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Notice of and reasons for Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion as a CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY in Part 1 of Schedule 2 of the Act and to remove the Sydney Turpentine-Ironbark Forest from Part 2 of Schedule 2 of the Act. Listing of ecological communities is provided for in Part 4 of the Act.

Summary of Conservation Assessment

Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion is eligible for listing as Critically endangered, as the highest threat category met by the community across all categories, under Clauses 4.9 (a), 4.11 (a) and 4.12 (a) because the community has: i) undergone a very large reduction in geographic distribution; ii) experienced a very large degree of environmental degradation; and iii) experienced a very large disruption of biotic processes and interactions.

This determination contains the following information:

Parts 1 & 2: Section 1.6 of the Act defines an ecological community as “an assemblage of species occupying a particular area”. These features of Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion are described in Parts 1 and 2 of this Determination, respectively.

Part 3: Part 3 of this Determination describes the eligibility for listing of this ecological community in Part 1 of Schedule 2 of the Act according to criteria prescribed by the *Biodiversity Conservation Regulation 2017*.

Part 4: Part 4 of this Determination provides additional information intended to aid recognition of this community in the field.

Part 1. Assemblage of species

1.1 Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (hereafter referred to as Sydney Turpentine-Ironbark Forest) is characterised by the assemblage of species listed below.

Acacia falcata
Acacia floribunda
Acacia implexa
Acacia longifolia
Acacia parramattensis
Adiantum aethiopicum
Allocasuarina torulosa
Angophora costata
Anisopogon avenaceus
Aristida vagans
Arthropodium milleflorum
Austrostipa pubescens
Austrostipa rudis
Billardiera scandens
Breynia oblongifolia
Brunoniella australis
Brunoniella pumilio
Bursaria spinosa
Cayratia clematidea
Centella asiatica
Cheilanthes sieberi
Clematis aristata

Clematis glycinoides var. *glycinoides*
Commelina cyanea
Denhamia silvestris
Desmodium varians
Dianella longifolia
Dichelachne rara
Digitaria parviflora
Doodia aspera
Echinopogon ovatus
Elaeocarpus reticulatus
Entolasia stricta
Eucalyptus fibrosa
Eucalyptus notabilis
Eucalyptus pilularis
Eucalyptus resinifera subsp. *resinifera*
Eustrephus latifolius
Gahnia aspera
Glochidion ferdinandi var. *ferdinandi*
Glycine microphylla
Gonocarpus tetragynus
Goodenia heterophylla
Hibbertia diffusa
Imperata cylindrica
Kennedia rubicunda
Lepidosperma laterale
Lindsaea microphylla
Lomandra longifolia
Myrsine variabilis
Opercularia hispida
Oplismenus aemulus
Oxalis exilis
Pandorea pandorana
Paspalidium distans
Persoonia linearis
Pittosporum undulatum
Poa sieberiana var. *sieberiana*
Pomaderris intermedia
Pratia purpurascens
Pultenaea villosa
Rumex brownii
Sigesbeckia orientalis subsp. *orientalis*
Smilax glyciphylla
Syncarpia glomulifera subsp. *glomulifera*
Trema tomentosa var. *viridis*
Veronica plebeia
Clerodendrum tomentosum
Daviesia ulicifolia
Desmodium rhytidophyllum
Dianella caerulea
Dichelachne inaequiglumis
Dichondra spp.
Dodonaea triquetra
Echinopogon caespitosus var. *caespitosus*
Einadia hastata
Entolasia marginata
Eucalyptus acmenoides
Eucalyptus globoidea
Eucalyptus paniculata subsp. *paniculata*
Eucalyptus punctata
Eucalyptus saligna X *E. botryoides*
Exocarpos cupressiformis
Geranium solanderi var. *solanderi*
Glycine clandestina
Glycine tabacina
Goodenia hederacea subsp. *hederacea*
Hibbertia aspera subsp. *aspera*
Hydrocotyle sibthorpioides
Indigofera australis
Kunzea ambigua
Leucopogon juniperinus
Lomandra filiformis subsp. *filiformis*
Microlaena stipoides
Notelaea longifolia forma *longifolia*
Opercularia varia
Oplismenus imbecillis
Ozothamnus diosmifolius
Panicum simile
Passiflora herbertiana subsp. *herbertiana*
Pittosporum revolutum
Poa affinis
Polyscias sambucifolia
Poranthera microphylla
Pseuderanthemum variabile
Rubus parvifolius
Sarcopetalum harveyanum
Smilax australis
Solanum prinophyllum
Themeda triandra
Tylophora barbata
Zieria smithii

1.2 The total species list of the community across all occurrences is likely to be considerably larger than that given above. Due to variation across the range of the community, not all of the above species are present at every site and many sites may also contain species not listed above. Annual species and geophytes may not be detectable at certain times of the year such as the cooler months.

Characteristic species may be abundant or rare and comprise only a subset of the complete list of species recorded in known examples of the community. Some characteristic species show a high fidelity (are relatively restricted) to the community, but may also occur in other communities, while others are more typically found in a range of communities.

The number and identity of species recorded at a site is a function of sampling scale and effort. In general, the number of species recorded is likely to increase with the size of the site and there is a greater possibility of recording species that are rare in the landscape.

Species presence and relative abundance (dominance) will vary from site to site as a function of environmental factors such as soil properties (chemical composition, texture, depth, drainage), topography, climate and through time as a function of disturbance (*e.g.* fire, logging, grazing) and weather (*e.g.* flooding, drought, extreme heat or cold).

At any one time, above ground individuals of some species may be absent but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.

The species listed above are vascular plants, however the community also includes micro-organisms, fungi and cryptogamic plants as well as vertebrate and invertebrate fauna. These components of the community are less well documented.

Part 2. Particular area occupied by the ecological community

2.1.1 The assemblage of species listed in Part 1.1 above which characterises the Sydney Turpentine-Ironbark Forest occurs within the Sydney Basin Bioregion. This Bioregion is defined by SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities. http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html

2.2 It is the intent of the NSW Threatened Species Scientific Committee that all occurrences of the ecological community (both recorded and as yet unrecorded, and independent of their condition) that occur within this bioregion be covered by this Determination.

Part 3. Eligibility for listing

3.1 Reasons for determining eligibility for listing

3.1.1 Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (STIF) is listed as an Endangered Ecological Community under the *Biodiversity Conservation Act 2016*. Since the original listing new data have become available and the NSW Threatened Species Scientific Committee has undertaken a review of the conservation status of the ecological community to inform the current listing status under the Act.

3.1.2 Sydney Turpentine-Ironbark Forest corresponds to the community referred to by this name in Benson and Howell (1990) and includes vegetation occurring on the Hornsby Plateau, the eastern Cumberland Lowlands and the northern Woronora Plateau physiographic regions (*sensu* Chapman and Murphy 1989). This vegetation was described as map unit 9o by Benson (1992) and Benson and Howell (1994). More recent field surveys have shown that the community also occurs near the south eastern margin of the Cumberland Plain as described by NSW OEH (2013ab) (map unit S_WSF09), and to the south west and north west of the Cumberland Plain as described by Tozer *et al*. (2010) (map unit WSF p87). Sydney Turpentine-Ironbark Forest includes map units 15 and 43 of Tozer (2003). Sydney Turpentine-Ironbark Forest falls within the Northern Hinterland Wet Sclerophyll Forests Class of Keith's (2004) Wet Sclerophyll Forest Formation (OEH 2013b).

3.1.3 Sydney Turpentine-Ironbark Forest has undergone a very large reduction in distribution. Clearing of STIF for agricultural development commenced in the inner west of Sydney soon after European settlement and accelerated following the expansion of Sydney's suburbs in the nineteenth and early twentieth centuries (Benson and Howell 1994). Although the pre-European extent of STIF is uncertain, there is general agreement among sources that the reduction in extent exceeds 90%. Tozer (2003) estimated that 30,339 ha of STIF existed prior to European colonisation and approximately 1,183 ha (± 227 ha) remained in 1997 (3.9 ±0.7%), although this estimate was based only on the distribution of STIF on the Cumberland Lowlands and the Hornsby and Woronora Plateaux. Tozer *et al*. (2010) estimated some 2,300 ha of STIF remains, comprising <10% of its original distribution and including STIF occurring to the south west and north west of the Cumberland Plain in the lower Blue Mountains. NSW OEH (2013b) found that the original distribution of STIF was probably higher than 23,000 ha but concurred that less than 10% remains. Additional remnants of STIF have been mapped by BMCC (2003) (a total of 190 ha) and Smith and Smith (2008) (148 ha). Combining these maps with the maps of Tozer et al. (2010) and NSW OEH (2013ab) gives an estimated 2,940 ha of STIF remaining, or less than 10% of Tozer's (2003) estimated original distribution.

3.1.4 The distribution of Sydney Turpentine-Ironbark Forest is highly restricted. The extent of occurrence (EOO) of STIF is 4,479 km^2 based on a minimum convex polygon enclosing known occurrences of the community as interpreted in Sections 4.2 – 4.10 and using the method of assessment recommended by IUCN (Bland *et al.* 2017). The estimated area of occupancy (AOO) is 12 10 km x 10 km grid cells, the scale recommended for assessing AOO by IUCN and applying a minimum occupancy threshold of 1% (Bland *et al.* 2017).

3.1.5 Remnants of Sydney Turpentine-Ironbark Forest are poorly represented in the formal reserve network, and unreserved areas are subject to the threat of vegetation clearing. An estimated 280 ha of STIF (less than 1% of the pre-European extent) is distributed among 15 reserves (with a minimum area of 0.5 ha) under the management of the NSW National Parks and Wildlife Service (Tozer *et al.* 2010; BMCC 2003; Smith and Smith 2008; NSW OEH 2013a). This includes 112 ha in Bargo SCA, 49 ha in Blue Mountains NP, 25 ha in Lane Cove NP and 22 ha in Newington NR. A further 254 ha occurs in Crown Reserves and 36 ha is preserved in perpetuity under Biobanking or Conservation Agreements. The total area under reservation is estimated to be 570 ha, equivalent to less than 2% of the estimated pre-1750 distribution or 20% of the remaining extent.

3.1.6 Remnants of Sydney Turpentine-Ironbark Forest have historically been subjected to a range of anthropogenic disturbances including logging, grazing by domesticated livestock and burning at varying intensities (Benson and Howell 1994). These disturbances have affected the structure and potentially the composition of remnants. For example, the density and average basal diameter of trees in remnants sampled by Benson and Howell (1994) suggested that the removal of large older trees has led to higher densities of smaller trees such that remnants typically have the structure of regrowth forest. Increased fire frequencies associated with hazard reduction burning have led to declines in populations of slow-maturing, fire sensitive species and effected a structural simplification in some remnants of STIF. Conversely, remnants with a long-term history of fire-exclusion, particularly when coupled with increases in nutrient and moisture availability, are characterised by higher densities and cover of mesic species (such as *Pittosporum undulatum*, *Glochidion ferdinandi* and *Homalanthus populifolius*), larger and more diverse populations of exotic species and lower diversity of understorey species (Rose and Fairweather 1997, McDonald *et al*. 2002, Howell 2003). 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' and 'Loss of hollow-bearing trees' are listed as a Key Threatening Processes under the Act.

3.1.7 Remnants of Sydney Turpentine-Ironbark Forest are typically small and fragmented and are susceptible to continuing attrition through clearing for routine land management practices due to the majority of remnants being located in close proximity to rural land or urban interfaces (Benson and Howell 1994; Tozer 2003). Applications to the NSW Land and Environment Court demonstrate that there is ongoing pressure to clear STIF in the course of developing private properties or for the establishment of Asset Protection Zones (https://www.caselaw.nsw.gov.au accessed 19/11/2018). 'Clearing of native vegetation' is listed as a Key Threatening Process under the Act.

3.1.8 Remnants of Sydney Turpentine-Ironbark Forest are subject to ongoing invasion by an extensive range of naturalised plant species. Weed invasion is exacerbated by the proximity of remnants to areas of rural and urban development and the associated influx of both weed propagules from gardens and nutrients contained in stormwater runoff, dumped garden refuse and animal droppings (Leishman 1990, Benson and Howell 1994, Leishman *et al.* 2004, Smith and Smith 2010). Species such as *Ligustrum lucidum* (Large-leafed Privet) and *Ligustrum sinense* (Small-leafed Privet) are highly invasive under conditions of enhanced soil nutrients and have been recorded in at least half of all plots sampling STIF by Tozer (2003). Other frequently recorded species include the shrubs *Ochna serrulata* (Mickey Mouse Plant), *Phytolacca octandra* (Inkweed), *Sida rhombifolia* (Paddy's Lucerne) and *Chrysanthemoides monilifera* (Bitou Bush/Boneseed), the scandent shrubs *Lantana camara* (Lantana) and *Asparagus aethiopicus* (Asparagus Fern), the climbers *Araujia sericifera* (Moth Vine), *Asparagus asparagoides* (Bridal Creeper) and *Hedera helix* (English Ivy) and the grasses *Paspalum dilatatum* (Paspalum), *Ehrhata erecta* (Panic Veldtgrass) and *Setaria parviflora* (Tozer 2003). 'Invasion and establishment of exotic vines and scramblers', 'Invasion, establishment and spread of *Lantana* (*Lantana camara* L. *sens. lat.*)', 'Invasion of native plant communities by *Chrysanthemoides monilifera*', 'Invasion of native plant communities by exotic perennial grasses' and 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants'are listed as Key Threatening Processes under the Act.

3.1.9 The threats to Sydney Turpentine-Ironbark Forest listed above are ongoing and likely to cause continuing declines in geographic distribution and disruption of biotic processes and interactions.

3.2 Criteria for listing

Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion is eligible to be listed as a Critically Endangered Ecological Community in accordance with Part 4 of the Act as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future, as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Clause 4.9 – Reduction in geographic distribution of ecological community
(Equivalent to IUCN criterion A)
Assessment Outcome: Critically endangered under Clause 4.9 (a)

The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of its component species:			
	(a)	for critically endangered ecological communities	a very large reduction in geographic distribution
	~~(b)~~	~~for endangered ecological communities~~	~~a large reduction in geographic distribution~~
	~~(c)~~	~~for vulnerable ecological communities~~	~~a moderate reduction in geographic distribution~~

Clause 4.10 - Restricted geographic distribution of ecological community
(Equivalent to IUCN criterion B)
Assessment Outcome: Endangered under Clause 4.10 (b), (d) (i, ii, iii), e

The ecological community's geographic distribution is:				
	~~(a)~~	~~for critically endangered ecological communities~~		~~very highly restricted.~~
	(b)	for endangered ecological communities		highly restricted.
	~~(c)~~	~~for vulnerable ecological communities~~		~~moderately restricted.~~
and at least 1 of the following conditions apply:				
	(d)	there is a projected or continuing decline in any of the following:		
		(i)	a measure of spatial extent appropriate to the ecological community,	
		(ii)	a measure of environmental quality appropriate to characteristic biota of the ecological community,	
		(iii)	a measure of disruption to biotic interactions appropriate to characteristic biota of the ecological community,	
	(e)	There are threatening processes that are likely to cause continuing decline in either geographic distribution, environmental quality or biotic interactions within the near future,		
	~~(f)~~	~~The ecological community exists at:~~		
		~~(i)~~	~~for critically endangered ecological communities~~	~~an extremely low number of locations.~~

		~~(ii)~~	~~for endangered ecological communities~~	~~a very low number of locations.~~
		~~(iii)~~	~~for vulnerable ecological communities~~	~~a low number of locations.~~

Clause 4.11 – Environmental degradation of ecological community
(Equivalent to IUCN criterion Clause C)
Assessment Outcome: Critically endangered under Clause 4.11 (a)

The ecological community has undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:			
	(a)	for critically endangered ecological communities	a very large degree of environmental degradation.
	~~(b)~~	~~for endangered ecological communities~~	~~a large disruption of biotic processes or interactions.~~
	~~(c)~~	~~for vulnerable ecological communities~~	~~a moderate degree of environmental degradation.~~

Clause 4.12 – Disruption of biotic processes or interactions in ecological community
(Equivalent to IUCN criterion D)
Assessment Outcome: Critically endangered under Clause 4.12 (a)

The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of its component species:			
	(a)	for critically endangered ecological communities	a very large disruption of biotic processes or interactions
	~~(b)~~	~~for endangered ecological communities~~	~~a large disruption of biotic processes or interactions~~
	~~(c)~~	~~for vulnerable ecological communities~~	~~a moderately large disruption of biotic processes or interactions~~

Clause 4.13 – Quantitative analysis of probability of collapse of ecological community
(Equivalent to IUCN criterion E)
Assessment Outcome: Data deficient

The probability of collapse of the ecological community is estimated to be:			
	~~(a)~~	~~for critically endangered species~~	~~extremely high~~
	~~(b)~~	~~for endangered ecological communities~~	~~a large disruption of biotic processes or interactions~~
	~~(c)~~	~~for vulnerable species~~	~~high~~

Dr Marco Duretto
Chairperson
NSW Threatened Species Scientific Committee

Part 4. Additional information about the ecological community

The following information is additional to that required to meet the definition of an ecological community under the Act but is provided to assist in the recognition of the Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (hereafter referred to as the Sydney Turpentine-Ironbark or STIF) in the field. Given natural variability, along with disturbance history, Sydney Turpentine-Ironbark may sometimes occur outside the typical range of variation in the features described below.

4.1 Sydney Turpentine-Ironbark Forest typically has the structural form of Open Forest (*sensu* Specht 1970) with a tree canopy ranging in height from the mid to upper range for this form (10-30 m) and with projected foliage cover at the mid to lower end of the range (30-50%) (Tozer *et al*. 2010). Remnants with a history of logging or other anthropogenic disturbance may resemble woodland or open woodland, with a sparser tree cover associated with lower tree densities and/or the selective removal of larger trees. Examples of STIF undergoing regrowth following tree removal may have higher densities of younger trees, and projected foliage cover at the high end of, or exceeding, the range given above. The dominant tree species include *Syncarpia glomulifera* and *Eucalyptus paniculata*. These species may have been characteristic of the community prior to European settlement but a range of other tree species may co-occur or even dominate STIF as a result of past disturbance or reflecting natural variation in the landscape (Benson and Howell 1994). These include *Eucalyptus globoidea*, *E. punctata*, *E. resinifera*, *E. pilularis* and *Angophora floribunda* (Benson and Howell 1994) and *E. acmenoides* (Tozer 2003). *Eucalyptus saligna* may have occurred locally in gullies or depressions (Benson and Howell 1994) or may be dominant at the upper end of the rainfall range over which STIF occurs (Tozer 2003). STIF is frequently characterised by a stratum of smaller trees which, in addition to saplings of the species listed above, is dominated by species such as *Pittosporum undulatum*, *Acacia parramattensis, Allocasuarina torulosa* and *Elaeocarpus reticulatus* (Tozer *et al*. 2010). The understorey may be either shrubby or grassy (Benson and Howell 1994). Frequently recorded shrub species include *Breynia oblongifolia*, *Bursaria spinosa*, *Denhamia silvestris, Hibbertia aspera* subsp. *aspera*, *Leucopogon juniperinus, Notelaea longifolia* forma *longifolia*, *Ozothamnus diosmifolius*, *Persoonia linearis*, *Pittosporum revolutum*, *Polyscias sambucifolia* (Tozer *et al.* 2010), *Dodonaea triquetra* and *Acacia falcata* (Benson and Howell 1994). Common herbaceous species include *Themeda triandra, Echinopogon caespitosus, Pseuderanthemum variable*, *Pratia purpurascens* (Benson and Howell 1994), *Lomandra longifolia*, *Dianella caerulea*, *Adiantum aethiopicum*, *Billardiera scandens*, *Dichondra* sp., *Echinopogon ovatus*, *Entolasia marginata*, *E. stricta*, *Imperata cylindrica*, *Microlaena stipoides* and *Oplismenus* spp. Climbers such as *Eustrephus latifolius, Glycine clandestina, Kennedia rubicunda, Pandorea pandorana* and *Tylophora barbata* are frequently present (Tozer *et al.* 2010).

4.2 Sydney Turpentine-Ironbark Forest has been reported as occurring in areas receiving moderate rainfall (900-1100 mm) on soils derived either from Wianamatta Shale or from Wianamatta Shale interbedded with Hawkesbury Sandstone (Benson and Howell 1994, Tozer 2003). In most of these locations STIF occurs up to approximately 100 m above sea level although it is found as high as 200 m above sea level on the western edge of the Hornsby Plateau where average annual rainfall falls below 1050 mm (Tozer 2003). Tozer *et al.* (2010) reported a broader range in elevation (up to 500 m a.s.l.) and rainfall (850–1250 mm) for the community in order to accommodate marginal examples at the upper (Heathcote) and lower (Thirlmere, Oakdale, east of Kurrajong) levels of the rainfall range.

Benson and Howell (1994) stated that STIF was the characteristic vegetation of inner western Sydney and was widespread between St Peters and Peakhurst and found as far west as Lansdowne. Sydney Turpentine-Ironbark Forest is also found on the Hornsby Plateau at locations between Ryde – Arcadia – Castle Hill (Benson and Howell 1994), on the Woronora Plateau at Menai and in the Lower Blue Mountains (Tozer *et al.* 2010).

4.3 Sydney Turpentine-Ironbark Forest occurs on low rolling hills characteristic of the Cumberland Lowlands and the broad, shale-capped ridges of the surrounding plateaux. These ridges often transition relatively abruptly to valleys incised into the underlying Hawkesbury Sandstone and in such situations STIF is replaced by Sandstone Ridgetop Woodland or Sandstone Gully Forest (Benson and Howell 1994, Tozer *et al.* 2010). As the depth of the shale cap decreases towards the ridge margin, an increasing component of the STIF flora is shared with adjoining sandstone vegetation communities. These areas correspond to the Turpentine-Ironbark Margin Forest (map unit 43) as described by Tozer (2003).

4.4 In the eastern parts of its range, Sydney Turpentine-Ironbark Forest has been described as a community intermediate between Cumberland Plain Woodland and Blue Gum High Forest along a gradient of increasing rainfall (Benson and Howell 1994). Moisture available for plant growth is determined by a range of factors including the timing and magnitude of rainfall events, soil depth and texture and topographic factors which influence rates of evapotranspiration. Collectively, these factors determine the points of transition between the three communities such that examples of STIF may occur outside the thresholds of annual rainfall described in Section 4.2. In areas where shale shallowly overlies sandstone, or where shale lenses are interbedded with sandstone, STIF intergrades with Shale Sandstone Transition Forest as described by Tozer (2003) and Tozer *et al*. (2010). In the western parts of its range STIF intergrades with Blue Mountains Shale Cap Forest with increasing elevation and rainfall (Benson 1992). The transition is characterised by the addition of *Eucalyptus deanei* and *E. cypellocarpa* as dominant species in association with *Syncarpia glomulifera, E. notabilis, E. globoidea* and *E. paniculata* Benson (1992).

4.5 The transition from Sydney Turpentine-Ironbark Forest to Blue Gum High Forest is associated with an increase in the height and projected foliage cover of the tree canopy and the replacement of *Syncarpia glomulifera* and *Eucalyptus paniculata* with *E. pilularis* and *E. saligna* as the dominant species. Based on plot samples analysed by Tozer *et al*. (2010), species which have been recorded more frequently in Blue Gum High Forest (WSFp153) compared with STIF (WSFp87) include, in decreasing order of diagnostic power*, *Platylobium formosum, Calochlaena dubia, Alphitonia excelsa, Smilax glyciphylla, Morinda jasminoides*, *Blechnum cartilagineum* and *Marsdenia rostrata.* Species which have been recorded more frequently in STIF include, in decreasing order of diagnostic power*, *Clematis glycinoides* var. *glycinoides, Solanum prinophyllum, Glycine microphylla, Bursaria spinosa, Echinopogon caespitosus* var. *caespitosus, Eucalyptus punctata, Acacia parramattensis, Panicum simile, Centella asiatica, Acacia floribunda, Hydrocotyle sibthorpioides, Veronica plebeia, Aristida vagans, Lomandra filiformis* subsp. *filiformis* and *Billardiera scandens*.

[*species listed in sections 4.5 – 4.8 generally occur in more than one of the related communities. Diagnostic power is a measure of the extent to which the records of a species are concentrated in the target community]

4.6 The transition from Sydney Turpentine-Ironbark Forest into Shale Sandstone Transition Forest is associated with a decrease in the height and cover of the tree canopy and the replacement of *Syncarpia glomulifera* and *Eucalyptus paniculata* with *E. crebra*, *E. fibrosa* and, to a lesser extent, *E. eugenioides* and *E. punctata*. Based on plot samples analysed by Tozer *et al*. (2010), species which have been recorded more frequently in Shale Sandstone Transition Forest (GWp2) compared with STIF (WSFp87) include, in decreasing order of diagnostic power*, *Goodenia hederacea* subsp. *hederacea, Allocasuarina littoralis, Lissanthe strigosa, Opercularia diphylla, Austrostipa pubescens, Vernonia cinerea* var. *cinerea, Lomandra filiformis* subsp. *coriacea, Stypandra glauca, Cymbopogon refractus, Laxmannia gracilis, Acacia decurrens, Lagenifera gracilis, Eragrostis brownii, Bossiaea prostrata, Calotis dentex, Jacksonia scoparia, Digitaria ramularis, Dichelachne micrantha, Dianella revoluta* var. *revoluta and Pimelea linifolia* subsp. *linifolia*. Species which have been recorded more frequently in STIF include, in decreasing order of diagnostic power*, *Eustrephus latifolius, Oplismenus imbecillis, Pandorea pandorana, Pittosporum undulatum, Imperata cylindrica, Clematis glycinoides* var. *glycinoides, Pseuderanthemum variabile, Adiantum aethiopicum, Pittosporum revolutum, Angophora costata, Polyscias sambucifolia, Oplismenus aemulus, Centella asiatica, Poa affinis, Denhamia silvestris, Clerodendrum tomentosum, Tylophora barbata, Kennedia rubicunda* and *Hydrocotyle sibthorpioides*.

4.7 Sydney Turpentine-Ironbark Forest is characterised by a number of frequently recorded species which are highly diagnostic of STIF but are much less frequently recorded in samples of the adjacent Sandstone Ridgetop Woodland and Sandstone Gully Forest (map units DSFp131 and DSFp142 of Tozer *et al.* (2010). These include, in decreasing order of diagnostic power*, *Pratia purpurascens, Dichondra* spp*., Eustrephus latifolius, Oplismenus imbecillis, Entolasia marginata, Breynia oblongifolia, Pittosporum undulatum, Bursaria spinosa, Hibbertia aspera* subsp. *aspera, Imperata cylindrica, Clematis glycinoides* var. *glycinoides, Pseuderanthemum variabile, Ozothamnus diosmifolius, Adiantum aethiopicum, Notelaea longifolia* forma *longifolia, Pittosporum revolutum, Solanum prinophyllum, Echinopogon caespitosus* var. *caespitosus, Leucopogon juniperinus, Glycine microphylla, Acacia parramattensis, Oplismenus aemulus, Panicum simile, Myrsine variabilis, Acacia floribunda, Echinopogon ovatus, Themeda triandra, Clerodendrum tomentosum, Tylophora barbata, Veronica plebeia* and *Aristida vagans* (Tozer *et al*. 2010).

4.8 Sydney Turpentine-Ironbark Forest may contain the following threatened animal and plant species listed under the BC Act or Commonwealth EPBC Act:

Plant Species	**Common Name**	**BC Act^**	**EPBC Act+**
Acacia pubescens	Downy Wattle	Vulnerable	Vulnerable
Acacia terminalis subsp. *terminalis*	Sunshine Wattle	Endangered	Endangered
Epacris purpurascens var. *purpurascens*		Vulnerable	
Eucalyptus benthamii	Camden White Gum	Vulnerable	Vulnerable
Grammitis stenophylla	Narrow-leaf Finger Fern	Endangered	
Persoonia mollis subsp. *maxima*		Endangered	Endangered
Pimelea curviflora var. *curviflora*		Vulnerable	Vulnerable
Zieria involucrata		Endangered	Vulnerable

Animal Species			
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered
Epthianura albifrons	White-fronted Chat	Vulnerable	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	
Glossopsitta pusilla	Little Lorikeet	Vulnerable	
Hieraaetus morphnoides	Little Eagle	Vulnerable	
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered
Litoria aurea	Green and Golden Bell Frog	Endangered	Vulnerable
Lophoictinia isura	Square-tailed Kite	Vulnerable	
Miniopterus australis	Little Bentwing-bat	Vulnerable	
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable	
Myotis macropus	Southern Myotis	Vulnerable	
Ninox connivens	Barking Owl	Vulnerable	
Ninox strenua	Powerful Owl	Vulnerable	
Pachycephala olivacea	Olive Whistler	Vulnerable	
Petaurus australis	Yellow-bellied Glider	Vulnerable	
Petaurus norfolcensis	Squirrel Glider	Vulnerable	
Petroica phoenicea	Flame Robin	Vulnerable	
Phascolarctos cinereus	KoalaKoala	Vulnerable	Vulnerable
Pommerhelix duralensis	Dural Land Snail	Endangered	Endangered
Pseudophryne australis	Red-crowned Toadlet	Vulnerable	
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	
Tyto novaehollandiae	Masked Owl	Vulnerable	
Tyto tenebricosa	Sooty Owl	Vulnerable	

^ *Biodiversity Conservation Act* 2016
+ *Environment Protection and Biodiversity Conservation Act 1999*

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