occur within largest woodland patches in the landscape. They forage for insects, nectar and honeydew. The nest is hidden by foliage high in the crown of a tree.		habitat likely.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V		Occurs from Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell to the east coast, in areas such as the Snowy River Valley, Cumberland Plain, Hunter Valley and parts of the Richmond and Clarence Valleys. Most common on the inland slopes and plains. Inhabits eucalypt woodlands and dry open forest, usually dominated by stringybarks or rough-barked species with open grassy understorey. Fallen timber is important foraging habitat. Nests in hollows in standing trees or stumps.	16 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Burhinus grallarius</i>	Bush Stone-curlew	E		Scattered distribution across NSW. The nearest known populations to the site are near Nowra and Pittwater although there is a record near Bargo from 1991. Inhabits lowland grassy woodland and open forest and, in coastal areas, Casuarina and Melaleuca woodlands, saltmarsh and mangroves. Requires a low, sparse groundcover, some fallen timber and leaf litter, and a general lack of a shrubby understorey.	One record within 10km (OEH, 2013)	Possible. Could forage and breed in larger woodland in the study area. Few recent records from the locality. No direct or indirect impact on potential habitat likely.
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Typically found west of the Great Dividing Range, but populations also occur in drier coastal areas including W Sydney, Hunter, Clarence and Snowy River valleys. Occurs in grassy eucalypt woodlands including Box Gum and Snow Gum communities, as well as open forest, mallee and natural and derived grasslands. Often found in riparian areas and occasionally in lightly wooded farmland. Nests in shrubby understorey or higher up under nests of other species.	10 records within 10km (OEH, 2013)	Likely. Could forage and breed in woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Dasyornis brachypterus</i>	Eastern Bristlebird	E	E	Occurs in three disjunct areas of south-eastern Australia: southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. Habitat characterised by dense, low vegetation including heath and open woodland with a heathy understorey. The fire history of habitat is important, and the Illawarra and southern populations reach maximum densities in habitat that have not been burnt for over 15 years.	Predicted to occur within 10km (DotE, 2013)	Nil. No suitable habitat present.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V		Sparsely distributed in areas of less than 500mm rainfall, north from north-western NSW. Inhabits a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. May also occur in sub-alpine Snow Gum (<i>Eucalyptus pauciflora</i>) woodland and occasionally in temperate rainforests.	12 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V		Widespread but uncommon from coast to southern tablelands and central western plains. Feeds almost exclusively on the seeds of Allocasuarina species. Prefers woodland and open forests, rarely away from Allocasuarina. Roost in leafy canopy trees, preferably eucalypts, usually <1km from feeding site. Nests in large (approx. 20cm) hollows in trees, stumps or limbs, usually in eucalypts.	17 records within 10km (OEH, 2013)	habitat likely. Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Melanodryas cucullata cucullata</i>	Hooded Robin	V		Considered a sedentary species, but local seasonal movements are possible. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Nests on low, live or dead forks or branches of trees or stumps, or occasionally on fallen trees or limbs. The Hooded Robin occurs throughout much of NSW, but is absent from coastal areas south of Sydney.	Four records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Hieraaetus morphnoides</i>	Little Eagle			Occurs throughout NSW except most densely forested parts of the Dividing Range escarpment. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	Four records within 10km (OEH, 2013)	Likely. Could forage throughout the study area and breed in woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Glossopsitta pusilla</i>	Little Lorikeet	V		Occurs from coast to western slopes of the Great Dividing Range. Inhabits dry, open eucalypt forests and woodlands. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Feed primarily on profusely-flowering eucalypts and a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands <i>Eucalyptus albens</i> and <i>E. melliodora</i> are particularly important food sources for pollen and nectar respectively. Mostly nests in small (opening approx. 3cm) hollows in living, smooth-barked eucalypts. Most breeding records are from the western slopes.	Seven records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Tyto novaehollandiae</i>	Masked Owl	V		Occurs across NSW except NW corner. Most common on the coast. Inhabits dry eucalypt woodlands from sea level to 1100 m. Roosts and breeds in large (>40 cm) hollows and sometime caves in moist eucalypt forested gullies. Hunts along the edges of forests and	Two records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
				roadsides. Home range between 500 ha and 1000 ha. Prey mostly terrestrial mammals but arboreal species may also be taken.		indirect impact on potential habitat likely.
<i>Ninox strenua</i>	Powerful Owl	V		Occurs from the coast to the western slopes. Solitary and sedentary species. Inhabits a range of habitats from woodland and open sclerophyll forest to tall open wet forest and rainforest. Prefers large tracts of vegetation. Nests in large tree hollows (> 0.5 m deep), in large eucalypts (dbh 80-240 cm) that are at least 150 years old. Pairs have high fidelity to a small number of hollow-bearing nest trees and defend a large home range of 400 - 1,450 ha. Forages within open and closed woodlands as well as open areas.	13 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Erythroriorchis radiatus</i>	Red Goshawk	CE	V	Typically occurs in coastal and subcoastal areas, with 90% of recent records in NSW confined to the Northern Rivers and Northern Tablelands regions, north of the Clarence River. Formerly occurred south to Port Stephens. Prefer woodlands and forests with a mosaic of vegetation types that are open enough for fast manoeuvring flight, avoiding very open or very dense habitats. In NSW inhabits mixed subtropical rainforest, Melaleuca swamp forest and open eucalypt forest along coastal rivers. Nests built within 1km of a permanent freshwater body in a large, tall tree (>20m) within a remnant stand. Home ranges large (120-200km ²).	Predicted to occur within 10km (DotE, 2013)	Unlikely. Outside usual range.
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E	In NSW confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks occasionally seen in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests, presumably in response to drought. Inhabits dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes.	Four records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage in woodland in the study area. No direct or indirect impact on potential habitat likely.
<i>Petroica boodang</i>	Scarlet Robin	V		In NSW occurs from coast to inland slopes. Breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within open understorey of shrubs and grasses and sometimes in open areas. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. Abundant logs and coarse woody debris are important habitat components.	7 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Tyto tenebricosa</i>	Sooty Owl	V		Occurs in the coastal, escarpment and tablelands regions of NSW. More common in the north and absent from the western tablelands and further west. Inhabits tall, moist eucalypt forests and rainforests, and are strongly associated with sheltered gullies, particularly those with tall rainforest understorey. Roosts in tree hollows, amongst	7 records within 10km (OEH, 2013)	Likely. Could forage and breed in woodland patches associated with creeks and rivers in the study area. No

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
				dense foliage in gullies or in caves, recesses or ledges of cliffs or banks. Nest in large (>40cm wide, 100cm deep) tree hollows in unlogged/unburnt gullies within 100m of streams or in caves.		direct or indirect impact on potential habitat likely.
<i>Pyrroholaemus sagittatus</i>	Speckled Warbler	V		Within NSW most frequently reported from the hills and tablelands of the Great Dividing Range, rarely from the coast. Inhabits a wide range of Eucalyptus-dominated communities with a grassy understorey, a sparse shrub layer, often on rocky ridges or in gullies. Sedentary and requires large, relatively undisturbed remnants to persist in an area. Forages on the ground for seeds and insects, and nests in a slight hollow in the ground or at the base of a low dense plant.	8 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Occurs across NSW, resident in North, northeast and along west-flowing rivers. Summer breeding migrant to southeast of state. Inhabits a variety of habitats including woodlands and open forests, with preference for timbered watercourses. Favours productive forests on the coastal plain, box-ironbark-gum woodlands on the inland slopes, and Coolibah/River Red Gum on the inland plains. In Sydney area nests in mature living trees within 100m of ephemeral/permanent watercourse. Large home range > 100 km ² .	1 records within 10km (OEH, 2013)	Likely. Could forage throughout the study area and breed in woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Lathamus discolor</i>	Swift Parrot	E	E	Migratory, travelling to the mainland from March to October. Breeds in Tasmania from September to January. On the mainland, it mostly occurs in the southeast foraging on winter flowering eucalypts and lerps, with records of the species between Adelaide and Brisbane. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. <i>Eucalyptus robusta</i> , <i>Corymbia maculata</i> and <i>C. gummifera</i> dominated coastal forests are also important habitat.	5 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		Sedentary, occurs across NSW from the coast to the far west. Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Sensitive to habitat isolation and loss of structural complexity, and adversely affected by dominance of Noisy Miners. Cleared agricultural land is potentially a barrier to movement. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	14 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
Mammals						
<i>Petrogale pencillata</i>	Brush-tailed Rock-wallaby	E	V	Occurs from the Shoalhaven north to the Queensland border. Now mostly extinct west of the Great Dividing Range, except in the	2 records within 10km (OEH, 2013)	Nil. No suitable habitat present.

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
				Warrumbungles and Mt Kaputar. Occurs on rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Diet consists of vegetation in adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Predicted to occur within 10km (DotE, 2013)	
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V		Generally occurs east of the Great Dividing Range along NSW coast. Inhabits various habitats from open grasslands to woodlands, wet and dry sclerophyll forests and rainforest. Essentially a cave bat but may also roost in road culverts, stormwater tunnels and other man-made structures. Only 4 known maternity caves in NSW, near Wee Jasper, Bungonia, Kempsey and Texas. Females may travel hundreds of kilometres to the nearest maternal colony.	26 records within 10km (OEH, 2013)	Likely. Could forage throughout the study area. No breeding habitat present. No direct or indirect impact on potential habitat likely.
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V		Occurs on southeast coast and ranges. Prefers tall (>20m) and wet forest with dense understorey. Absent from small remnants, preferring continuous forest but can move through cleared landscapes and may forage in open areas. Roosts in hollow trunks of Eucalypts, underneath bark or in buildings. Forages in gaps and spaces within forest, with large foraging range (12km foraging movements recorded).	3 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V		Occurs in dry sclerophyll forest and woodland east of the Great Dividing Range. Forages in natural and artificial openings in vegetation, typically within a few kilometres of its roost. Roosts primarily in tree hollows but also recorded from man-made structures or under bark.	9 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V		Occurs along the east coast of NSW, and inland to the Pillaga, Dubbo, Parkes and Wagga Wagga. Inhabits range of habitats from coastal heath and woodland through open and closed forests, subalpine heath and rainforest. Inhabits rainforest, sclerophyll forests and heath. Banksia spp. and myrtaceous shrubs and trees are favoured food sources and nesting subject sites in drier habitats. Diet mostly pollen and nectar from Banksia spp., Eucalyptus spp., Callistemon spp. and insects. Nests in hollows in trees, under the bark of Eucalypts, forks of tea-trees, abandoned bird nests and <i>Xanthorrhoea</i> bases.	1 record within 10km (OEH, 2013)	Possible. Could forage and breed in woodland and forest. Few local records. No direct or indirect impact on potential habitat likely.
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Occurs on the east coast and Great Dividing Range. Inhabits a variety of habitats from woodland to wet and dry sclerophyll forests and rainforest, also remnant paddock trees and timber-lined creeks, typically below 500m asl. Forages in relatively uncluttered areas, using natural or man-made openings in denser	9 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
				habitats. Usually roosts in tree hollows or fissures but also under exfoliating bark or in the roofs of old buildings. Females congregate in maternal roosts in suitable hollow trees.		indirect impact on potential habitat likely.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Roosts in camps within 20 km of a regular food source, typically in gullies, close to water and in vegetation with a dense canopy. Forages in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths, swamps and street trees, particularly in eucalypts, melaleucas and banksias. Highly mobile with movements largely determined by food availability. Will also forage in urban gardens and cultivated fruit crops.	9 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage in larger woodland patches in the study area. No known breeding camps in the study area. No direct or indirect impact on potential habitat likely.
<i>Phascolarctos cinereus</i>	Koala	V	V	Occurs from coast to inland slopes and plains. Restricted to areas of preferred feed trees in eucalypt woodlands and forests. Home range varies depending on habitat quality, from < 2 to several hundred hectares.	24 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Occurs from the coast to the western slopes of the divide. Largest numbers of records from sandstone escarpment country in the Sydney Basin and Hunter Valley. Roosts in caves and mines and most commonly recorded from dry sclerophyll forests and woodlands. An insectivorous species that flies over the canopy or along creek beds. In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys.	6 records within 10km (OEH 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage in larger woodland patches in the study area. No breeding habitat present. No direct or indirect impact on potential habitat likely.
<i>Mlniotperus australis</i>	Little Bentwing Bat	V		Occurs from Cape York to Sydney. Inhabits rainforests, wet and dry sclerophyll forests, paperbark swamps and vine thickets. Only one maternity cave known in NSW, shared with Eastern Bentwing-bats at Willi Willi, near Kempsey. Outside breeding season roosts in caves, tunnels and mines and has been recorded in a tree hollow on one occasion. Forages for insects beneath the canopy of well-timbered habitats.	2 records within 10km (OEH, 2013)	Likely. Could forage throughout the study area. No breeding habitat present. No direct or indirect impact on potential habitat likely.
<i>Potorous tridactylus</i>	Long-Nosed Potoroo	V	V	Restricted to east of the Great Dividing Range, with annual rainfall >760 mm. Inhabits coastal heath and dry and wet sclerophyll forests. Requires relatively thick ground cover and appears restricted to areas of light and sandy soil. Feeds on fungi, roots, tubers, insects and their larvae, and other soft-bodied animals in the soil.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Could forage and breed in larger woodland patches in the study area. No local records.
<i>Pseudomys</i>	New Holland		V	Occurs in disjunct, coastal populations from Tasmania to	Predicted to occur	Unlikely.

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
<i>novaehollandiae</i>	Mouse			Queensland. In NSW inhabits a variety of coastal habitats including heathland, woodland, dry sclerophyll forest with a dense shrub layer and vegetated sand dunes. Populations may recolonise/ increase in size in regenerating native vegetation after wildfire, clearing and sandmining. Presence strongly correlated with understorey vegetation density, and high floristic diversity in regenerating heath.	within 10km (DotE, 2013)	Could forage and breed in larger woodland patches in the study area. No local records.
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	E	E	Occurs mainly in 2 areas: Ku-ring-gai Chase and Garigal National Parks north of Sydney, and far south-east NSW, but also occurs between these areas. Inhabits scrubby vegetation, including heath, shrubland, and heathy forest and woodland. Often associated with well-drained soils and dry heathland communities, and prefers periodically burnt areas as this increases insect abundance.	2 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Could forage and breed in larger woodland patches in the study area. Few local records. No direct or indirect impact on potential habitat likely.
<i>Myotis macropus</i>	Large-footed Myotis	V		Mainly coastal but may occur inland along large river systems. Usually associated with permanent waterways at low elevations in flat/undulating country, usually in vegetated areas. Forages over streams and watercourses feeding on fish and insects from the water surface. Roosts in a variety of habitats including caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage, typically in close proximity to water. Breeds November or December.	8 records within 10km (OEH, 2013)	Likely. Could forage above farm dams. No maternity caves present in the study area. Could roost in tree hollows. No direct or indirect impact on potential habitat likely.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	Inhabits a range of environments including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Den sites are in hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces. Females occupy home ranges of up to 750 ha and males up to 3,500 ha, usually traversed along densely vegetated creek lines.	6 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		Occurs along the drier inland slopes as well as coastal habitats. Inhabits woodland and open forest with a Eucalyptus, Corymbia or Angophora overstorey and a shrubby understorey of Acacia or Banksia. Key habitat components include reliable winter and early-spring flowering Eucalypts, Banksia or other nectar sources, and hollow-bearing trees for roost and nest sites (van der Ree and Suckling 2008, Quin et al 2004), with social groups moving between multiple hollows. Social groups include one or two adult males and females with offspring, and have home ranges of 5-10ha within NSW.	1 record within 10km (OEH, 2013)	Possible. Could forage and breed in larger woodland patches in the study area. Few local records. No direct or indirect impact on potential habitat likely.
<i>Petaurus australis</i>	Yellow-bellied Glider	V		Occurs along the east coast to the western slopes of the Great Dividing Range. Inhabits a variety of forest types but prefers tall	15 records within 10km (OEH, 2013)	Likely. Could forage and breed in

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
				mature eucalypt forest with high rainfall and rich soils. Relies on large hollow-bearing trees for shelter and nesting, with family groups of 2-6 typically denning together. In southern NSW its preferred habitat at low altitudes is moist gullies and creek flats in mature coastal forests. Mostly feeds on sap, nectar and honeydew.		larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
Reptiles						
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	E	V	Nocturnal, sheltering in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter, and spring, moving to shelters in hollows of large trees within 200m of escarpments in summer. Feeds mostly on geckos and small skinks, and occasionally on frogs and small mammals.	19 records within 10km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Nil. No suitable habitat present.
Frogs						
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Occurs along the coast and eastern slopes of the Great Dividing Range south from Wollemi National Park. Appears to exist as 2 populations with a 100km gap in records between Jervis Bay and Eden. Northern population occurs on sandy soils supporting heath, woodland or open forest. Breeds in ephemeral to intermittent streams with persistent pools. Only infrequently moves to breeding sites, most commonly found on ridges away from creeks, several hundred metres from water.	Predicted to occur within 10km (DotE, 2013)	Unlikely. Could forage in woodland and breed in woodland and creeks in the study area. No local records.
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		Restricted to Sydney Basin, from Nowra to Pokolbin and west to Mt Victoria. Inhabits heathland and open woodland on Hawkesbury and Narrabeen Sandstones, within 100m of ridgelines. Breeds in ephemeral feeder creeks or flooded depressions, requiring unpolluted water between 5.5 and 6.5 pH. Shelters under rocks, amongst masses of dense vegetation or leaf litter. Populations restricted to immediate vicinity of breeding areas.	7 records within 10km (OEH, 2013)	Likely. Could forage and breed in woodland and creeks in the study area. No direct or indirect impact on potential habitat likely.
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Formerly occurred from Brunswick Heads to Victoria, but >80% populations now extinct. Inhabits marshes, natural and artificial freshwater to brackish wetlands, dams and in stream wetlands. Prefers sites containing cumbungi (<i>Typha</i> spp.) or spike rushes (<i>Eleocharis</i> spp.), which are unshaded and have a grassy area and/or rubble as shelter/refuge habitat nearby. <i>Gambusia holbrooki</i> is a key threat as they feed on green and Golden Bell Frog eggs and tadpoles.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable habitat present.
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	V	Occurs on plateaus and eastern slopes of the Great Dividing Range south from Watagan State Forest. Occurs along permanent rocky streams with thick fringing vegetation associated with eucalypt woodlands and heaths among sandstone outcrops, hunting either in	Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable habitat present.

Scientific name	Common name	TSC/ FM Act ¹	EPBC Act	Habitat association	Details of record	Likelihood of occurrence within the study area
<i>Mixophyes balbus</i>	Stuttering Frog, Southern Barred Frog (in Victoria)	E	V	shrubs or on the ground. Occurs along the east coast of Australia. Has undergone a massive range reduction particularly in the south of its range: within the Sydney Basin. Inhabits rainforest and wet, tall, open forest. Shelter in deep leaf litter and thick understorey vegetation on the forest floor. Feeds on insects and smaller frogs, breeding in streams during summer after heavy rain. The species does not occur in areas where the riparian vegetation has been disturbed or where there have been significant upstream human impacts.	Predicted to occur within 10km (DotE, 2013)	Nil. Outside usual range.
Fish						
<i>Macquaria australasica</i>	Macquarie Perch	E (FM Act)	E	Occurs in the upper reaches of the Lachlan, Murrumbidgee and Murray Rivers, and in parts of the Hawkesbury and Shoalhaven catchment areas. Inhabits river and lake habitats, especially the upper reaches of rivers and their tributaries. Requires clear water with deep, rocky holes and abundant cover (including aquatic vegetation, woody debris, large boulders and overhanging banks). Spawning occurs in spring and summer in shallow upland streams or flowing sections of river systems.	Predicted to occur within 10km (DotE, 2013) Recorded in locality (DPI, 2013)	Nil. No suitable habitat present.
Invertebrates						
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	E		Occurs within a small area of the Cumberland Plain, from Richmond and Windsor to Picton. Found primarily under litter of bark, leaves and logs, or in loose soil around grass clumps within Cumberland Plain Woodland. Has also been found under rubbish. Feeds on fungus. During periods of drought can burrow into the soil to escape the dry conditions.	22 records within 10km (OEH, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Austrocordulia leonardi</i>	Sydney Hawk Dragonfly	E (FM Act)		The known distribution of the species includes three locations in a small area south of Sydney, from Audley to Picton. The species is known from the Hawkesbury-Nepean, Georges River, Port Hacking and Karuah drainages. The Sydney Hawk Dragonfly has only ever been collected from deep and shady riverine pools with cooler water. Larvae are found under rocks where they co-exist with <i>Austrocordulia refracta</i> .	Recorded in locality (DPI, 2013)	Nil. No suitable habitat present.

Note 1: FM Act - Fisheries Management Act 1994

Migratory species

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Recorded/ predicted to occur within 10 km	Likelihood of occurrence within the study area
<i>Rostratula australis</i>	Australian Painted Snipe	E	V, Migratory Wetlands	Refer to threatened biota table above.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable wetland habitat within the study area. Wetland habitat present is very restricted in area. No direct or indirect impact on potential habitat likely.
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	Migratory Terrestrial	This species of bird usually inhabits dense gullies of rainforest, sclerophyll forests and eucalypt woodlands along the coastal regions from Victoria to Cape York and is migratory over much of its range (Slater et al. 1989).	Predicted to occur within 10km (DotE, 2013)	Possible. Could forage and breed in woodland in the study area. No direct or indirect impact on potential habitat likely.
<i>Ardea ibis</i>	Cattle Egret	-	Migratory Marine, Wetlands	This species of Migratory bird occurs in grasslands, woodlands, wetlands and pasture areas often seen with cattle and other animals. It makes shallow platform nests in wetland areas in surrounding trees and shrubs. They feed on grasshoppers and other invertebrates, frogs, lizards, and small mammals.	14 records within 10 km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. May occur in adjacent paddocks. No direct or indirect impact on potential habitat likely.
<i>Apus pacificus</i>	Fork-tailed Swift	-	Migratory Marine	In NSW, the Fork-tailed Swift is recorded in all regions. It is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas, over cliffs and beaches and also over islands and sometimes well out to sea. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh but are also found over treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes and sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines. They probably roost aerially, but are occasionally observed to land. The Fork-tailed Swift is an aerial eater, foraging along the edge of low pressure systems for insects.	Predicted to occur within 10km (DotE, 2013)	Possible. Could forage high above the study area. Would not be impacted by the proposal. No direct or indirect impact on potential habitat likely.
<i>Ardea alba</i>	Great Egret	-	Migratory Marine,	This species of wetland bird occurs in a variety of habitats including marshes, swamps, river margins, lake shorelines, flooded	Predicted to occur within 10km	Possible. May forage and breed in

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Recorded/ predicted to occur within 10 km	Likelihood of occurrence within the study area
			Wetlands	grasslands, sea-grass flats, mangrove swamps, coastal lagoons, and offshore coral reefs. Feeds in shallow to moderately deep water, on shore next to the water, or on dry ground primarily on fish, insects and shrimp. Other foods include frogs, lizards, snakes, small mammals, and small birds. Breeding occurs in early spring and summer, nesting in trees, bushes, bamboo, reeds and other plants near water and on islands.	(DotE, 2013)	farm dams. No direct or indirect impact on potential habitat likely.
<i>Gallinago hardwickii</i>	Latham's Snipe	-	Migratory Wetlands	This species of medium sized wading bird occurs in permanent and ephemeral wetlands up to 2000 m above sea-level, usually inhabiting open, freshwater wetlands with nearby low, dense vegetation such as swamps, flooded grasslands or heathlands, around bogs and other water bodies. This species can also occur in habitats with saline or brackish water and in modified or artificial habitats. It feeds in mud, either exposed or in very shallow water with low, dense vegetation. Roosting occurs on the ground near or in foraging areas beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable. They feed on a variety of seeds, plant material, and insects.	Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable wetland habitat within the study area. Wetland habitat present is very restricted in area.
<i>Merops ornatus</i>	Rainbow Bee-eater	-	Migratory Terrestrial	This species of small bird occurs in a variety of habitat but seems to prefer lightly timbered forests and woodlands, and various cleared or semi-cleared habitats, including farmland and areas of human habitation often located close to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in heathland, sedgeland, vine forest and vine thicket, and on beaches. Breeding occurs from August to January, nesting in enlarged chambers at the end of long burrow or tunnel excavated by both sexes in flat or sloping ground, in the banks of rivers, creeks or dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces. Nest sites are often re-used. This species primarily feeds on insects including bees, wasps, beetles, moths, butterflies, damselflies, dragonflies, flies, ants and bugs, and will occasionally eat earthworms, spiders and tadpoles. This species migrates north for the winter months within Australia after breeding has occurred.	2 records within 10 km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Likely. Could forage and breed in larger woodland patches in the study area. No direct or indirect impact on potential habitat likely.
<i>Xanthomyza phrygia</i>	Regent Honeyeater	CE	E, Migratory Terrestrial	Refer to threatened biota table above.		Likely. Could forage in woodland in the study area. No direct

Scientific name	Common name	TSC Act	EPBC Act	Habitat association	Recorded/ predicted to occur within 10 km	Likelihood of occurrence within the study area
						or indirect impact on potential habitat likely.
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	Migratory Terrestrial	This species is a breeding migrant to southeast Australia during July to December, wintering in Papua New Guinea. It prefers wetter eucalypt forests, gullies, coastal scrub, watercourses, and rainforests where it feeds of insects. Occasional reports have this species utilising parks and gardens during migration (Pizzey & Knight 1998).	Predicted to occur within 10km (DotE, 2013)	Possible. Could forage and breed in larger woodland patches in the study area. No local records. No direct or indirect impact on potential habitat likely.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	Migratory Terrestrial	This is a migratory species which breeds around the Calliope Ranges in QLD southward to Tasmania during September / October to January / February before migrating north to southern and eastern Papua New Guinea and adjacent islands over winter. It prefers heavily vegetated gullies in forests, tall woodlands and during migration, coastal forests, woodlands, mangroves, trees in open country, and even gardens (Pizzey & Knight 1998).	Predicted to occur within 10km (DotE, 2013)	Possible. Could forage and breed in larger woodland patches in the study area. No local records. No direct or indirect impact on potential habitat likely.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	Migratory Terrestrial	This species of large bird occurs along the coastline of Australia and also range inland over large rivers and wetlands, favouring forested coasts and forested margins of inland waterways. Nests are usually near water, in tall live or dead trees or on remote coastal cliffs. River Red Gum (<i>Eucalyptus camaldulensis</i>), Forest Red Gum (<i>E. tereticornis</i>) and Southern Mahogany (<i>E. botryoides</i>) are commonly used as nest trees (Emison & Bilney 1982). On islands free of predators, nests may be close to the ground in shrubs or rocky platforms (Marchant & Higgins 1993).	5 records within 10 km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Unlikely. No suitable habitat present.
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	Migratory Terrestrial	This species of migratory bird migrates from breeding grounds in Siberia, the Himalayas, and Japan to Australia in Summer, arriving mid-October and departing mid-April. It is known to inhabit a variety of habitats including forests, woodlands, farmlands, plains, lakes, coasts and towns (Pizzey and Knight 1999). Feeds on insects during flight, chiefly ahead of weather changes. In Australia, this species is nomadic, responding to local weather changes (Readers Digest 1993).	4 records within 10 km (OEH, 2013) Predicted to occur within 10km (DotE, 2013)	Possible. Could forage high above the study area. Would not be impacted by the proposal. No direct or indirect impact on potential habitat likely.

Flora species recorded in the study area

Scientific name	Common name	Exotic (*)
<i>Acacia decurrens</i>	Black Wattle	
<i>Acacia falcata</i>		
<i>Acacia fimbriata</i>	Fringed Wattle	
<i>Acacia floribunda</i>	White Sally	
<i>Allocasuarina littoralis</i>	Black She-Oak	
<i>Allocasuarina torulosa</i>	Forest Oak	
<i>Asparagus sp.</i>		*
<i>Baeckea linifolia</i>	Weeping Baeckea	
<i>Bothriochloa macra</i>	Red Grass	
<i>Bromus sp.</i>	A Brome	*
<i>Bursaria spinosa</i>	Native Blackthorn	
<i>Casuarina glauca</i>	Swamp Oak	
<i>Chloris ventricosa</i>	Tall Chloris	
<i>Chlorophytum comosum</i>	Spider Plant	*
<i>Cirsium vulgare</i>	Spear Thistle	*
<i>Cotoneaster pannosus</i>		*
<i>Dichondra repens</i>	Kidney Weed	
<i>Dichondra repens</i>	Kidney Weed	
<i>Einadia hastata</i>	Berry Saltbush	
<i>Entolasia stricta</i>	Wiry Panic	
<i>Eragrostis curvula</i>	African Lovegrass	*
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	
<i>Eucalyptus fibrosa</i>	Red Ironbark	
<i>Eucalyptus paniculata</i>	Grey Ironbark	
<i>Eucalyptus punctata</i>	Grey Gum	
<i>Eucalyptus tereticornis</i>	Forest Red Gum	
<i>Hardenbergia violacea</i>	False Sarsaparilla	
<i>Hypericum gramineum</i>	Small St John's Wort	
<i>Lantana camara</i>	Lantana	*
<i>Ligustrum lucidum</i>	Large-leaved Privet	*
<i>Ligustrum sinense</i>	Small-leaved Privet	*
<i>Lycium ferocissimum</i>	African Boxthorn	*
<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree	
<i>Microlaena stipoides</i>	Weeping Grass	
<i>Paspalum dilatatum</i>	Paspalum	*
<i>Plantago lanceolata</i>	Lamb's Tongues	*
<i>Pyracantha crenatoserrata</i>		*
<i>Senecio madagascariensis</i>	Fireweed	*
<i>Senna pendula var. glabrata</i>		*
<i>Themeda australis</i>	Kangaroo Grass	
<i>Tradescantia fluminensis</i>	Wandering Jew	*
<i>Verbena bonariensis</i>	Purpletop	*
<i>Vinca minor</i>	Lesser periwinkle	*

Fauna species recorded in the study area

Scientific name	Common name	Observation type
Birds		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe	O
<i>Cracticus tibicen</i>	Australian Magpie	O
<i>Corvus coronoides</i>	Australian raven	O
<i>Chenonetta jubata</i>	Australian Wood Duck	O
<i>Elanus axillaris</i>	Black-shouldered Kite	O
<i>Acanthiza pusilla</i>	Brown Thornbill	W
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo	O
<i>Anas castanea</i>	Chestnut Teal	O
<i>Sturnus vulgaris</i>	Common Starling	O
<i>Ocyphaps lophotes</i>	Crested Pigeon	O
<i>Platycercus eximius</i>	Eastern Rosella	O
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	W
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	W
<i>Eolophus roseicapillus</i>	Galah	O
<i>Threskiornis spinicollis</i>	Straw-necked Ibis	O
<i>Rhipidura albiscapa</i>	Grey Fantail	O
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	O
<i>Grallina cyanoleuca</i>	Magpie-lark	O
<i>Vanellus miles</i>	Masked Lapwing	O
<i>Philemon corniculatus</i>	Noisy Friarbird	W
<i>Manorina melanocephala</i>	Noisy Miner	O
<i>Anas superciliosa</i>	Pacific Black Duck	O
<i>Porphyrio porphyrio</i>	Purple Swampphen	O
<i>Pachycephala rufiventris</i>	Rufous Whistler	W
<i>Pardalotus punctatus</i>	Spotted Pardalote	W
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	O
<i>Malurus cyaneus</i>	Superb Fairy-wren	O
<i>Hirundo neoxena</i>	Welcome Swallow	O
<i>Cormobates leucophaea</i>	White-throated Treecreeper	W
<i>Lalage sueurii</i>	White-winged Triller	O
<i>Rhipidura leucophrys</i>	Willie Wagtail	O
<i>Acanthiza nana</i>	Yellow Thornbill	O
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	O
Mammals		
<i>Vombatus ursinus</i>	Common Wombat	F
<i>Macropus giganteus</i>	Eastern Grey Kangaroo	O
<i>Oryctolagus cuniculus</i>	Rabbit	O
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	O
Reptiles		
<i>Ctenotus taeniolatus</i>	Copper-tailed Skink	O
<i>Physignathus lesueurii</i>	Eastern Water Dragon	O
<i>Lampropholis guichenoti</i>	Pale-flecked Garden Sunskink	O
Frogs		
<i>Limnodynastes peronii</i>	Brown-striped Frog	W
<i>Crinia signifera</i>	Common Eastern Froglet	W
<i>Uperoleia laevigata</i>	Smooth Toadlet	W
Invertebrates		
<i>Cornu aspersum</i>	Garden Snail	O

Key: F – tracks; O – observed; W – heard.

Assessment of significance

An assessment of significance has been prepared in accordance with the threatened species assessment guidelines (DEC and DPI, 2005) for Shale-Sandstone Transition Forest. The proposal would not have any direct impacts on this community. There is the potential for minor indirect impacts.

Shale-Sandstone Transition Forest
i) How is the project likely to affect the lifecycle of a threatened species and/or population?
a) displaces or disturbs threatened species and/or populations;
Not applicable to an ecological community.
b) disrupts breeding cycle;
Not applicable to an ecological community.
c) disturbs the dormancy period;
Not applicable to an ecological community.
d) disrupts roosting behaviour;
Not applicable to an ecological community.
e) changes foraging behaviour;
Not applicable to an ecological community.
ii) How is the project likely to affect the habitat of a threatened species, population or ecological community?
a) disturbs any permanent, semi-permanent or ephemeral water bodies;
The proposal would not impact any permanent, semi-permanent or ephemeral water bodies of relevance to the occurrence of the community in the study area.
b) degrades soil quality;
No patches of Shale-Sandstone Transition Forest are likely to be directly impacted by construction activities. Vegetation near the WRP site is planted and not commensurate with this community. The CDU pipeline would be trenched along the existing access track and would avoid direct impacts on soil quality within this community. Mitigation measures are proposed to minimise potential temporary impacts from sedimentation and erosion associated with construction.
c) clears or modifies native vegetation;
Patches of Shale-Sandstone Transition Forest would not be cleared or directly impacted by construction. The CDU pipeline would be trenched along the existing access track and would avoid direct impacts on this community. There is the potential for trenching to release sediments into the adjacent vegetation. Construction vehicles could introduce weeds into the adjacent vegetation. Shale-Sandstone Transition Forest in the study area is already impacted by factors including fragmentation, isolation, edge effects and weed invasion. Mitigation measures are proposed to minimise potential temporary impacts from sedimentation and erosion associated with construction, and to minimise the spread of weeds.
d) introduces weeds, vermin or feral species or provides conditions for them to increase and/or spread;
There are already weeds present in Shale-Sandstone Transition Forest in the study area. Construction vehicles may introduce new weeds to the vegetation. Mitigation measures are proposed to minimise the spread of weeds. Foxes and rabbits were recorded in the study area. The proposal would not fragment or isolate any habitat nor result in any other changes that are likely to favour feral animals. The proposal is unlikely to increase the incidence of these invasive species, or introduce new invasive species to the habitat in the area.
e) removes or disturbs key habitat features such as trees with hollows, caves and rock crevices, foraging habitat;
Shale-Sandstone Transition Forest would not be directly impacted. No tree hollows, caves or rock crevices would be directly impacted.

Shale-Sandstone Transition Forest
f) affects natural revegetation and recolonisation of existing species following disturbance.
Patches of Shale-Sandstone Transition Forest would not be directly impacted by construction. The CDU pipeline would be trenched along the existing access track and would avoid direct impacts on this community. The proposal would not affect natural revegetation or recolonisation of existing species following disturbance.
iii) Does the project affect any threatened species or populations that are at the limit of its known distribution?
Shale-Sandstone Transition Forest in the study area is located near the southern limit of its distribution of the Cumberland Plain. The southern boundary of Wollondilly LGA represents the southern edge of the Cumberland Plain.
iv) How is the project likely to affect current disturbance regimes?
a) modifies the intensity and frequency of fires;
The proposal is unlikely to affect the intensity and frequency of fires.
b) modifies flooding flows;
The proposal would not modify flooding flows.
v) How is the project likely to affect habitat connectivity?
a) creates a barrier to fauna movement;
No patches of Shale-Sandstone Transition Forest would be directly impacted. The CDU pipeline would be trenched along an existing road and thus would not create a barrier through the landscape. As such there would be no further fragmentation or isolation of any patches of this community in the study area. No barriers to fauna movement would be created.
b) removes remnant vegetation or wildlife corridors; and
No patches of this community would be directly impacted. As such there would be no further removal of remnant vegetation or wildlife corridors.
c) modifies remnant vegetation or wildlife corridors.
No patches of Shale-Sandstone Transition Forest would be directly impacted. The pipeline would be trenched along an existing road and thus would not create a barrier through the landscape. The patches of Shale-Sandstone Transition Forest in the study area are already impacted by factors including fragmentation, isolation, edge effects and weed invasion. No wildlife corridors are likely to be impacted by any possible modification of remnant vegetation.
vi) How is the project likely to affect critical habitat?
No critical habitat has been identified for this community. The approved recovery plan for the Cumberland Plain (2011) does not identify critical habitat for this community, but identifies "priority land" which is crucial to their survival as these patches "can contribute most to the long-term recovery and maintenance of threatened biodiversity". The vegetation in the study area does not fall within the identified priority conservation lands (DECCW 2010) and is unlikely to be of high conservation priority given its small size and high degree of fragmentation.
Conclusion
The proposal is not 'likely' to have a 'significant impact' on Shale Sandstone Transition Forest given: - No patch of this community would be directly impacted. - Mitigation measures would be employed to minimise the risk of indirect impacts such as sedimentation and weed spread.

Appendix C – Aboriginal heritage assessment



PICTON SEWERAGE SCHEME MODIFICATION
Aboriginal Heritage Assessment

Prepared for GHD
on behalf of Sydney Water

Wollondilly Local Government Area

November 2014

Ref. 1224

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Document Information

Project Name	Picton Sewerage Scheme Modification: Aboriginal Heritage Assessment
Project Number	1224
Status	Final
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Recipient	Amanda Raleigh, Principal Environmental Planner
Issue Date	November 2014
Prepared by	Dr Matthew Kelleher; Stirling Smith
Approved by	Dr Matthew Kelleher; Alison Nightingale

Aboriginal heritage information must not be made publicly available or be published in any form or by any means by Sydney Water or our contractors / joint ventures, unless where approval has been sought from [OEH's AHIMS Registrar](#) and provided in writing to Sydney Water.

Sydney Water has removed this information out of respect for Aboriginal cultural heritage and the Aboriginal community.

Executive Summary

Sydney Water is proposing to amplify the Picton Water Recycling Plant (Picton WRP) to respond to existing and future needs. The construction and operation of the works required to amplify the Picton WRP ('the proposal') requires approval from the NSW Minister for Planning in the form of a modification of the existing approval under Section 75W of the *Environmental Planning and Assessment Act 1979*. Sydney Water is also currently considering various options to manage and/or reuse the additional effluent that would be produced by the amplified WRP. This includes an option to expand the Picton Farm and irrigate new areas (the irrigation option).

Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged by GHD Pty Ltd (GHD) on behalf of Sydney Water to undertake an Aboriginal heritage assessment as part of the environmental impact assessment of the proposal and irrigation option. The environmental impact assessment has been prepared to accompany the modification application and in accordance with the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the Secretary's Environmental Assessment Requirements).

Assessment of the study area identified one artefact scatter and rock shelter complex (SQ1), and one rock shelter with potential archaeological deposit (SQ2). In accordance with section 89A of the *National Parks and Wildlife Act 1974* the Office of Environment and Heritage (OEH) will be notified of SQ1 and SQ2.

Sydney Water has agreed that should the irrigation option proceed, that it would manage identified Aboriginal heritage sites by installing a fence along [REDACTED] of SQ1, realigning vehicle tracks along the new fence line and diverting drainage away from SQ1.

The management strategies will mean the proposal and irrigation option will have no impact on Aboriginal archaeological sites.

No further Aboriginal archaeological assessment is warranted within the scope of the existing proposal or irrigation option.

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1 Introduction

1.1 Project background

There is currently insufficient capacity at the Picton Water Recycling Plant (WRP) to treat the forecast increase in wastewater flows. Various planning and design reports have been undertaken to identify what needs to be done to enable the Picton Sewerage Scheme to meet future requirements. As part of this work, Sydney Water is proposing to amplify the Picton WRP to respond to existing and future needs. The construction and operation of the works required to amplify the Picton WRP ('the proposal') requires approval from the NSW Minister for Planning in the form of a modification of the existing consent under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Sydney Water is also currently considering various options to manage and/or reuse the additional wastewater that would be produced by the amplified WRP. This includes an option to expand the Picton Farm and irrigate new areas (the irrigation option).

Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged by GHD Pty Ltd (GHD) on behalf of Sydney Water to undertake an Aboriginal heritage assessment as part of the environmental impact assessment of the proposal and the irrigation option. The environmental impact assessment has been prepared to accompany the modification application and in accordance with the environmental assessment requirements of the Secretary of the Department of Planning and Environment (the Secretary's Environmental Assessment Requirements).

1.2 The proposal

The proposal would involve constructing and operating the following facilities to increase the capacity of the Picton WRP:

- two additional intermittently decanted aeration lagoons (IDALs)
- new inlet works and associated components to distribute flows to the existing and proposed IDALs
- two additional sludge lagoons
- a chemical dosing unit (CDU) for pH correction
- a pipeline (about 275 metres long) to deliver chemicals from the CDU to the western dam
- various ancillary works.

1.3 Options to manage/reuse the additional wastewater produced by the amplified WRP (the irrigation option)

Sydney Water is also currently considering various options to manage and/or reuse the additional wastewater that would be produced by the amplified WRP. As an input to the option selection process, KNC undertook investigations relating to the potential Aboriginal heritage impacts of one of these options. The option considered would involve expanding the Picton Farm, including:

- establishing and operating two new irrigation areas (referred to as Area 1 and Area 2, Figure 1) outside of the existing Picton Farm boundary for reuse of additional effluent. The method of irrigation would be land treatment by subsurface irrigation.
- a pump and transfer main to deliver effluent to the two new irrigation areas.

The findings of the assessment of this irrigation option are also included in this report.

1.4 Report scope

The study area for this report includes both the site for the proposed amplification of the Picton WRP (the proposal) and the area that would be potentially impacted by the irrigation option outlined in section 1.3 (Figure 1). The study area is located within the Wollondilly Shire Local Government Area (LGA) and is approximately 65k south west of the Sydney CBD.

The report provides input to:

- the environmental impact assessment prepared to accompany the modification application for the proposal
- the options development and assessment process for expanding the existing effluent management system

The preferred option for expanding the effluent management system will be the subject of a separate assessment process.

1.5 Assessment process

The assessment process included an assessment of the potential impacts on Aboriginal heritage values/objects and proposed mitigation measures in accordance with the Draft *Guidelines for the Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) as per the Secretary's Environmental Assessment Requirements.

The Aboriginal cultural heritage assessment process is outlined in the following steps:

- Step 1** Preliminary assessment including desktop assessment of existing information (database search, background information, landscape assessment)
- Step 2** Information requirements including social/cultural information (where available), landscape, archival and archaeological investigation
- Step 3** Integration of information is a synthesis of all information to describe the cultural landscape and inform the management requirements
- Step 4** Information regarding the proposed development and identifies impacts on Aboriginal heritage values
- Step 5** Integration of assessment with proposed development compares Aboriginal heritage values against the potential impacts from the proposed development to identify specific outcomes
- Step 6** Management strategy for Aboriginal heritage.

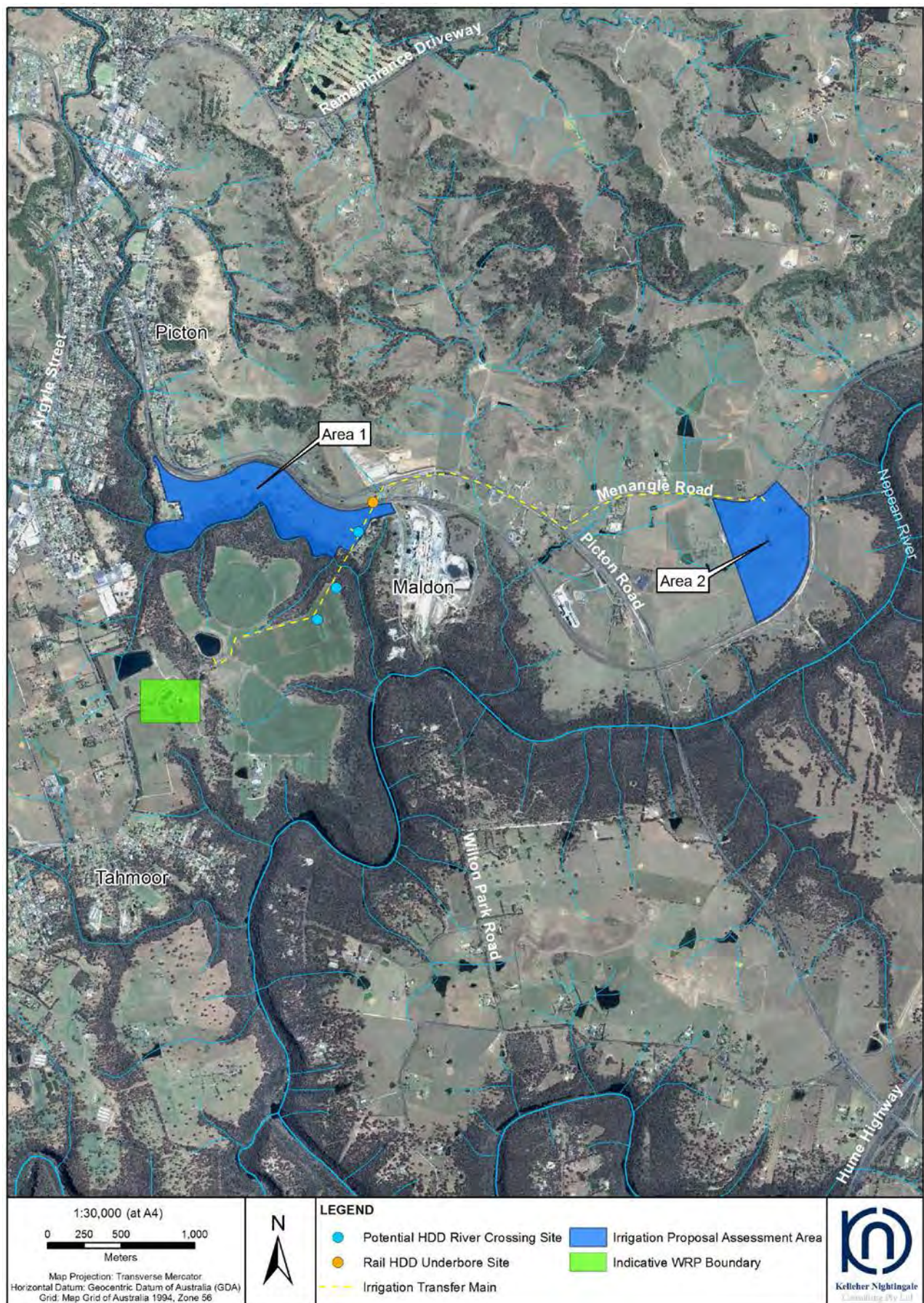


Figure 1. Study area

2 Preliminary assessment

2.1 AHIMS

The study area was assessed for recorded Aboriginal heritage via the Aboriginal Heritage Information Management System (AHIMS). The AHIMS database is operated by the Office of Environment and Heritage (OEH) and regulated under section 90Q of the *National Parks and Wildlife Act 1974*. AHIMS contains information and records related to registered Aboriginal archaeological sites (Aboriginal objects, as defined under the Act) and declared Aboriginal places (as defined under the Act) in NSW.

A search of AHIMS was conducted on 3 November 2014 to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area.

The AHIMS Web Service database search was conducted within the following coordinates (GDA, Zone 56):

Eastings: 0279000 to 0288000
Northings: 6208000 to 6215000
Buffer: 50 metres

The AHIMS search results showed:

102	Aboriginal sites are recorded in or near the above location
0	Aboriginal places have been declared in or near the above location

The distributions of recorded Aboriginal sites within  of the study area are shown in Figure 2. The frequencies of site types within the AHIMS database search area are shown in Table 1.

Table 1. Frequency of site features from AHIMS database search

Site Types	Frequency	(%)
Art site	1	1
Grinding grooves	2	2
Modified tree (carved or scarred)	8	8
Open artefact scatter	44	44
Potential archaeological deposit	17	17
Shelter with art	22	22
Shelter with deposit	1	1
Shelter with potential archaeological deposit	4	4
Stone arrangement	1	1
<i>Total</i>	<i>100</i>	<i>100</i>

AHIMS site 52-2-4070 is listed as a deleted duplicate site and has not been included in Table 1. AHIMS site 52-2-2355 is listed as a restricted site in the search results. OEH confirmed that this site is not within the study area. This site has not been included in Table 1.

2.2 Other heritage registers and databases

Other sources of information including heritage registers and lists were also searched for known Aboriginal heritage in the vicinity of the study area. These included:

- Wollondilly Local Environment Plan 2011
- Sydney Water Heritage Register
- State Heritage Register and State Heritage Inventory
- Commonwealth Heritage List
- National Heritage List
- Register of the National Estate
- Australian Heritage Places Inventory and
- Historic Heritage Information Management System (HHIMS).

No items of Aboriginal heritage were listed or registered on these databases within the study area.

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Figure 2. Registered Aboriginal heritage sites within [REDACTED] of study area (AHIMS search results)

2.3 Summary of Aboriginal heritage in the vicinity of study area

No items of Aboriginal heritage have previously been identified in the study area. A comprehensive survey of the study area has not previously been undertaken. Therefore, the absence of known sites within the area relates to the lack of archaeological investigation and not necessarily to the absence of Aboriginal sites.

The AHIMS search results provide insight into the distribution and characteristics of Aboriginal heritage surrounding the study area. From this data a model of site types and distributions that could be expected within the study area can be developed.

Aboriginal sites within the AHIMS database search area were predominantly artefact scatters and isolated artefacts which constituted 44% of recorded sites. In the vicinity of the study area, artefact scatters (52-2-3217 and 52-2-3218) and isolated finds (52-2-3212, 52-2-3213, 52-2-3214, 52-2-3215 and 52-2-3216) were situated on gentle undulating hills and ridgelines. A concentration of low density artefact scatters, isolated finds and a scarred tree were identified approximately [REDACTED] of the transfer main between Area 1 and Area 2. Elsewhere, a series of rock shelters with art (52-2-0967, 52-2-2080, 52-2-2081, 52-2-3573, 52-2-3692 and 52-2-3706) were situated approximately [REDACTED] of Area 1 and [REDACTED] of Area 2.

2.4 Landscape

The study area covered ridge crest, upper slope and benched maximal lower slope contexts across shale and sandstone geology bordering the Nepean River and tributaries (Figure 3). The majority of the study area consisted of gentle to moderate slopes across the ridge crest. The study area is crossed by numerous drainage channels/tributaries originating from expansions of Bringelly Shale pushing out of the ridge crests. The drainage channels feed into the Nepean River through the sandstone and the resulting erosion has created rock overhangs along the maximal slopes.

Soils across the study area developed in situ from the underlying shale and sandstone geology. The majority of the study area is covered by the Blacktown soil landscape, consisting of shallow to moderately deep soil with low susceptibility to erosion (Figure 4). These residual soils have the potential to contain intact archaeological deposit where they aggrade. Elsewhere, the colluvial movement and sandy matrix of Hawkesbury soils along the waterways makes this soil landscape unlikely to exhibit intact archaeological material outside of closed context (rock shelters) where soil movement is restricted.

2.5 Summary of known and potential Aboriginal heritage in the area

The desktop review and assessment combined the results of heritage register searches, background information and landscape assessment. No Aboriginal objects or declared Aboriginal places were identified through the desktop review within the study area. Previous disturbance to the Picton WRP and along the road corridors limits the potential for intact Aboriginal heritage. However, desktop modelling identified moderate levels of archaeological potential based on the presence of previously recorded sites, suitable landforms, soil intactness and levels of disturbance within the study area.

Potential archaeological areas (areas of archaeological sensitivity) were identified [REDACTED] based on the desktop assessment (Figure 5: [REDACTED]). These areas exhibited the highest statistical chance for containing Aboriginal archaeological objects/features. No potential archaeological areas were identified at the [REDACTED].

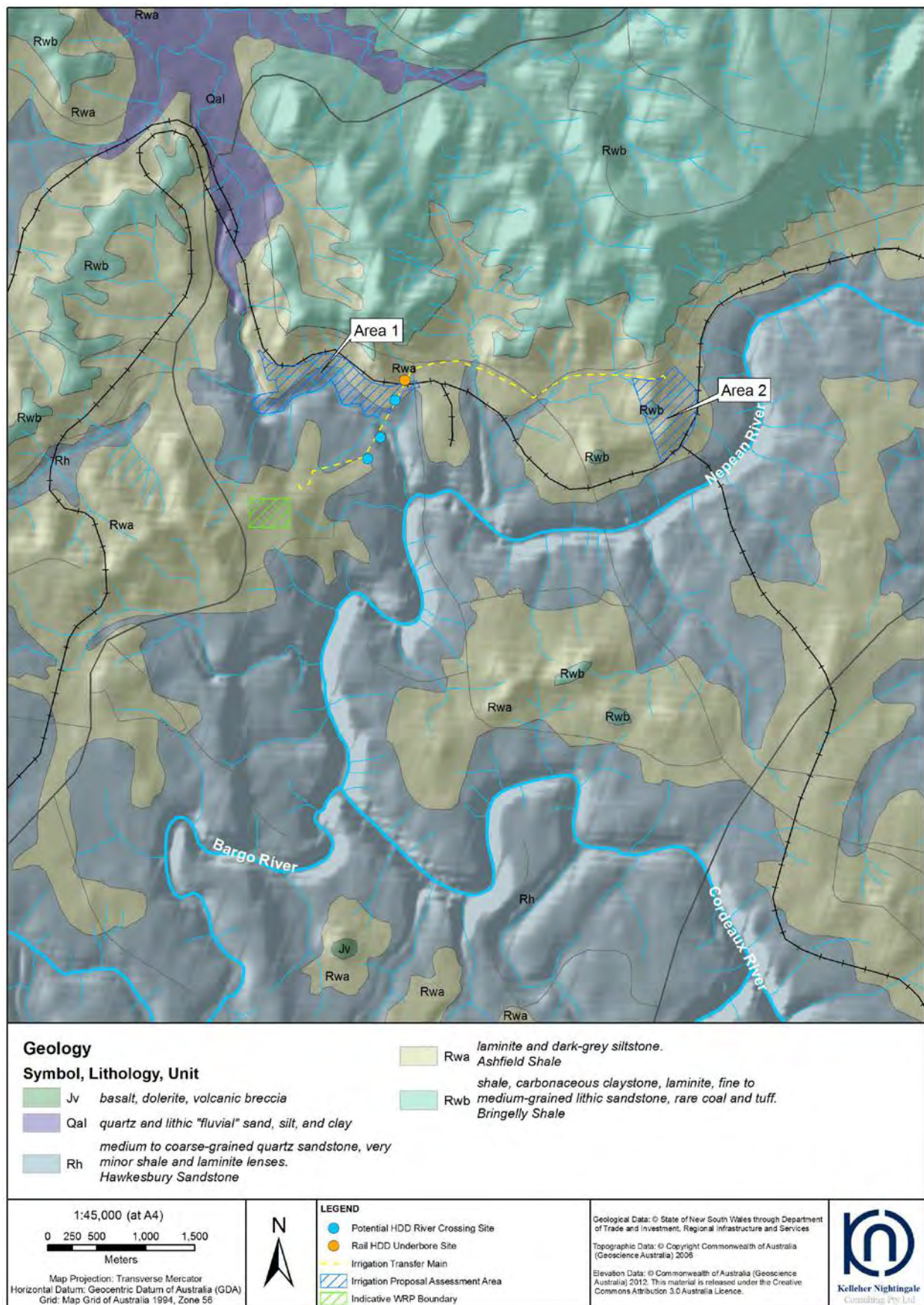


Figure 3. Geology of the study area

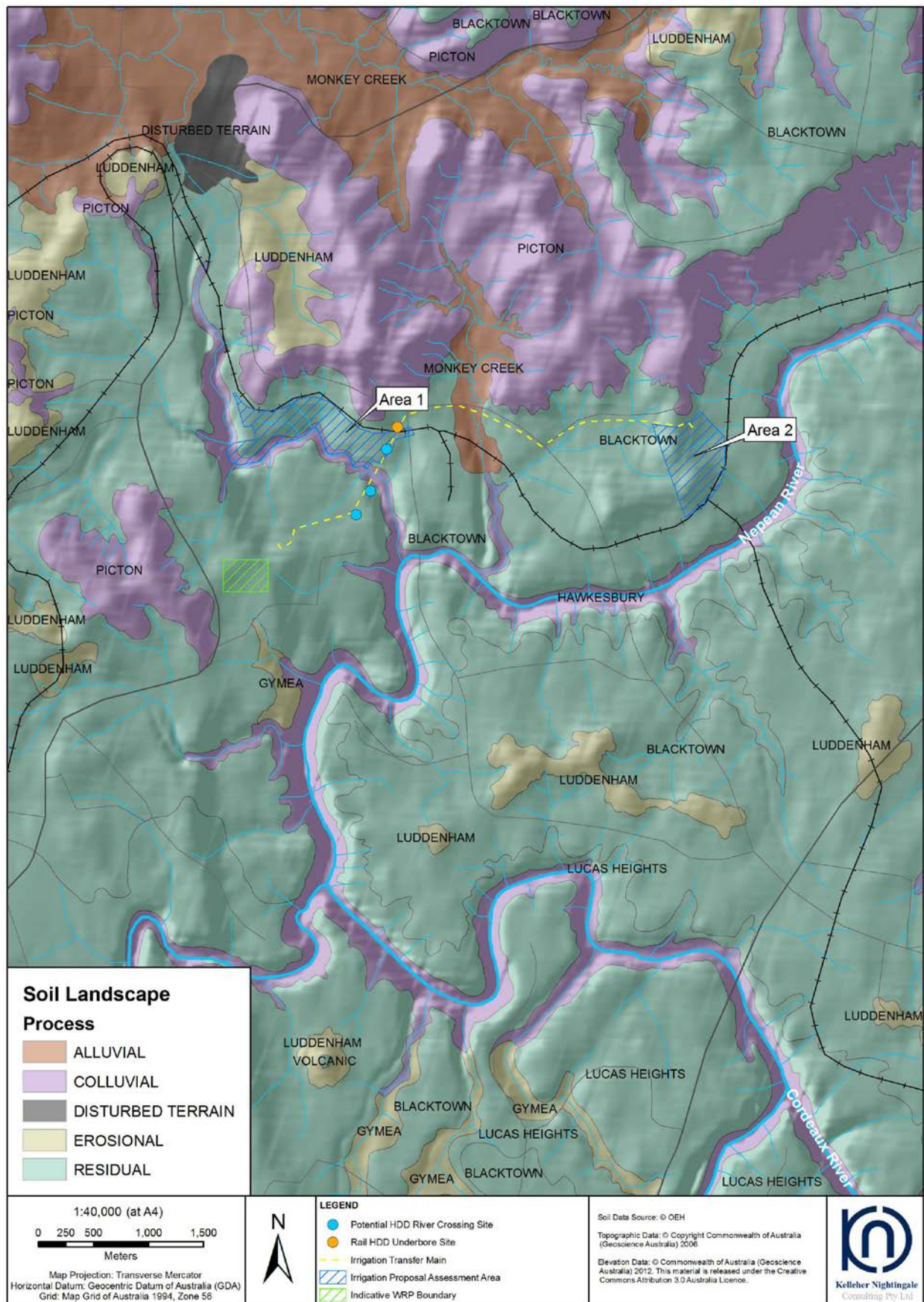


Figure 4. Soil landscapes of the study area

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Figure 5. Archaeological potential areas 

3 Information requirements

3.1 Social/cultural information

Sydney Water understands the value of consultation with the local Aboriginal community at the early stage of project development. Consultation with Aboriginal people has been undertaken as part of this assessment in accordance with the Draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005).

The formal consultation process has included:

- government agency notification letters
- contacting identified Aboriginal parties to register interest in the project
- advertising for registered stakeholders in the Macarthur Chronicle (28/01/2014) and Wollondilly Advertiser (29/01/2014)
- notification of closing date for registration
- ongoing compilation of registrants list, through continuing to register individuals and groups for consultation on the project
- consultation/information day held at 50 Matthews Lane, Picton on 25/02/14, at which the results of the preliminary Aboriginal heritage assessment were presented and discussed. Relevant cultural information was also discussed and where appropriate integrated into this report
- provision of draft Aboriginal heritage assessment report for review
- ongoing consultation with the local Aboriginal community.

Registered stakeholders for the proposal are listed in Table 2.

Table 2. Registered Aboriginal stakeholders

Registered Aboriginal Stakeholder	Name of Aboriginal person and / or contact person
Tharawal Local Aboriginal Land Council	CEO
Cubbitch Barta Native Title Claimants Aboriginal Corporation	Glenda Chalker
Darug Aboriginal Cultural Heritage Assessments	Celestine Everingham
Darug Aboriginal Land Care	Des Dyer
Darug Custodian Aboriginal Corporation	Leanne Watson
Darug Land Observations	Gordon Workman
Peter Falk Consultancy	Peter Falk
Tocomwall	Scott Franks
Wurrumay Consultancy	Kerrie Slater

A consultation/information day was held on 25 February 2014 at 50 Matthews Lane, Picton. Representatives from Tharawal Local Aboriginal Land Council (Ivan Simon), Cubbitch Barta Native Title Claimants Aboriginal Corporation (Glenda Chalker), Peter Falk Consultancy (Peter Falk), Darug Land Observations (Jacob Eldering) and Tocomwall (John Phillips) were in attendance. A description of the proposal and irrigation option and the preliminary Aboriginal heritage assessment was presented and discussed. Aboriginal stakeholders were pleased that identified heritage sites would not be impacted as part of the planned works. No additional Aboriginal heritage sites within the study area were identified at the meeting. It was agreed that stakeholders would be sent a copy of the assessment report for review. Stakeholders were encouraged to provide comments on the assessment report.

Following the meeting an inspection of site SQ1 was undertaken at the request of Glenda Chalker and Ivan Simon. The assessment confirmed the location of SQ1 and modified the extent of the artefact scatter. The site dimensions of SQ1 were mapped against a contour map to confirm the artefact scatter was not being impacted by the proposal or irrigation option.

Glenda Chalker and Ivan Simon requested the [REDACTED] of SQ1 be protected with a fence to ensure against inadvertent impacts and that a new vehicle track be routed along the [REDACTED] of the fence. Sydney Water agreed to the fencing and track alignment. In addition, drainage from the track will be constructed to divert flows away from SQ1 and into the [REDACTED] of the site.

The draft heritage assessment was issued to Aboriginal stakeholders for review. Comments were received from Darug Aboriginal Land Care and Cubbitch Barta Native Title Claimants Aboriginal Corporation. Darug Aboriginal Land Care supported the finding of the report and also asked for buffer zone around sites. The requested buffers were incorporated into the subsequent potential layout plan to protect the identified sites. Cubbitch Barta also supported the finding and requested:

- a detailed recording of the identified sites
- monitoring of the shelter site
- creation of an Aboriginal heritage management plan
- Aboriginal heritage induction of construction works.

In response to Cubbitch Barta further requests, Sydney Water has agreed to allow a detailed recording of the identified archaeological sites by Aboriginal stakeholders provided that they arrange access through Sydney Water. Sydney Water will also include Aboriginal heritage within the construction environmental management plan, which includes the induction of construction workers. Based on the layout plan the identified archaeological sites will not be impacted and a buffer exists between work areas and archaeological sites, therefore monitoring will not be required to protect the Aboriginal heritage sites. Aboriginal stakeholders would be allowed to visit the sites provided they obtain access from Sydney Water. Finally, an overall management strategy for the property will be produced, which will include Aboriginal heritage, however a standalone Aboriginal management plan will not be produced.

3.2 Archaeological investigation

The study area was inspected on 5 July and 27 September 2013. The visual inspection was carried out by KNC archaeologists Stirling Smith and Tristram Miller. Visual inspection included pedestrian inspection of the entirety of the study area concentrating on the identified potential archaeological areas.

The majority of the study area consisted of cleared grass covered lands, with native woodland and sandstone cliffs adjacent to Stonequarry Creek and the Nepean River. The grass was thick and overall ground visibility was approximately 1%. Several sealed and unsealed roads, structures and dams were also present in the study area. These areas were heavily disturbed.

_____ areas contained numerous overhangs, which were inspected for Aboriginal objects. The desktop model showed (via recorded site locations) that _____ within the region were also likely to draw Aboriginal people to inhabitation or periodic use.

One artefact scatter and rock shelter complex (SQ1), and one potential archaeological deposit (SQ2) were identified

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Figure 6. Location of SQ1 and SQ2

SQ1 (GDA 0281172E 6213929N)

Site SQ1 consisted of a complex of rock shelters situated around [REDACTED] with an associated artefact scatter [REDACTED]. The area formed [REDACTED] and it is likely that this area was used in the past as [REDACTED].

An artefact scatter [REDACTED] was identified [REDACTED]. The [REDACTED] was located [REDACTED]. The artefacts were identified [REDACTED]. The artefact had been produced from chert, mudstone, silcrete and quartz. The [REDACTED] of the site is defined by the [REDACTED] and change between [REDACTED].

European items including glass and ceramic were also identified on the surface in this area. It is likely that erosion in this area caused the redeposition of objects and deflation of remnant deposits.



Plate 1. Artefact scatter facing south-east



Plate 2. Artefact scatter facing south



Plate 3. Artefacts from SQ1



Plate 4. Artefacts from SQ1

A large sandstone shelter approximately 95 metres long on [REDACTED] of the [REDACTED] contained at least nine faded charcoal motifs and one silcrete core.



Plate 5. Rock shelter with charcoal motifs and core



Plate 6. Silcrete core



Plate 7. Faded charcoal motifs on rock shelter wall



Plate 8. Faded charcoal motifs on rock shelter wall

In addition, two rock shelters located approximately xx xxxxx xxx of the xxxx xxxxxxxxxxxx exhibited sandy deposits contained by overhang collapse. The potential for Aboriginal archaeological objects to exist within these deposits was high, based on known sites and landscape location.



Plate 9. Rock shelters with potential archaeological deposits at site complex SQ1



Plate 10. Rock shelters with potential archaeological deposits at site complex SQ1

SQ2 (GDA 0280415E 6213905N)

SQ2 consisted of a large rock shelter with potential archaeological deposit located approximately [REDACTED] [REDACTED] [REDACTED]. Sediment within the deposit had accumulated due to large rockfall outside the dripline. The potential for Aboriginal archaeological objects to exist within these deposits was high, based on known sites and landscape location.



Plate 11. Rock shelters with potential archaeological deposit at SQ2

In accordance with section 89A of the *National Parks and Wildlife Act 1974* the Office of Environment and Heritage (OEH) will be notified of SQ1 and SQ2.

4 Integration of information – Conclusions

No registered sites were identified during the desktop review within the study area. The relatively undisturbed agricultural land of the proposed irrigation areas exhibited some potential for archaeological survival. However, landform assessment and the location of registered Aboriginal sites indicated that the [REDACTED] [REDACTED] [REDACTED] were focal points for past Aboriginal occupation. The desktop assessment indicated that archaeological potential was [REDACTED] [REDACTED] [REDACTED]. No archaeological potential was identified [REDACTED] [REDACTED] [REDACTED].

Visual inspection of the study area identified one artefact scatter and rock shelter complex (SQ1), and one rock shelter with potential archaeology deposit (SQ2) [REDACTED] [REDACTED] [REDACTED]. Site SQ1 comprised of an artefact scatter, a rock shelter with Aboriginal objects and two rock shelters with potential archaeological deposits. Site SQ2 did not contain visible Aboriginal objects; however, sediment had accumulated within the rockshelter which could contain subsurface Aboriginal objects.

5 Proposed development impacts

The placement of the proposal and irrigation option was designed to cause as minimal environmental impact as possible.

The nature and extent of the proposal and irrigation option will not impact on Aboriginal site SQ1 and potential archaeological deposit SQ2 (Figure 7). The proposed irrigation zone (impact area) is shown in Figure 7. Sydney Water has advised that [REDACTED] of that area.

A distance of at least [REDACTED] exists between Aboriginal archaeological heritage site SQ1 and the proposed [REDACTED]. Site SQ2 is [REDACTED] from the closest proposed [REDACTED].

Management of SQ1 would involve Sydney Water installing a fence along [REDACTED] of SQ1, realigning vehicle tracks along the new fence line and diverting drainage away from SQ1 (Figure 8).

Provided that sites SQ1 and SQ2 are avoided, as shown in Figure 7, it can reasonably be determined based on the desktop review, assessment of landforms and visual inspection that no Aboriginal objects would be harmed by either the proposal or the irrigation option, within the study area boundaries as shown in this report.

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Figure 7. The proposal, irrigation option and Aboriginal sites

Map removed from public document

Figure 8. SQ1 showing location of realigned track and drainage corridor

6 Management strategy for Aboriginal heritage – Recommendations

Sydney Water has agreed that should the irrigation option proceed, that it would manage identified Aboriginal heritage sites by installing a fence along [REDACTED] of SQ1, realigning vehicle tracks along the new fence line and diverting drainage away from SQ1 (Figure 8).

It is recommended that Sydney Water incorporate the location of all Aboriginal Cultural Heritage (ACH) within the study area into any future management plans and that all on-site Sydney Water staff, contractors & sub-contractors are made aware of the ACH in the study area.

Following these management strategies would avoid impacts to sites SQ1 and SQ2.

No Aboriginal archaeological heritage sites would be harmed by the proposal and irrigation option as shown in this report, in relation to the following amplification of the Picton WRP, including:

- two additional intermittently decanted aeration lagoons (IDALs)
- new inlet works and associated components to distribute flows to the existing and proposed IDALs
- two additional sludge lagoons
- a chemical dosing unit (CDU) for pH correction
- a pipeline (about 275 metres long) to deliver chemicals from the CDU to the western dam
- various ancillary works.
- expansion of Picton Farm, involving:
 - establishing and operating two new irrigation areas (referred to as Area 1 and Area 2, Figure 1) outside of the existing Picton Farm boundary for reuse of additional effluent. The method of irrigation would be land treatment by subsurface irrigation.
 - a pump and transfer main to deliver effluent to the two new irrigation areas.

No further Aboriginal archaeological assessment of the proposal or irrigation option presented in this report is warranted.

References

- DEC, July 2005. Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation. Department of Environment and Conservation.
- Hazelton, P.A., and Tille, P.J., 1990. *Soil Landscapes of the Wollongong-Port Hacking 1:100,000 Sheet*. Soil Conservation Service of NSW, Sydney.
- Hazelton, P.A. and Tille, P.J., 1990. *Wollongong – Port Hacking Soil Landscapes Series Sheet 9029-9129*. Soil Conservation Service of NSW, Sydney.
- Stroud, W.J., Sherwin, L., Roy, H.N. and Baker, C.J., 1985, *Wollongong – Port Hacking 1:100,000 Geological Sheet 9029-9129, 1st Edition*. Geological Survey of New South Wales, Sydney.

Appendix A AHIMS Search Results

Results listings removed from public document.

Appendix B Aboriginal Stakeholder comments

Darug Aboriginal Landcare

Uncle Des Dyer



Cristany Milicich
Archaeologist
Kelleher Nightingale Consulting Pty Ltd
Level 10 25 Bligh Street
Sydney 2000
NSW

Re: Picton Sewerage Scheme:

Dear Cristany,

The Darug Aboriginal Landcare has no objections to the proposed area of development.

We agree with the **recommendation and methodology**, in your report. We agree that a plan of management of the known sites be put in place before any work starts, as the sites will not be impact on, we ark that the fenced area has a bumper zone around them so it will not be excavated.

All land holds specific social, spiritual and cultural values to our organisation.

We would like to thank you and look forward to working with you again

Respectfully yours,
Des Dyer
Site Officer
Darug Aboriginal Land Care

Cubbitch Barta Native Title Claimants
Aboriginal Corporation,

2nd April, 2014.

Kelleher Nightingale Consulting Pty Ltd.
Level 10, 25 Bligh Street,
SYDNEY. N.S.W. 2000.

Dear Matthew,

RE: PICTON SEWERAGE
SCHEME MODIFICATION 4

Thank you for the opportunity of reviewing the draft report in relation to the proposed works for the Picton Sewerage scheme.

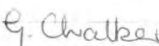
I have no objections to the recommendations made after the site inspection by myself and Ivan Simon, but I would like to make some further recommendations, and they are as follows;

1. That the artefact scatter that was identified on 25th February be recorded in detail with proper drawings, measurements and record the artefacts present, be carried out as soon as possible.
2. That the shelters be base line recorded as soon as possible, so that any impact that may be caused can be monitored. They also need to be recorded in detail for the AHIMS register.
3. That an Aboriginal Heritage Management Plan be put together and applied to the area, so that the sites can be properly managed within that Plan.
4. Construction workers and the managers of the land should all be aware of the responsibilities that will go with the management and safety of the sites on Sydney Water land.

I would also like to thank Sydney Water, as to the consideration in avoiding the Aboriginal sites that are on this land, and the measures that can be put in place in order to prevent them from harm.

I would also like noted that the land on which this proposed works is to take place is Dharawal land, and that it is not appropriate for some of these registered stakeholders to be making comments on Cultural issues.

Yours faithfully,

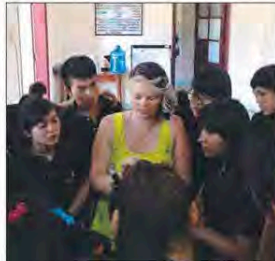

Glenda Chalker
Hon. Chairperson

Appendix C Advertisement

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NEWS
1-56

NEWS 27



The students were keen to learn from Nicole Boulter in Vietnam (left) and (right) Nicole, in red, poses with the students and other hairdressers.



for giving orphans hope

I loved it and came back a changed person
- NICOLE BOULTER

ures program enabled her and other hairdressers to teach skills to 18 orphans over a six-week period.

"I saw it as an opportunity to be able to help people

learn a skill that I love, and teach them something to give them more opportunities in life," Ms Boulter said. "The program itself went for six weeks, with two hairdressers going every two weeks. Myself and another hairdresser taught cutting and upstyling modules. "At the end ... all 18 of the kids got a job, which was awesome for us to hear."

Ms Boulter, of Campbelltown, said the students did not speak or understand English but, assisted by a translator, all were eager to learn. "I was devastated to leave, they became like your little sisters," she said. "You got to experience how they live, and we had lunch and dinner with them every day and they were learning for eight hours a day."

"Every day they were so happy to see us ... and to know that we were completely changing their lives and opportunities was the most touching for me. "They aren't going to live in the streets when they get too old for the orphanage now ... they have now got something in their lives and can work and in some way take care of themselves."

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NEWS LOCAL

Sydney WATER

Aboriginal Cultural Heritage Consultation

Proposed changes to the Picton Sewerage Scheme

Sydney Water proposes to increase the capacity of the Picton Sewerage Scheme to service new connections and growth in the area. The proposed changes include amplifying the Picton Water Recycling Plant (2355 Remembrance Drive, Picton) and new irrigation areas (located at 1285 and 1290 Menangle Road, 60 Picton Road and 6 Maiden Bridge Road, Maitland).

The project requires a modification to the existing approval from the NSW Minister for Planning and Infrastructure under Section 75W of the Environmental Planning and Assessment Act 1979. As required by the Director General of the Department of Planning and Infrastructure, Sydney Water is undertaking consultation in accordance with the Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (D67/2009) for the preparation of the Environmental Assessment. Sydney Water invites Aboriginal people with cultural knowledge relevant to determining the significance of Aboriginal objects and/or places in the proposal area to register their interest.

Sydney Water may use information gathered from this consultation to prepare the Aboriginal heritage impact assessment to meet the Director General's Requirements. This will assist the Minister for Planning and Infrastructure consider and determine Sydney Water's application to modify the approval for the Picton Sewerage Scheme. To register your interest please contact:

Cathy O'Rourke, Sydney Water
PO Box 389, Parramatta NSW 2150
Phone: 8849 6922
Email: cathy.orourke@sydneywater.com.au

The closing date for registration of interest is Friday 14 February 2014.

Sydney Water Corporation ABN 49 776 225 030

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Sydney WATER

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The closing date for registration of interest is Friday 14 February 2014.

Sydney Water Corporation ABN 40 778 223 086

News

IN BRIEF

Seniors forum

Wollondilly Council will host a seniors forum in the gallery of the council building on Wednesday, February 5, at 10am. The topic is "Future Development in the Shire". Several service providers will attend to discuss accommodation options and the future development plans of their facilities. Mayor Bern Banasik said: "I encourage local seniors to come along to hear about what is happening in Wollondilly. Morning tea will be provided. Details: 4677 1150."

Traders market

A creative traders' market will be held at Wollondilly Shire Hall, Menangle Street, Picton, on Sunday, 9am-2pm. The markets are an opportunity to buy local fresh produce direct from the farmer and handmade items produced locally. For a stall, phone 0449 851 676. Details: wollondillytradersmarket.com.au.

Train with Tigers

The Wests Tigers will have a training event for junior players at Tabcorp Park Menangle on Saturday, Robbie Farish, Aaron Woods, Chris Lawrence and Mick Potter will put local juniors through their paces in front of the grandstand in between races. The event will start at 4pm, with a race named the Wests Tigers NSW Sapling Stakes. Details: www.menangleparkraceway.com.au.

Advertiser



Ready for action – and paintball fun

IT'S a bird. It's a plane. No, it's a life-sized model of a Blackhawk helicopter on the back of a truck. Motorists driving along Appin Road on Monday, January 20, about noon may have noticed the helicopter being delivered

to Delta Force Paintball. The 17-metre prop that features a 16-metre rotor span will be part of the Appin centre's \$500,000 renovation. The helicopter model can fit up to 15 people ready to slug it out in paintball.

Anzac deadline looms

HUME MP Angus Taylor has reminded communities across his electorate there are only a couple of weeks left to apply for one-off grants for Anzac centenary projects. "I am encouraging community groups, councils, schools, local museums or galleries, who have a project in mind for the Anzac centenary in 2015, to get in contact with my electorate office in Cowra," he said. "There is a federal gov-

ernment allocation of \$125,000 for projects in each electorate." Mr Taylor said there were some fine plans afoot. These included restoration projects for World War I memorials and gardens, community events and commemorative books and CDs. The deadline is February 15. Details: Maroo Island at the Hume (Cowra) electorate office on 8341 1106.

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