APPENDIX 4 RIPARIAN VEGETATION COMMUNITIES AND FLORA SPECIES RECORDED DURING FIELD INVESTIGATION

Table 8.14 Riparian Vegetation communities located within the study area, description, threats and conservation status (Source: DECCW 2009)

Vegetation Community	Description	Threats	Values
Beach Spinifex Grassland	This vegetation community is composed of an open cover of grass and herbs. It fringes the sandy beaches of the coastline and sandy inlets and is often temporary in nature due to growing on mobile sand deposits including beach foredunes and dune blowouts. Dominant species include the grass, Hairy Spinifex (<i>Spinifex sericeus</i>) and succulent herb such as Pigface (<i>Carpobrotus glaucescens</i>). The species in this community are well adapted to disturbance and their stout rhizomes stabilise the sand against wind and storm erosion.	 Intense recreational pressures in the Sydney area, including sand removal, trampling and rubbish aggregation This community is rarely retained on heavily used beaches and or modified dunal landscapes 	 Found in all coastal national parks and reserves
	Location within study area (see Figures 8.6a – 8.6g)		
	This vegetation community is found in association with Coastal Foredune Wattle Scrub. It is distributed within the study area from Carters Island to near the mouth of the Cooks River. It is located within Towra Point Nature Reserve.		
Castlereagh Ironbark Forest	This vegetation community has a varied structure, ranging from a moderately tall open eucalypt forest or woodland to a low dense thicket of paperbarks with low emergent eucalypts. The most commonly recorded eucalypt is Broad-leaved Ironbark (<i>Eucalyptus fibrosa</i>), with a regular associate with this community being Woollybutt (<i>Eucalyptus longifolia</i>). However sites are often comprised of a diverse canopy due to the subtle grades between substrates. The small tree layer includes <i>Melaleuca decora</i> , with a dense shrub cover below, including <i>Melaleuca nodosa</i> , Blackthorn (<i>Bursaria</i>)	 Clearing in the past, including for urban development Weed invasion, rubbish dumping, inappropriate mowing and high frequency fires 	 Representative Endangered Ecological Community (EEC): Cooks River/Castlereagh Ironbark Forest Remnants are small isolated patches surrounded by urban areas
	<i>spinos</i> a) and Peach Heath (<i>Lissanthe strigosa</i>). The ground cover includes a sparse layer of grasses and herbs, which can be minimal where dense shrub layers reduce light penetration.		
	Location within study area (see Figures 8.6a – 8.6g)		
	This vegetation community is distributed upstream of Salt Pan		

Vegetation Community	Description	Threats	Values
	Creek.		
Castlereagh Scribbly Gum Woodland	Found on poorly consolidated sand deposits on hinterland plains and valleys of the Sydney Basin region. In the Sydney Metropolitan Catchment Management Authority (SMCMA) area it occurs on old stream deposits including at Holsworthy and Voyager Point. The woodland structure is open, with low growing eucalypts dominated by Hard-leaved Scribbly gum (<i>Eucalyptus</i> <i>sclerophylla</i>), Narrow-leaved Apple (<i>Angophora bakeri</i>) and Drooping Red Gum (<i>Eucalyptus parramattensis subsp.</i> <i>parramattensis</i>). Often there is a sparse cover of Tall Paperbark (Melaleuca decora). The shrub layer is well developed and composed of banksias, hakeas, wattles, tea trees and paperbarks with a diverse groundcover underneath, typically with good cover provided by grasses and sedges. Location within study area (see Figures 8.6a – 8.6g)	 Clearing for urban development and sand mining, resulting in disjunct and isolated remnants Current threats: Frequent fire Illegal trail riding Rubbish dumping Weed invasion Recreational and associated urban pressures currently due to being surrounded by urban development 	 On the Cumberland Plain the Voyager Point and Holsworthy area represent one of two large remnants remaining Naturally rare In the SMCMA area it is not represented in the formal reserve system
	Williams Creek and along Georges River downstream of Kelso Creek		
Castlereagh Shale- Gravel Transition Forest	The low soil fertility and relatively low mean annual rainfall have resulted in a community that is an open eucalypt forest with a variable understorey, ranging from dense shrubs to a low sparse shrub cover with an abundant ground layer of grasses. The dominant eucalypt species is Broad-leaved Ironbark (<i>Eucalyptus fibrosa</i>), accompanied by a variety of other eucalypts influenced by the location of the community. The small tree layer is composed of <i>Melaleuca decora</i> with a shrub layer underneath including Blackthorn (<i>Bursaria spinosa</i>) and Gorse Bitter Pea (<i>Daviesia ulicifolia</i>). The ground layer includes a mix of grasses, sedges and herbs.	 Clearing in the past, including for urban development Weed invasion, rubbish dumping, inappropriate mowing and high frequency fires 	 Representative EEC: Shale Gravel Transition Forest in the Sydney Basin Bioregion Remnants are small isolated patches surrounded by urban areas
	Location within study area (see Figures 8.6a – 8.6g)		
	This vegetation community is distributed on the southern side of Williams Creek near the confluence with the Georges River and at Voyager Point.		
Coastal Alluvial	This community is found on low-lying alluvial deposits associated	- Coastal development	 Representative EEC: River Flat Eucalypt Forest on

Vegetation Community	Description	Threats	Values
Bangalay Forest	 with stream banks and inlets along the coastal zone, formed by sandy loams washed down from eroding sandstone ridges and gullies above. It occurs on elevations less than 15 metres above sea level and where rainfall exceeds 1200mm per annum. The sclerophyll forest is most often dominated by a single species, Bangalay (<i>Eucalyptus botryoides</i>). A sparse lower layer of casuarinas is usually present with Swamp Oak found adjacent to the water and Forest Oak (<i>Allocasuarina torulosa</i>) on drier, elevated parts of the flat. The understorey is generally open with conspicuous isolated trees or clumps of Cabbage Tree Palm (<i>Livistona australis</i>) found alongside a number of other mesic species and paperbarks. The ground layer is characterized by a high cover of ferns amongst a diverse range of grasses, herbs and sedges. Location within study area (see Figures 8.6a – 8.6g) This vegetation community is located in Carina Bay. 	 Predicted sea level rise arising from climate change (long-term) Water pollution, alterations to drainage and water flow patterns and frequent fire. Invasive weeds including Lantana (<i>Lantana camara</i>) 	Coastal Floodplains
Coastal Dune Littoral Rainforest	This vegetation community, found on recent sand deposits, forms a low closed canopy of rainforest trees dominated by Tuckeroo (<i>Cupaniopsis anacardioides</i>). Occasionally there is an emergent eucalypt, casuarinas, banksias or paperbark. Rainforest tree species also include Lilly Pilly (<i>Acmena smithii</i>) and Cheese Tree (<i>Glochidion ferdinandi</i>). The small tree layer in the Sydney region includes the threatened species the Magenta Lilly Pilly (<i>Syzygium paniculatum</i>). Location within study area (see Figures 8.6a – 8.6g) This vegetation community is found with Towra Point Nature Reserve.	 Invasive weeds including Lantana (Lantana camara) and Bitou Bush (Chrysanthemoides monilifera subsp. monilifera) are prolific in disturbed areas that adjoin remnants 	 Representative EEC: Littoral Rainforest The small isolated remnants of this community remaining in the SMCMA occur on the Kurnell Peninsula. This includes areas within the study area at Towra Point Nature Reserve. These remnants are threatened by encroaching lantana.
Coastal Enriched Sandstone Moist Forest	This tall open forest has a distinctive mesic shrub and small tree layer. The dominate species in the canopy varies with different combination of eucalypt species, usually with Smooth-barked Apple (<i>Angophora costata</i>). Under this canopy layer there is often a tall stand of forest oak (<i>Allocasuarina torulosa</i>) with taller small trees below composed predominantly of rainforest species such as Coachwood (<i>Ceratopetalum apetalum</i>), Blueberry Ash (<i>Elaeocarpus reticulatus</i>) and occasionally Cabbage Palms (<i>Livistona australis</i>). The ground layer varies from a sparse to	 Weed infestation, in particular from lantana (<i>Lantana camara</i>) Frequent fire may present localised impacts Impacts due to clearing are minimal due to the unsuitable nature of the environment, where this community is found, for urban development or agriculture 	 In the region the SMCMA encompasses the majority of this communities distribution Found in Lane Cove, Royal and Sydney Harbour National Parks

Vegetation Community	Description	Threats	Values
	dense cover of ferns and twiners.		
	This vegetation community has a limited distribution throughout the study area, found from Salt Pan Creek downstream to Shipwrights Bay Reserve. This patchy distribution is similar to its distribution within the SMCMA, where it is found in sandstone gullies and sheltered slopes enriched by clay material (DECCW 2009a),		
Coastal Enriched Sandstone Sheltered Forest	This vegetation community is most commonly found along steep sheltered slopes, however it does also occur at a variety of topographic locations. This tall open eucalypt forest has an understorey of dry sclerophyll shrubs with ferns and forbs amongst the ground cover. The common eucalypts are Smooth- barked Apple (<i>Angophora costata</i>), Red Bloodwood (<i>Corymbia gummifera</i>) and Sydney Peppermint (<i>Eucalyptus piperita</i>). The small tree layer is sparse, including <i>Allocasuarina littoralis</i> and Old-man Banksia (<i>Banksia serrata</i>) and occurs above a range of wattles, tea-trees, gee bungs and grass trees. Location within study area (see Figures 8.6a – 8.6g)	 Clearing for urban development (low threat where community occurs in rugged infertile environments) Localised weed infestation occurs in proximity to the urban margins Frequent fire 	 Large proportion is found in the protected area network Represented in Garrigal, Georges River and Lane Cove National Parks
	This vegetation community is extensively distributed throughout the study area from opposite the entrance to Deadman's Creek, downstream to Shipwrigths Bay.		
Coastal Flats Swamp Mahogany Forest	This open forest is dominated by Swamp Mahogany (<i>Eucalyptus robusta</i>). The smaller tree layer includes Swamp Oak (<i>Casuarina glauca</i>) and Paperbarks (<i>Melaleuca linariifolia, Melaleuca styphelioides</i>) and an understorey including Cheese Tree (<i>Glochidion ferdinandi</i>) and Cabbage Tree Palm (<i>Livistona australis</i>), which are part of a distinct mesic element. Climbers are also part of this vegetation community, such as Snake Vine (<i>Stephania japonica var. discolor</i>) and Common Silkpod (<i>Parsonsia straminea</i>) and the groundcover composed of sedges, ferns, grasses and herbs.	 Original extent greatly reduced by clearing Threats associated with remnants being surrounded by urban and industrial development including stormwater pollution, altered drainage, rubbish dumping and weed invasion Common weed species include Lantana (<i>Lantana camara</i>) and Crofton weed (<i>Ageratina adenophora</i>) All remaining stands show evidence of 	 Representative EEC: Swamp Sclerophyll Forest on Coastal Floodplains This vegetation community is not reserved within the SMCMA
	Location within study area (see Figures 8.6a – 8.6g)	disturbance	
	This vegetation community is located mainly along the		

Vegetation Community	Description	Threats	Values
	tributaries, including Deadmans Creek, Mill Creek and Little Salt Pan Creek, as well as in Kogarah Bay and Sylvania.		
Coastal Foredune Wattle Scrub	This vegetation community is a low dense scrub distributed on coastal sandmass frontal dunes and beach ridges along the eastern coastline of NSW. The exposed location of this community to the coastal winds prunes the vegetation, which includes Coast Tea-tree (<i>Leptospermum laevigatum</i>) and Coastal Wattle (<i>Acacia longifolia subsp. sophorae</i>). This community has been regenerated in some areas by plantings as part of dune stabilisation works and bush regeneration. This has resulted in poor species diversity in some of these small patches, compared to those that include salt tolerant succulent herbs and grasses. Location within study area (see Figures 8.6a – 8.6g)	 Urban development: coastal foredunes have been heavily cleared and modified Exotic species Reduced species diversity by profuse regeneration of Coastal Teatree (<i>Leptospermum laevigatum</i>) High levels of disturbance by recreational pursuits associated with beach and boating leisure 	- Community is represented in Botany Bay, Sydney Harbour and Royal National Parks
	This vegetation community is found in association with Beach Spinifex Grassland. It is distributed within the study area from Sandringham Bay north to near the mouth of the Cooks River. It is located within Towra Point Nature Reserve.		
Coastal Freshwater Reedland	Coastal Freshwater Reedland is found on poorly drained alluvial flats and sand depressions across the NSW east coast. Predominantly freshwater communities although some swamps may be brackish. The reedlands are tall sometimes reaching over 3 metres in height and are dominated by one or two species, predominantly Common Reed (<i>Phragmites australis</i>) and Cumbungi (<i>Typha orientalis</i>). Other tall reeds include Elaeocharis sphacelata. The continuous cover of reedlands may include a sparse cover of Swamp Oak (<i>Casuarina glauca</i>) or Swamp Paperbark (<i>Melaleuca ericifolia</i>) on the drier margins of the swamp. Location within study area (see Figures 8.6a – 8.6g) This vegetation community has a limited distribution within the study area this found of Flavel Bay.	 The community has been extensively cleared and modified from development Weed invasion, land infilling, altered drainage regimes, water pollution from urban runoff, trampling from recreational pressures and feral animals are recognized threats Most remnant stands are situated amongst intense urban landuses which threaten the long-term survival of these patches 	- Representative EEC: Freshwater Wetlands on the Coastal Floodplains
	study area. It is found at Floyd Bay, Dhurawal Bay, Georges River National Park and Lime Kiln Bay.		
Coastal Freshwater	Swamp Oak (<i>Casuarina glauca</i>) provides an open to dense stand of canopy trees on poorly drained substrates that are	 Past clearing is likely to have removed extensive stands of these swamp 	 Representative EEC: Sydney Freshwater Wetlands

Vegetation Community	Description	Threats	Values
Swamp Forest	inundated periodically by fresh or brackish waters within this community. Tall paperbarks (<i>Melaleuca spp.</i>) may also be present in the upper stratum although more frequently they are found as small trees in the sub canopy layer. The shrub layer is very sparse, with a prominent cover of water-loving plants found beside open boggy ground and standing water. A diverse range of plant species can occur in response to the prevailing conditions. Herbs, ferns, grasses, rushes and sedges may found in various combinations at any given site. Distinctly freshwater conditions may feature Slender Knotweed (<i>Persicaria decipiens</i>), Tall Sedge (<i>Carex appressa</i>) and Red-fruit Saw-sedge (<i>Gahnia sieberiana</i>). Sites that have a brackish influence commonly include Sea Rush (<i>Juncus kraussii</i>) amongst the ground layer. Location within study area (see Figures 8.6a – 8.6g) Located at various locations throughout the study area, predominantly along creeklines. Locations include Kelso, Deadmans, Mill and Salt Pan Creeks as well as along the Georges River near Kelso Creek and Towra Point Nature Reserve.	 forests within the region and the SMCMA. Continuing clearing and land reclamation of these swampy areas occurs with urban land use. Low lying areas are threatened by changing saline conditions associated with sea level rise arising from climate change Many existing remnants in Sydney are isolated or adjoin the urban interface. As a result, weed infestation, pollution from storm water runoff, recreation pressure and altered drainage all remain pervasive threats. 	
Coastal Sand Littoral Forest	This forest and woodland vegetation community, found on coastal sand deposits, includes a large amount of littoral rainforest species throughout the sclerophyllous shrub and small tree layer. Species found within this community include Tuckeroo (<i>Cupaniopsis anacardioides</i>), Coast Banksia (Banksia integrifolia subsp. Integrifolia), Swamp Mahogany (Eucalyptus robusta), Bangalay (Eucalyptus botryoides) and Swamp Oak (Casuarina glauca). Vines are abundant and include Cockspur Thorn (<i>Maclura cochinchinensis</i>). The structure and species of this community are highly influenced by habitat and disturbance. Location within study area (see Figures 8.6a – 8.6g) Large areas of this vegetation community are located at the eastern extent of the study area at Towra Point Nature Reserve and Woolooware Bay.	 Widespread and intensive disturbance arising from sand mining, industrial and urban development has resulted in extensive loss of this community. In many instances the original topography of the landscape has irreversibly changed with the loss and migration of sand dunes. Extant areas are often in dynamic stages of succession and heavily cloaked in invasive weeds such as Lantana (<i>Lantana camara</i>) and Bitou Bush (<i>Chrysanthemoides monilifera subsp. rotundata</i>). 	- Representative EEC: Kurnell Dune Forest
Coastal Sand Swamp	Coastal Sand Swamp Mahogany Forest is a low open eucalypt forest with a sparse dry shrub layer and a very distinctive ground	 Clearing has depleted a large proportion of the original extent of this 	 Representative EEC: Swamp Sclerophyll Forest on Coastal

Vegetation Community	Description	Threats	Values
Mahogany Forest	cover of sedges, rushes and ferns. Swamp Mahogany (<i>Eucalyptus robusta</i>) dominates the canopy layer above a low cover of paperbarks, tea-trees, banksias and wattles. It occurs on low-lying coastal sandy substrates found in or adjoining dune swales, lagoons and other alluvial infill, underlain by an elevated water table that saturates the peaty sand year round. This encourages a diverse and abundant layer of sedges and rushes. These include Bare Twig- rush (<i>Baumea juncea</i>) Jointed Twig-rush (<i>Baumea articulata</i>), Tall Saw-sedge (<i>Gahnia clarkei</i>) and Zig-zag Bog-rush (<i>Schoenus brevifolius</i>). Location within study area (see Figures 8.6a – 8.6g)	 community in the SMCMA and across its range. Threats are considered to be high as all remnants are enclosed by urban and industrial development. This presents significant issues associated with stormwater pollution, altered drainage, rubbish dumping and weed invasion. Evidence of disturbance is present in all remaining stands. Some sites are regenerating following past clearing. 	Floodplains - Important remnant at Kurnell Peninsula
	Small area of this vegetation in two areas within the study area, including along Mill Creek and at Towra Point Nature Reserve.		
Coastal Sandstone Foreshores Forest	An open forest with a moist shrub layer and ground cover of ferns, rushes and grasses. The flora of this community has a maritime influence given its exposure to prevailing sea breezes. The canopy can be dominated by pure stands of Smooth-barked Apple (<i>Angophora costata</i>) though more regularly is found in combination with other tree species. Localised patches of Bangalay (<i>Eucalyptus botryoides</i>) and Coast Banksias (<i>Banksia integrifolia subsp. integrifolia</i>) occur closest to the coast, whereas Sydney Peppermint (<i>Eucalyptus piperita</i>) and Blackbutt (<i>Eucalyptus pilularis</i>) prefer more protected locations and in the case of the latter, some minor shale enrichment in the soil. A prominent layer of hardy mesic small trees and shrubs is present. These include Sweet Pittosporum (<i>Pittosporum undulatum</i>), cheese tree (<i>Glochidion ferdinandi</i>) and Blueberry Ash (<i>Elaeocarpus reticulatus</i>). Found on sheltered sandstone slopes found along the foreshores of Sydney's major waterways and coastal escarpments. The distribution is coastal and requires a combination of low elevation between 2-45 metres above sea level and mean annual rainfall that exceeds 1100 mm per annum.	 Clearing for urban development has occurred across the range of the community. Weed infestation is widespread in stands close to urban margins. Fire is likely to have been excluded for long periods of time and many stands are isolated within dense urban land uses. The absence of fire may be preferentially encouraging some mesic woody species over pyrophytic species. Many stands given their proximity to water views experience very high recreational pressures. Dieback arising from <i>Phytophora</i> is severely affecting stands in the Sydney Harbour area. 	 Conservation status unknown, though occurs within a number of National Parks and Reserves
	Location within study area (see Figures 8.6a – 8.6g)		
	Small amounts of this vegetation community is located along Salt Pan Creek, Coronation Bay, Oatley Bay, Oyster Bay and		

Vegetation Community	Description	Threats	Values
	Kogarah Bay.		
Coastal Sandstone Riparian Forest	Often only narrow in width, this forest is dominated by smooth- barked apple (Angophora costata) and Sydney peppermint (Eucalyptus piperita). The small tree layer tends to feature a mix of species common to riparian scrubs and hardy rainforest communities. This includes low growing Coachwood (<i>Ceratopetalum apetalum</i>), Water Gum (<i>Tristaniopsis laurina</i>) and Tea Tree (<i>Leptospermum spp.</i>). Also present is River Lomatia (<i>Lomatia myricoides</i>). The ground is invariably rocky and covered in small leaved ferns such as Umbrella Fern (<i>Sticherus flabellatus</i>) and Coral Fern (<i>Gleichenia spp.</i>). Occurs within narrow sandstone gorges and minor creek lines of the sandstone plateaus carry a sandstone gully forest, influenced by a suite of riparian and rainforest species. It is widespread across the SMCMA area although very restricted in extent. Location within study area (see Figures 8.6a – 8.6g) A small patch of this vegetation community is located at Lime	 Clearing is likely to have had limited affect on the distribution of the community because of the infertile soils and precipitous nature of the habitat. Current threats are likely to arise from local weed invasion from up stream developments and frequent fire 	 A large area of this community occurs within informal reserves associated with the Woronora River Less than 10% estimated to have been cleared within the Sydney Basin
Coastal Sandstone Sheltered Peppermint- Apple Forest	Kiln Bay. The vegetation community is a moderately tall open forest composed of Sydney Peppermint (<i>Eucalyptus piperita</i>) and Smooth-barked Apple (<i>Angophora costata</i>). The community inhabits rocky environments and the understorey is a diverse mix of heath and shrub species including banksias, tea-trees and wattles. A common species that is conspicuous in summer when it is in flower is the NSW Christmas bush (<i>Ceratopetalum gummiferum</i>). Location within study area (see Figures 8.6a – 8.6g) This vegetation community has a limited distribution within the	 Localised impacts along boundaries with urban development including weeds and frequent fire Clearing has not been extensive due to the unsuitability for agriculture and urban development of the infertile sandy soils and steep rocky slopes 	 A large part of the extant area of this forest is protected in Garrigal, Royal, Heathcote and Dharawal reserves
Coastal Shale- Sandstone Forest	study area. It is located on the east and west bank of Mill Creek. This vegetation community is predominantly a tall open eucalypt forest with a sparse dry sclerophyllous shrub layer and a grassy ground cover. Eucalypt species characteristic of this community include Tall Red Bloodwood (<i>Corymbia gummifera</i>) and Smooth- barked Apple (<i>Angophora costata</i>). However this community is made distinctive from the surrounding sandstone woodlands due	 Clearing, first for agriculture and then for urbanisation Remnants commonly small and surrounded by high density urban land use, with current threats including: Frequent fire 	- The legal status of this community is unclear with some remnants of the forest described as a variant of the Duffys Forest Ecological Community in the Sydney Basin Bioregion an

Vegetation Community	Description	Threats	Values
	to the local abundance of Blackbutt (<i>Eucalyptus pilularis</i>), Turpentine (<i>Syncarpia glomulifera</i>) and Mahogany (<i>Eucalyptus resinifera, E. umbra</i>). A sparse cover of Casuarinas (<i>Allocasuarina littoralis</i>) occurs with an open layer of dry shrubs including banksias, wattles, hakeas and geebungs. The ground cover is diverse and includes grasses, rushes and herbs. Location within study area (see Figures 8.6a – 8.6g) Along Georges River downstream of Kelso Creek, Jewfish Bay, Oatley Bay and Connells Bay	 Weeds Rubbish dumping 	 Endangered Ecological Community under the Threatened Species Conservation Act 1995, however the characteristic species do not match those defined in Coastal Shale- Sandstone Forest. Represented in Royal, Garrigal and Lane Cove National Parks.
Coastal Tea-tree- Banksia Scrub	This vegetation community is characterised by littoral heath and scrub, found along headlands, coastal foredunes and beach ridges near the open ocean. It is usually comprised of a dense cover of Coast Tea-tree (<i>Leptospermum laevigatum</i>) and Coast Banksia (<i>Banksia integrifolia subsp. integrifolia</i>), with the height of the scrub varying considerably in response to exposure to prevailing winds. Location within study area (see Figures 8.6a – 8.6g) This vegetation community is limited in its distribution within the study area, only occurring within Towra Point Nature Reserve.	 Headland development and sandmining Infestations of the invasive weeds Lantana (<i>Lantana camara</i>) and bitou bush (<i>Chrysanthemoides monilifera subsp.rotundata</i>) High level of disturbance due to recreational pursuits, clearing and tree pruning for views, weeds and rubbish dumping due to the closeness of most remnants in or close proximity to built environments 	 Represented in Towra Point Nature Reserve, Botany Bay and Royal National Parks
Coastal Upland Wet Heath Swamp	This vegetation community, part of the sandstone upland swamp complex found across the Sydney Basin Bioregion, is a wet heath-open sedgeland community with a sparse to dense heath layer. One or several species of banksia, hakea or tea-tree are usually found within the upper layer. The ground layer is composed of a diverse and abundant cover of sedges and ferns. Location within study area (see Figures 8.6a – 8.6g) This vegetation community is limited in its distribution within the study area, only occurring within Towra Point Nature Reserve.	 Moderate level of threat Urban development Illegal trail riding, frequent fire and disruption of water flow due to underground mining are threats on the Woronora Plateau 	- Represented in Royal, Garrigal, Dharawal and Sydney Harbour and Botany Bay reserves
Cumberland Riverflat Forest	This vegetation community is an open eucalypt forest with a canopy typically including either Rough-barked Apple (<i>Angophora floribunda</i>) or Broad-leaved Apple (<i>Angophora</i>	 Threats are severe, historically being cleared for agriculture and remaining remnants usually adjoined by 	 Representative EEC: River Flat Eucalypt Forest Represented in Georges River National Park

Vegetation Community	Description	Threats	Values
	 subvelutina), as well as Forest Red Gum (Eucalyptus tereticomis) and/or Cabbage Gum (Eucalyptus amplifolia). Blue Box (Eucalyptus baueriana) is commonly found within the study area along the Georges River near Bankstown as well as on Cabramatta and Prospect Creek. Paperbark (Melaleuca spp.) and wattles (Acacia spp.) are part of this community's understorey. They form an occastiona sparse to open small tree layer with a sparse shrub layer underneath, usually including Blackthorn (Bursaria spinosa). The most abundant cover is found along the ground where there are many small herbs and ferns. Location within study area (see Figures 8.6a – 8.6g) This vegetation community dominates the riparian zone from Liverpool Weir downstream to Salt Pan Creek. The largest remaining areas of this vegetation community within the SMCMA are along the George River (DECCW 2009a). 	 urbanization Diverse and abundant cover of weeds species including Small-leaved Privet (<i>Ligustrum sinense</i>) and Bridal Creeper (<i>Asparagus asparagoides</i>). A good example of weed invasion is shown in Figure 8.10a. The remnants within the study area within flood zones have a minimized threat of being cleared, however they are still threatened by the change of drainage patterns, water pollutions and increased sedimentation Within the study area this community was often found to be disturbed by weed species including Balloon Vine (<i>Cardiospermum grandiflorum</i>), Lantana (<i>Lantana camara</i>), Morning Glory (<i>Ipomoea indica</i>) and Small-leaved Privet (<i>Ligustrum sinense</i>). The disturbance within this community along Prospect Creek has been previously reported. 	 Of the 786ha of this community within the SMCMA only 2% is within formal conservation reserves. 36% is located within informal reserves
Cumberland Shale Plains Woodland	An open grassy woodland dominated by Grey Box (<i>Eucalyptus moluccana</i>), Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Ironbark (<i>Eucalyptus crebra/ Eucalyptus fibrosa</i>). Localised patches of Spotted Gum (<i>Corymbia maculata</i>) may occur in the Fairfield LGA. Occurs on the gentle topography associated with the shale plains of Western Sydney. It is typified by a sparse to moderate cover of shrubs and a high cover of grasses and forbs. Location within study area (see Figures 8.6a – 8.6g) A small patch of this vegetation community is located at Pelican Point at Towra Point Nature Reserve.	 Past clearing for agriculture has removed extensive stands of this woodland resulting in permanent loss and fragmentation. Remnants are threatened by continued urban and industrial expansion. Invasion by African olive (<i>Olea</i> <i>europaea subsp. africana</i>) is a significant threat. Dense stands of this weed occupy large areas formerly occupied by the community (Cuneo 2008 in SMCMA). NSW Scientific Committee (1997) also considers grazing, inappropriate fire regimes, and artificial enrichment from water runoff (including point and 	 Representative EEC: Cumberland Plain Woodland Anticipated that this community is 75-90% cleared in the Sydney Basin

Vegetation Community	Description	Threats	Values
		diffuse sources) as significant threats on the community.	
Cumberland Swamp Oak Riparian Forest	Distinguishing feature of this community is the prominent stands of Swamp Oak (<i>Casuarina glauca</i>) found along or near streams. Often these are relatively young trees, swarming amongst a mix of old and young eucalypts such as Rough-barked Apple (<i>Angophora floribunda</i>), Forest Red Gum (<i>Eucalyptus tereticornis</i>) and Grey Box (<i>Eucalyptus molucanna</i>). The understorey is typical of the open grassy and herbaceous characteristics of other riverflat forests. It may be that this is a pioneering community and is reestablishing following clearing. It is known that many creeklines in western Sydney are slightly saline, particularly during drought (Benson and Howell 1990 in SMCMA). Water tables are likely to rise following clearing, bringing salt water closer to the surface. This may explain why the salt tolerant swamp oak is so prolific in these environments and in many instances appears to outcompete the eucalypt species. Location within study area (see Figures 8.6a – 8.6g) The vegetation community is located along Prospect Creek and on the Georges River at Milperra.	 The community has been extensively cleared in the past for agriculture with subsequent urban consolidation now adjoining most remnants in the SMCMA. Most stands are threatened by a diverse and abundant cover of invasive weeds of which Small-leaved Privet (<i>Ligustrum sinense</i>) and Bridal Creeper (<i>Asparagus asparagoides</i>) are very common. While threats from urban clearing are minimised by the occurrence of remnants within flood zones, alteration of drainage patterns, water pollutions and increased sedimentation remain threats. 	 Representative EEC: Swamp Oak Floodplain Forest Anticipated that this community is 75-90% cleared in the Sydney Basin
Hinterland Flats Eucalypt Forest	Tall open eucalypt forest with a scattered mesic shrub layer and a grassy and herbaceous ground cover dominated by both Bangalay (<i>Eucalyptus botryoides</i>) and its hybrid with Sydney Blue Gum (<i>Eucalyptus saligna x botryoides</i>) where at its tallest it may reach over 35 metres in height. Outside of the SMCMA it includes a higher number of tree species such as River Peppermint (<i>Eucalyptus elata</i>). An open layer of small trees features a number of wattles of which Coast Myall (<i>Acacia binervia</i>) is most common. The hardy rainforest trees Grey Myrtle (<i>Backhousia myrtifolia</i>) and Sweet Pittosporum occur. On the banks of the Georges River the small tree layer may include dense stands of the exotic Small-leaved Privet (<i>Ligustrum sinense</i>). Smaller shrubs may have a reduced cover and diversity as a result. Invariably however the taller Bracken Fern (<i>Pteridium esculentum</i>) occurs above an abundant cover of grasses.	 Threats are high. Clearing is unlikely to have depleted this forest as extensively as other riverflat forests given the narrow areas of habitat and less fertile soils. Urban and industrial land use surrounds most stands and a large proportion of remnants are now characterised by a diverse and abundant cover of invasive weeds. Altered drainage patterns, water pollutions, increased sedimentation and frequent fire remain pervasive threats. 	 Representative EEC: River Flat Eucalypt Forest Anticipated that this community is 80-95% cleared in the Sydney Basin

Vegetation Community	Description	Threats	Values
	It occurs predominantly along the sandy riverbanks of the Georges River and its tributaries. It also occurs on gentle narrowly incised valleys that drain the north western Woronora Plateau west from the Woronora River.		
	Location within study area (see Figures 8.6a – 8.6g)		
	This vegetation community has a limited distribution within the study area. It is found in Little Moon Bay, Mill Creek and Deadmans Creek. The largest proportion of its extent within the study area occurs in the upstream areas of these creeks. This is most likely where more elevated alluvial systems occur which have a greater proportion of sandy material in comparison to the broader floodplains of the Georges Rivers.		
Hinterland Riverflat Paperbark Swamp Forest	An open to closed forest of tall paperbarks (<i>Melaleuca linariifolia/Melaleuca styphelioides</i>). These are joined by a range of hardy mesic small trees such as Black Wattle (<i>Callicoma serratifolia</i>), Cheese Tree (<i>Glochidion ferdinandi</i>) and Grey Myrtle (<i>Backhousia myrtifolia</i>). A sparse cover of emergent eucalypts is common with samples identifying Bangalay (<i>Eucalyptus botryoides</i>) near Holsworthy though more commonly it is the closely related Swamp Mahogany (<i>Eucalyptus robusta</i>) that occurs sometimes with Cabbage Gum (<i>Eucalyptus amplifolia</i>). At times the eucalypt canopy may be absent. Light is mostly excluded from the forest floor and as result there is only a sparse cover of sedges, ferns and grasses. Local swampy depressions may favour sedge species over grasses and ferns. This community is found on low lying alluvial flats of the Hawkesbury–Nepean, Parramatta and Georges River systems. Only small stands remain in the SMCMA area, with more extensive areas situated near the Hawkesbury River. Most frequently found near backswamps in the narrow headwaters and inlets of alluvial flats not far from major waterways. Most remnants are situated at the interface with sandstone escarpments and as a result species typical of the surrounding community may be included.	 Clearing has depleted much of the original extent of this community in the SMCMA and across its range. Remnants occur in the SMCMA in a highly urbanised environment. This presents significant issues associated with stormwater pollution, altered drainage, rubbish dumping and weed invasion. Evidence of disturbance is present in all remaining stands. 	 Representative EEC: Swamp Sclerophyll Forest on Coastal Floodplains Anticipated that this community is 15-30% cleared in the Sydney Basin
	Location within study area (see Figures 0.04 – 0.09) This representation community is located at reprint to be strong within		
	I his vegetation community is located at various locations within the study area including along the low lying area at the entrance		

Vegetation Community	Description	Threats	Values
	of Mill Creek, Little Salt Pan Creek, Salt Pan Creek. Georges River National Park at Alfords Point, Great Moon Bay, Edith Bay, Gungah Bay and Towra Point Nature Reserve.		
Hinterland Sandstone Gully Blackbutt-Apple Forest	This vegetation community is found in the enriched sandstone gullies of the western Woronora Plateau and the tributaries of the Georges River between Wilton and Sandy Point. This moderately tall eucalypt forest is typically dominated by Smoothbarked Apple (<i>Angophora costata</i>) and Blackbutt (<i>Eucalyptus pilularis</i>) with Red Bloodwood (<i>Corymbia gummifera</i>) as common though less abundant. Grey Gum (<i>Eucalyptus punctata</i>) may also be locally common. Just under the canopy cover there is often a sparse layer of tall casuarinas with an understorey of dry shrubs, ferns and forbs. The shrub layer is sparse and sclerophyllous and includes tea-trees, banksias, wattles, geebungs, grevilleas and peas. Location within study area (see Figures 8.6a – 8.6g) This vegetation community is distributed along the middle region of the study area, extending from Deadman's Creek, downstream to Lime Kiln Bay.	 The majority of this community is not threatened by urban development Clearing has occurred on the foreshores of the Georges River and upper slopes and crests in the Wedderburn area Military activity in the Holsworthy Defence Area may present localised impacts Frequent fire arising from arson is also present along the western perimeter of the distribution Weed invasion - Fireweed (<i>Senecio madagascariensis</i>) was commonly recorded 	- Well represented in Georges River National Park and Dharawal State Recreation Area
Hinterland Sandstone Transition Grey Gum Forest	Found on the broad ridges associated with Mittagong Formation sandstone in the western stretches of the Woronora Plateau between Appin and Holsworthy. These bedrocks form interbanding layers of shale and sandstone material that erode to a sandy soil with a gentle shale influence. Often the presence of shale soil is not obvious as sites often include sandstone benching or outcropping. Forms a moderately tall open eucalypt forest dominated by Grey Gum (<i>Eucalyptus punctata</i>) and Red Bloodwood (<i>Corymbia gummifera</i>) with one of a number of stringybarks (commonly <i>Eucalyptus oblonga</i>) as a regular associate. A sparse small tree layer of casuarina (<i>Allocasuarina littoralis/ Allocasuarina torulosa</i>) is common. Local stands of Blackbutt (<i>Eucalyptus pilularis</i>) are found close to residual shale caps or near sheltered slopes and gullies or at the narrowing end of broad Mittagong sandstone ridges. The understorey is typically shrubby with a diverse mix of plants common on sandstone soils including wattles, tea-trees, banksias and geebungs. Unlike sandstone	 Threats are moderate. Past clearing has depleted about one third of its original extent. Remaining areas are contiguous along the ridges on either side of the Georges and Nepean Rivers in Campbelltown where there are increasing urban pressures. Existing stands are under continuous pressure from physical damage arising from recreational activities, rubbish dumping, grazing, mowing and weed invasion (NSW Scientific Committee 1998a). Frequent fire is also likely to represent an emerging threat. 	 Representative EEC: Shale Gravel Transition Forest in the Sydney Basin Bioregion Anticipated that this community is 20-40% cleared in the Sydney Basin

Vegetation Community	Description	Threats	Values
Sydney Foreshores Shale Forest	 woodlands however, the ground layer supports a relatively number of grass species of which Kangaroo Grass (<i>Themeda australis</i>) and Spear Grass (<i>Austrostipa pubescens</i>) are indicative of the presence of shale in the soil. Location within study area (see Figures 8.6a – 8.6g) This vegetation community is located along the Georges River just upstream of its confluence with Deadmans Creek and at entrance to Mill Creek. Sydney Foreshores Shale Forest is restricted to the Sydney region where it occurs at elevations between 6 and 20 metres above sea level and where mean annual rainfall exceeds 1100 millimetres. Patches are small and discontinuous, often surrounded by sandstone forests and woodlands. It is found on localised patches of shale enriched sandstone which occur on crests and slopes of minor sandstone scarps adjoining the coastal waterways of Sydney. It is a tall open eucalypt forest with a sparse shrub layer and a dense cover of graminoids (grasses, rushes and sedges). The canopy generally includes Grey Gum (<i>Eucalyptus punctata</i>) and smooth-barked apple (Angophora costata) while Forest Red Gum (<i>Eucalyptus tereticornis</i>) may dominate locally. Often the shrub and small tree layer is only a sparse cover of wattles or casuarinas. In contrast the ground cover is characterised by dense clumps of Spiny-headed Mat-rush (<i>Lomandra longifolia</i>) above a low cover of other grasses and herbs. Location within study area (see Figures 8.6a – 8.6g) 	 Threats are moderate. The extent of past clearing is difficult to determine as this forest is associated with shale lenses and caps that are not discernable from available soil or geology mapping. This naturally rare forest is likely to have been cleared for waterside urban development in the lower reaches of the Parramatta, Georges and Hacking Rivers. Remnants are exposed to high impacts arising from weed infestation and recreational pressures given their proximity to the urban interface. 	- Representative EEC: Sydney Turpentine-Ironbark Forest
	A small amount of this vegetation community is located at Gungah Bay.		
Sydney Turpentine- Ironbark Forest	The forest is characterised by an open layer of mesic and sclerophyllous shrubs and small trees with a grassy ground cover. The composition of the canopy is variable depending on location and substrate. Typically it is recognised by an upper stratum of Turpentine (<i>Syncarpia glomulifera</i>), Red Mahogany (<i>Eucalyptus resinifera</i>) and various ironbarks species (of which <i>Eucalyptus paniculata</i> most often recorded). On the north shore these forests are found on shale enriched sheltered sandstone	 NSW Scientific Committee (1998b) consider that remnants are small and scattered. Identified threats include: clearing, physical damage from recreational activities, rubbish dumping, grazing, mowing, weed invasion. 	 Representative EEC: Sydney Turpentine-Ironbark Forest Anticipated that this community is <approximately 90% cleared in the Sydney Basin</approximately

Vegetation Community	Description	Threats	Values
	slopes where ironbark species are far less frequently recorded. Instead Blackbutt (<i>Eucalyptus pilularis</i>) is more common.		
	A tall open forest found on shale and shale enriched sandstone soils on the coast and hinterland of Sydney. It has been extensively cleared but was once widely distributed between Sutherland and the Hornsby Plateau with outlying examples found on shale rich deposits at Campbelltown, Menai, Kurrajong and Heathcote. The primary distribution of this forest occurs in areas receiving between 900 and 1250 millimetres of mean annual rainfall and at elevations between 10 and 180 metres above sea level. Some sites near Campbelltown receive less rainfall, but occur deep in a shale enriched sandstone gullies.		
	Location within study area (see Figures 8.6a – 8.6g)		
	A small amount of this vegetation community is located at Gungah Bay.		
Woronora Sandstone Exposed Bloodwood Woodland	This exposed sandstone vegetation community has a low growing open eucalypt canopy with a dense shrub layer and an open ground cover comprised of sedges and forbs. Common dominant tree species include Red Bloodwood (<i>Corymbia</i> <i>gummifera</i>), Stringybark (<i>Eucalyptus oblonga</i>) and Scribbly gums (<i>Eucalyptus racemosa/Eucalyptus haemastoma complex</i> <i>and Eucalyptus sclerophylla</i>). On the edges of the Georges River Grey Gum (<i>Eucalyptus punctata</i>) may be prominent.	 Urban development Frequent fire from arson occurs near the perimeter of the urban areas in the Georges River catchment Unformed motorbike trails are commonly found across the distribution of the community 	 Represented in Dharawal, Heathcote and Georges River reserves
	The shrub layer includes a diverse mix of common sandstone heath species such as banksias, wattles, teatrees, hakeas and conesticks		
	Location within study area (see Figures 8.6a – 8.6g)		
	This vegetation community extends from near the confluence of the Georges River and Deadmans Creek downstream to Shipwrights Bay, and includes the tributaries of Mills Creek, Little Saltpan Creek and Salt Pan Creek.		

Table 8.20 Weed species recorded during field investigation

Family	Scientific Name	Common Name	Location
APIACEAE	Foeniculum vulgare	Fennel	Harris Creek (nth side) Salt Pan Creek (east side – old tip site)
APIACEAE	Hydrocotyle bonariensis	American pennywort	Towra Point – Oyster Depot
ASPARAGACEAE	Asparagus aethiopicus	Asparagus Fern	Salt Pan Creek (east side) Towra Point – Oyster Depot
ASTERACEAE	Bidens pilosa	Cobblers pegs	Salt Pan Creek (east side) Towra Point – Oyster Depot
ASTERACEAE	Taraxacum officinale	Dandelion	Salt Pan Creek (east side) Salt Pan Creek (east side – old tip site)
BASELLACEAE	Anredera cordifolia	Madeira Vine	Harris Creek (nth side) Salt Pan Creek (west side)
BIGNONIACEAE	Jacaranda mimosifolia	Jacaranda	Near Liverpool Weir (south side)
CACTACEAE	Opuntia stricta	Common Prickly Pear	Near Liverpool Weir (south side)* Bulba Gong Island*
COMMELINACEAE	Tradescantia fluminensis	Wandering Jew	Towra Point – Oyster Depot
CONVOLVULACEAE	Ipomoea indica	Morning Glory	McMillian Park Prospect Creek (Fairfield side)
EUPHORBIACEAE	Ricinus communis	Castor Oil Plant	Salt Pan Creek (east side – old tip site)*
JUNCACEAE	Juncus acutus	Sharp Rush	Beauty Point
LAURACEAE	Cinnamomum camphora	Camphor Laurel	Vegetation island between Liverpool Sewage Treatment Plant and McMillian Park
NYCTAGINACEAE	Bougainvillea glabra	Bougainvillea	Prospect Creek (Fairfield side)
OCHNACEAE	Ochna serrulata	Mickey Mouse Plant	Harris Creek (nth side)

Family	Scientific Name	Common Name	Location
OLEACEAE	Ligustrum sinense	Small-leaved Privet	Cabramatta Creek (Fairfield side)* Harris Creek (both sides)
OLEACEAE	Olea europaea subsp. cuspidata	African Olive	Towra Point – Oyster Depot*
PLANTAGINACEAE	Plantago lanceolata	Lamb's Tongues	Salt Pan Creek (east side – old tip site)
POACEAE	Briza maxima	Quaking Grass	Salt Pan Creek (east side)
POACEAE	Pennisetum clandestinum	Kikuyu Grass	Harris Creek (nth side)
POLYGONACEAE	Acetosa sagittata	Rambling Dock	Cabramatta Creek (Fairfield side) Salt Pan Creek (west side)
SAPINDACEAE	Cardiospermum grandiflorum	Balloon Vine	Harris Creek (nth side) McMillian Park Cherrybrook Park Cabramatta Creek (Liverpool side) Prospect Creek (both side) Towra Point – Oyster Depot
SOLANACEAE	Cestrum parqui	Green cestrum	Salt Pan Creek (east side – old tip site)*
SOLANCEAE	Solanum mauritianum	Wild Tobacco Bush	Cabramatta Creek (Liverpool side)
URTICACEAE	Parietaria judaica	Asthma weed/Pellitory	Salt Pan Creek (east side)*
VERBENACEAE	Lantana camara	Lantana – Liverpool, Fairfield	Riparian edge next to Liverpool Sewage Treatment Plant* McMillian Park* Cherrybrook Park (Liverpool side) (and south of Warwick Farm Racecourse)* South Park (Liverpool)* Cabramatta Creek (Fairfield side)*

Family	Scientific Name	Common Name	Location
			Bulba Gong Island (Liverpool)*
			Prospect Creek (Bankstown side)*
			Salt Pan Creek (east side)*
			Beauty Point*
			Towra Point – Oyster Depot*
VERBENACEAE	Verbena sp.	Purpletop	Salt Pan Creek (west side)

* This species has been declared as a noxious weed within LGA.