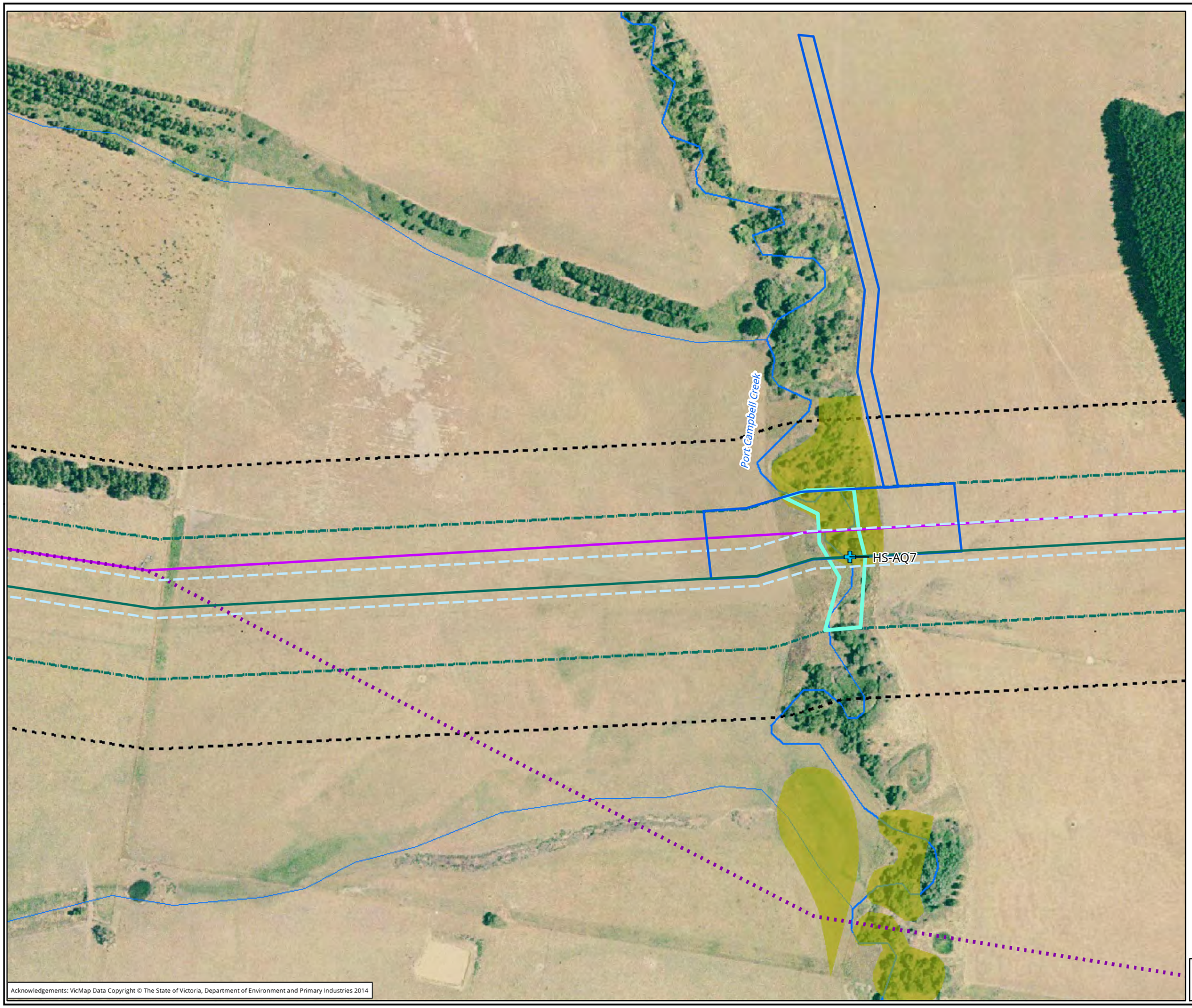

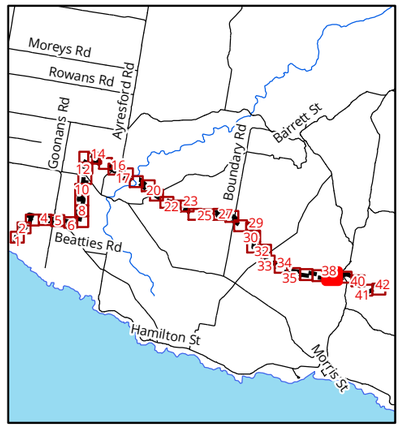

Legend

Proposed MEG Pipeline
- Desktop assessment
- Field assessed 2009/2010
- Alignment 100m buffer
- Field assessed 2010
- Alternate alignment 2010

Ecological Vegetation Class
- Sedgy Riparian Woodland
- Aquatic assessment
- Proposed Burrowing Crayfish buffer

Construction Impact
- Temp construction ROW
- AWS area

Figure 2.38: Ecological features of the study area

0 25 50 75 100 125

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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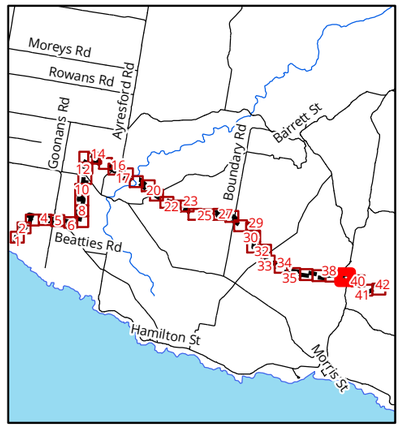
Location:P:\17900s\17973\Mapping
17973_F2_EcoFeatures



Legend

Proposed MEG Pipeline

- Desktop assessment
- Field assessed 2009/2010
- Alignment 100m buffer
- Field assessed 2010
- Alternate alignment 2010

Construction Impact

- Temp construction ROW
- AWS area

Figure 2.39: Ecological features of the study area

0 25 50 75 100 125

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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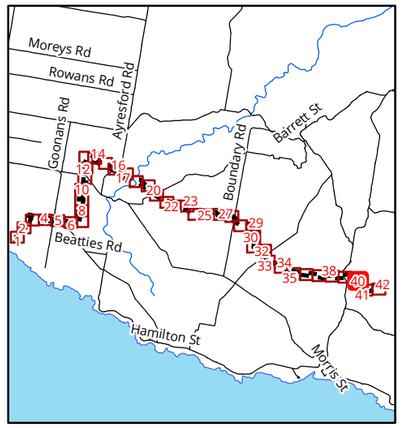

Legend

Proposed MEG Pipeline

- Desktop assessment
- Field assessed 2009/2010
- Alignment 100m buffer
- Field assessed 2010
- Alternate alignment 2010

Construction Impact

- Temp construction ROW

Figure 2.40: Ecological features of the study area

0 25 50 75 100 125

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 29 September 2014,
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Location:P:\17900s\17973\Mapping
17973_F2_EcoFeatures

Legend

Proposed MEG Pipeline

- Desktop assessment
- Field assessed 2009/2010
- Alignment 100m buffer
- Field assessed 2010
- Alternate alignment 2010

Construction Impact

- Temp construction ROW

Figure 2.41: Ecological features of the study area

0 25 50 75 100 125

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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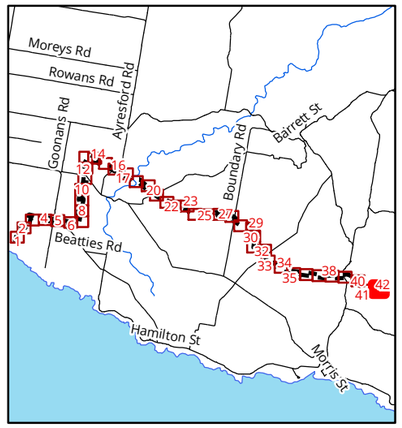
Location:P:\17900s\17973\Mapping
17973_F2_EcoFeatures

Otway Gas plant

Waarre Rd



Legend

Proposed MEG Pipeline
- Desktop assessment
- Field assessed 2009/2010
- Alignment 100m buffer
- Field assessed 2010
- Alternate alignment 2010

Construction Impact
- Temp construction ROW
- AWS area

Figure 2.42: Ecological features of the study area

0 25 50 75 100 125

Metres

Scale: 1:2,500 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Matter: 17973,
Date: 29 September 2014,
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Location:P:\17900s\17973\Mapping
17973_F2_EcoFeatures

Princes Hwy

1 4 7 10
2 5 8 11 13
3 6 9 12 14

Species list

5km buffer on Study area

Rowans Rd
Barrons Rd
Couchs Rd
Bonnetts Rd
Henrys Sawmill Rd
Nullawarre
Rollos Rd
Great Ocean Rd
Timboon - Nullawarre Rd
Kings Rd
MOYNE SHIRE
Hickeys Rd
Hesketh Rd
Hickeys Rd
Baileys Rd
Blakes Rd
Buckley Creek
Buckley Creek
Rollos Rd
Childers Cove Rd

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria

Figure 3.1 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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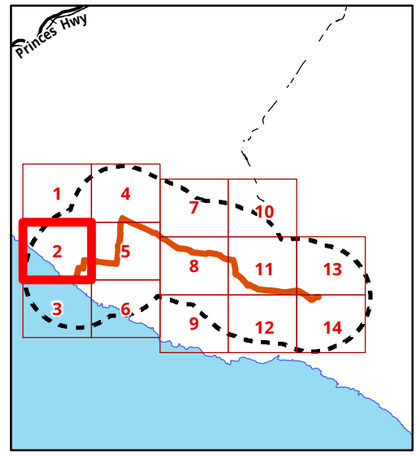
17973_F3_ThrFlora_20140506

Childers Cove Rd
Great Ocean Rd
Springvale
Hesketh Rd
Buckley Creek
Nirranda
3665
3665
3367
Princes Hwy
Cemetery Rd
Blakes Rd
Andersons Rd
Mathiesons Rd
MOYNE
SHIRE
4449
Baileys Rd
Borthwicks Rd
Lanes Rd
3019
3615
1456
3367
1082
3367
1456
3367
1456
2790
3019
1082
2790
3367



Species list

5km buffer on Study area

Nationally significant flora

- 1456 - Clover Glycine
- 2790 - Leafy Greenhood
- 3367 - Metallic Sun-orchid
- 3665 - Short Spider-orchid

State significant flora

- 1082 - Swamp Diuris
- 2839 - Coast Bush-pea
- 3019 - Dune Fan-flower
- 4449 - Slender Pink-fingers

Figure 3.2 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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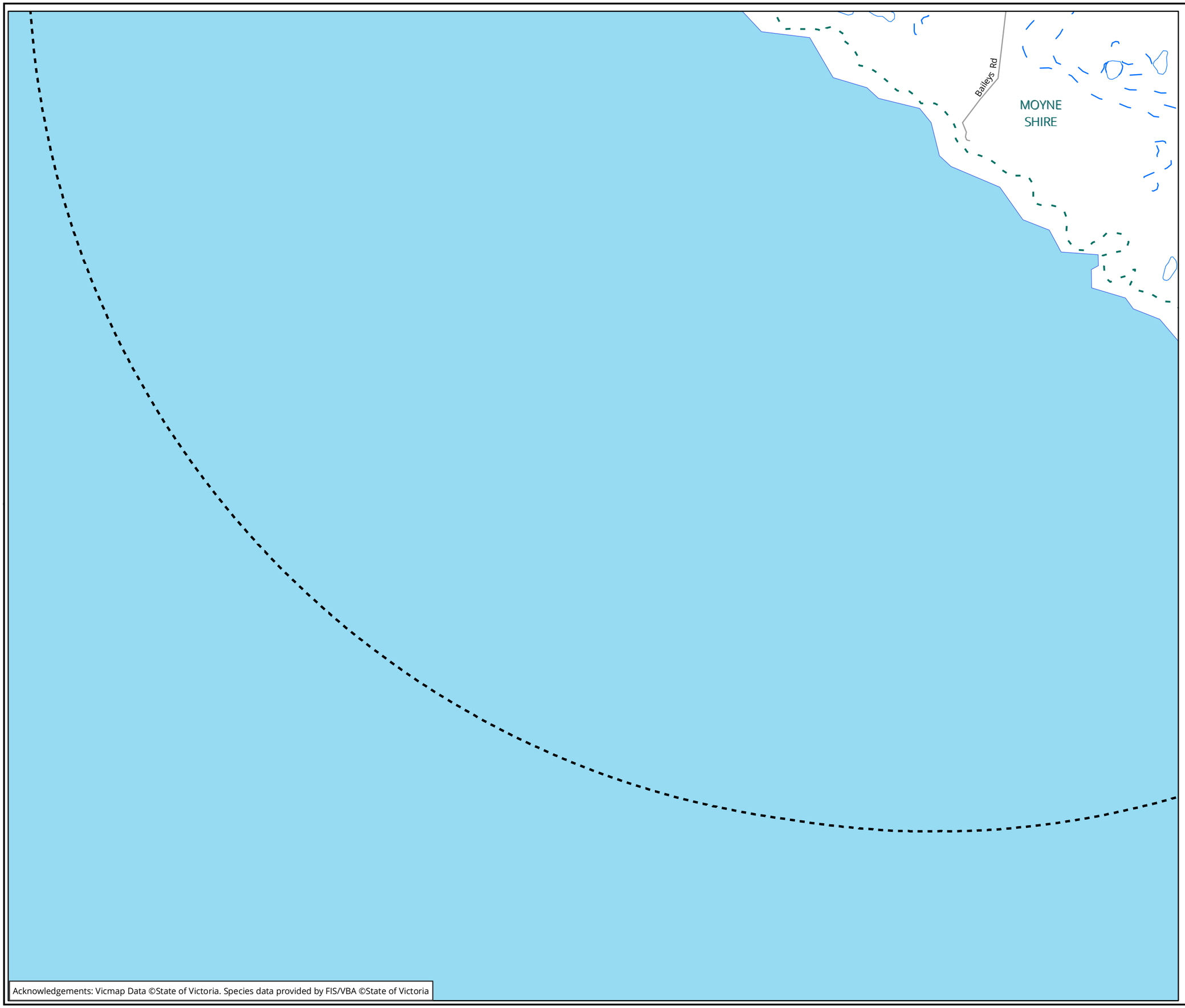

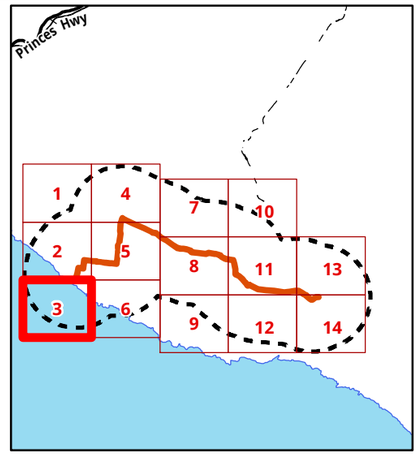

Species list

5km buffer on Study area

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Figure 3.3 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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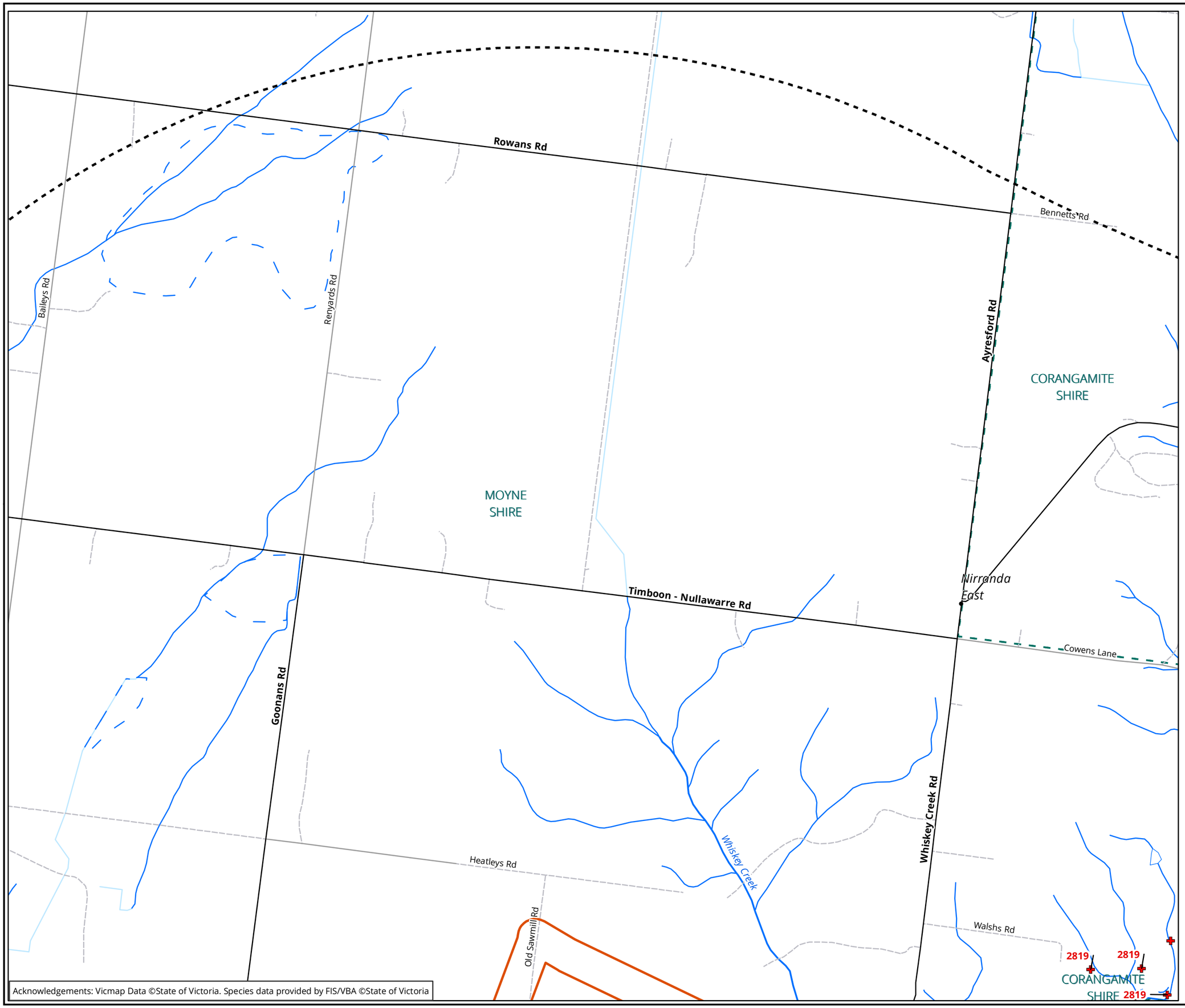

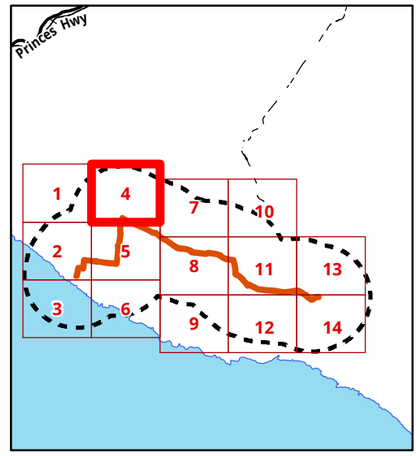

Species list

Study area

5km buffer on Study area

Nationally significant flora

2819 - Swamp Greenhood

State significant flora

4876 - Small Sickle Greenhood

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria

Figure 3.4 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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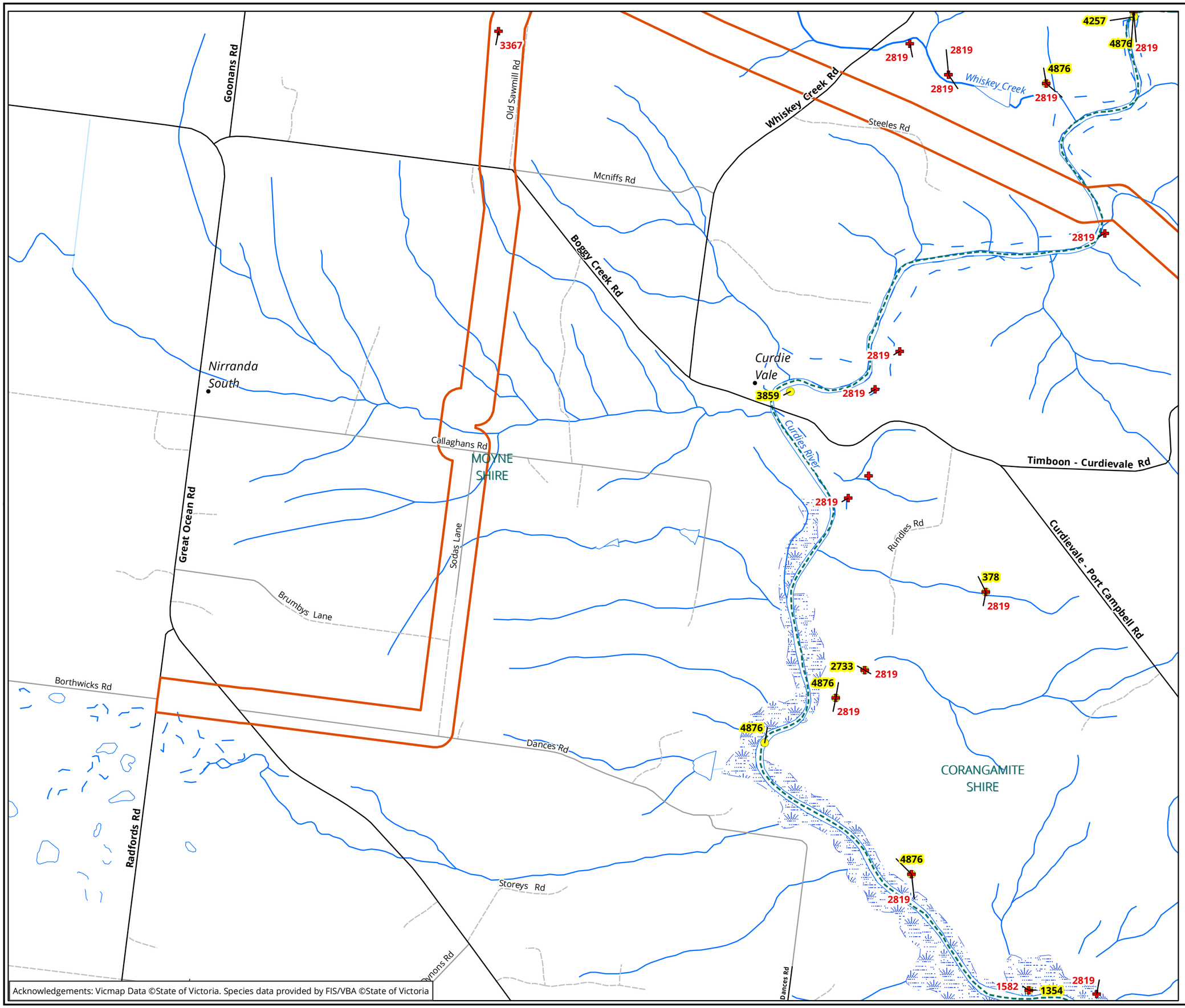

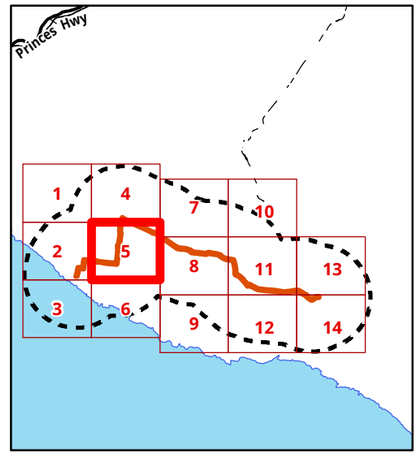

Species list

- Study area
- 5km buffer on Study area

Nationally significant flora

- 1582 - Square Raspwort
- 2819 - Swamp Greenhood
- 3367 - Metallic Sun-orchid

State significant flora

- 1354 - Coast Ballart
- 2733 - Showy Lobelia
- 378 - Lax Twig-sedge
- 3859 - Currant-wood
- 4257 - Small Shade-nettle
- 4876 - Small Sickle Greenhood

Figure 3.5 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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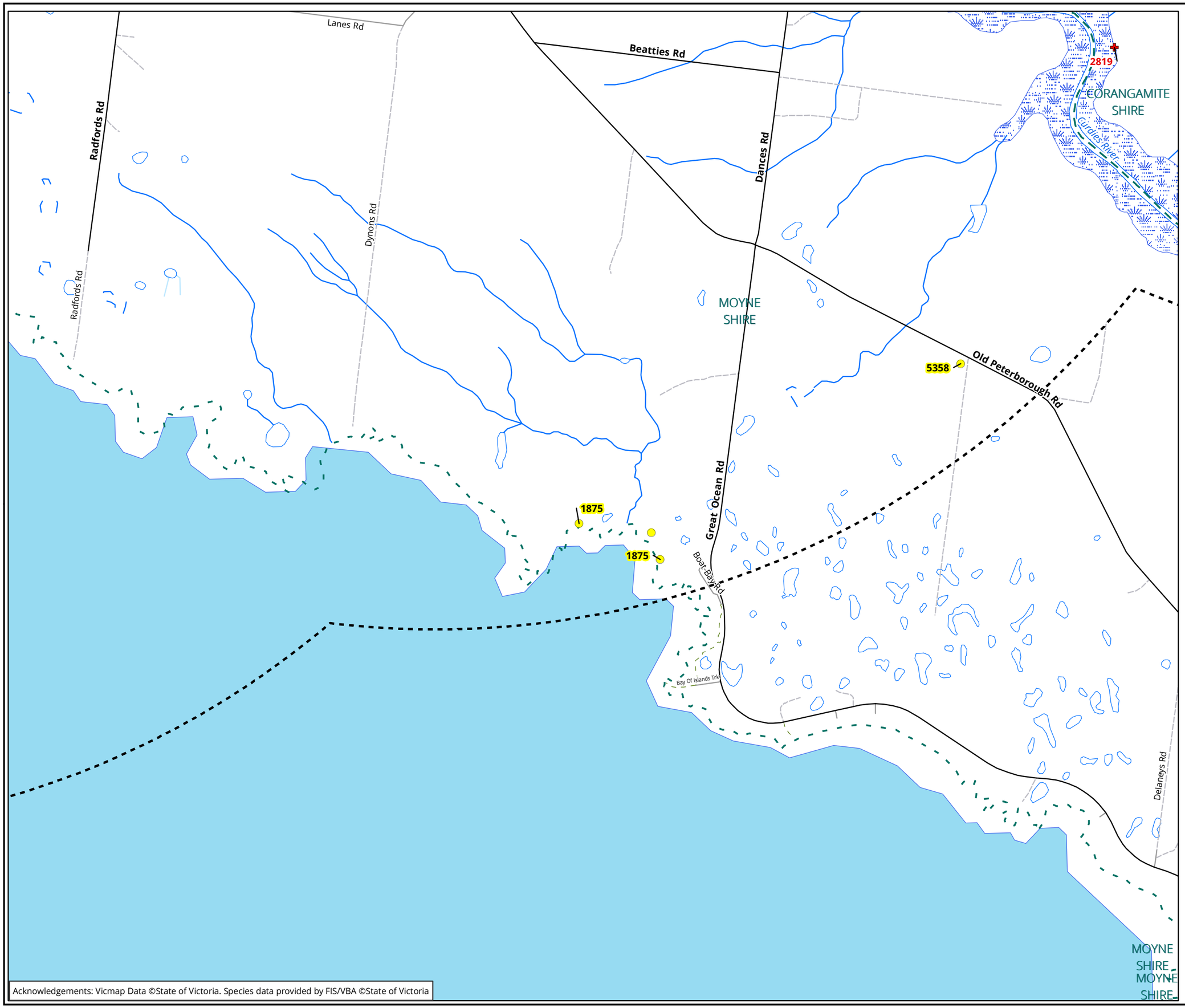

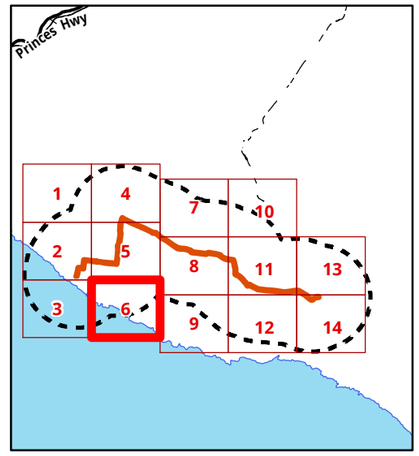

Species list

5km buffer on Study area

Nationally significant flora

2819 - Swamp Greenhood

State significant flora

1875 - Drooping Velvet-bush

5358 - Western Peppermint

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria

Figure 3.6 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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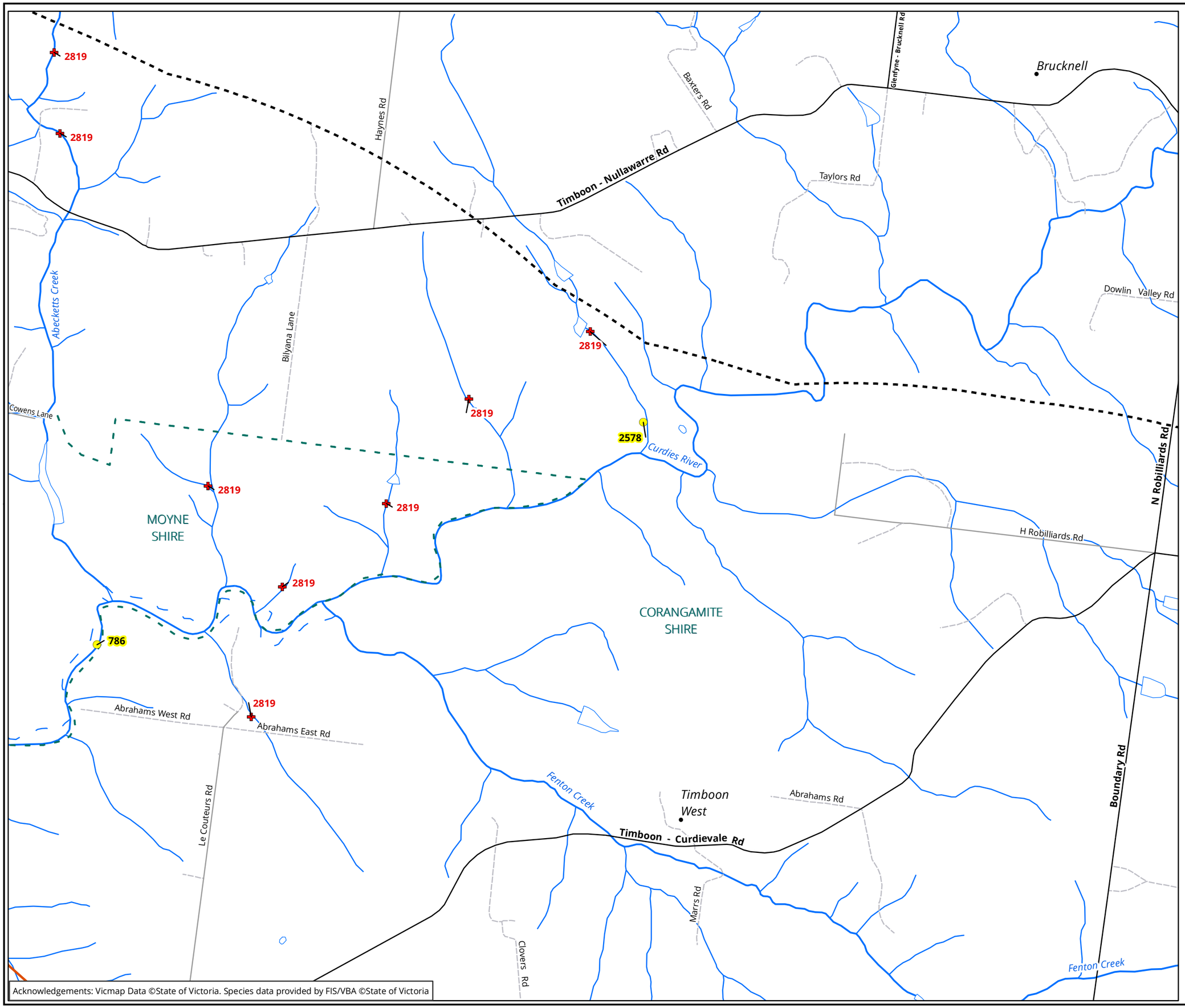

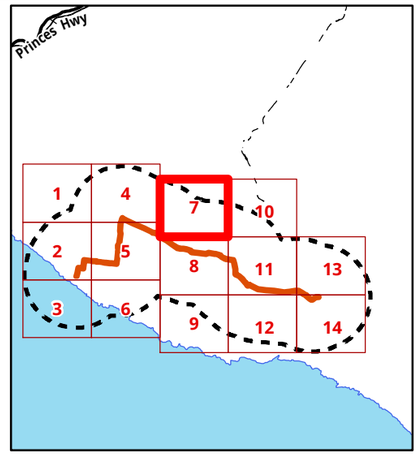

Species list

- Study area
- 5km buffer on Study area

Nationally significant flora

- 2819 - Swamp Greenhood

State significant flora

- 2578 - Lime Fern
- 786 - Leafy Twig-sedge

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria

Figure 3.7 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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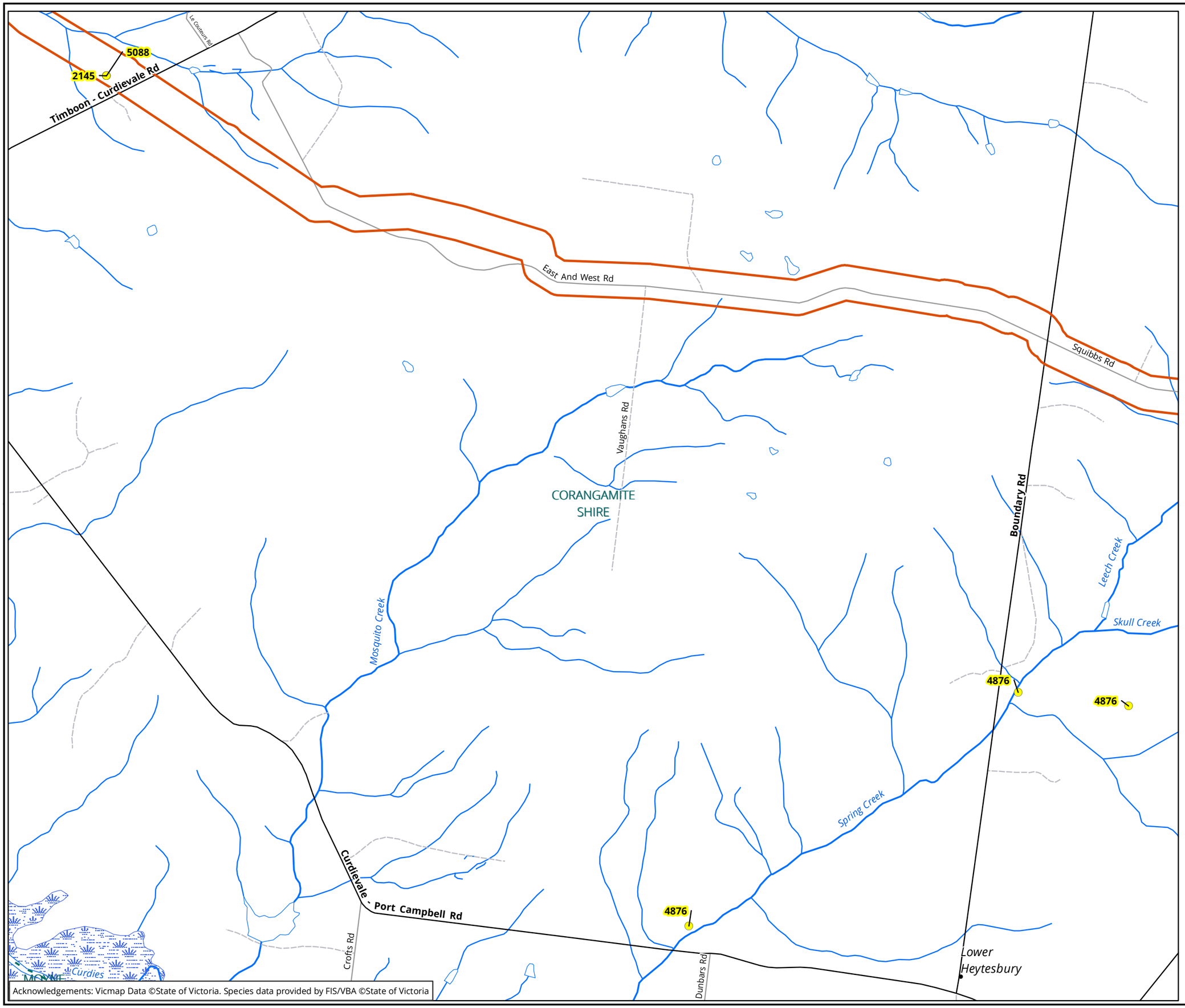

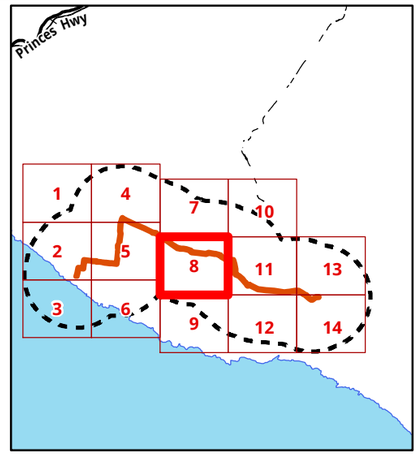

Species list

- Study area
- 5km buffer on Study area

State significant flora

- 2145 - Giant Honey-myrtle
- 4876 - Small Sickle Greenhood
- 5088 - Tufted Grass-tree

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria

Figure 3.8 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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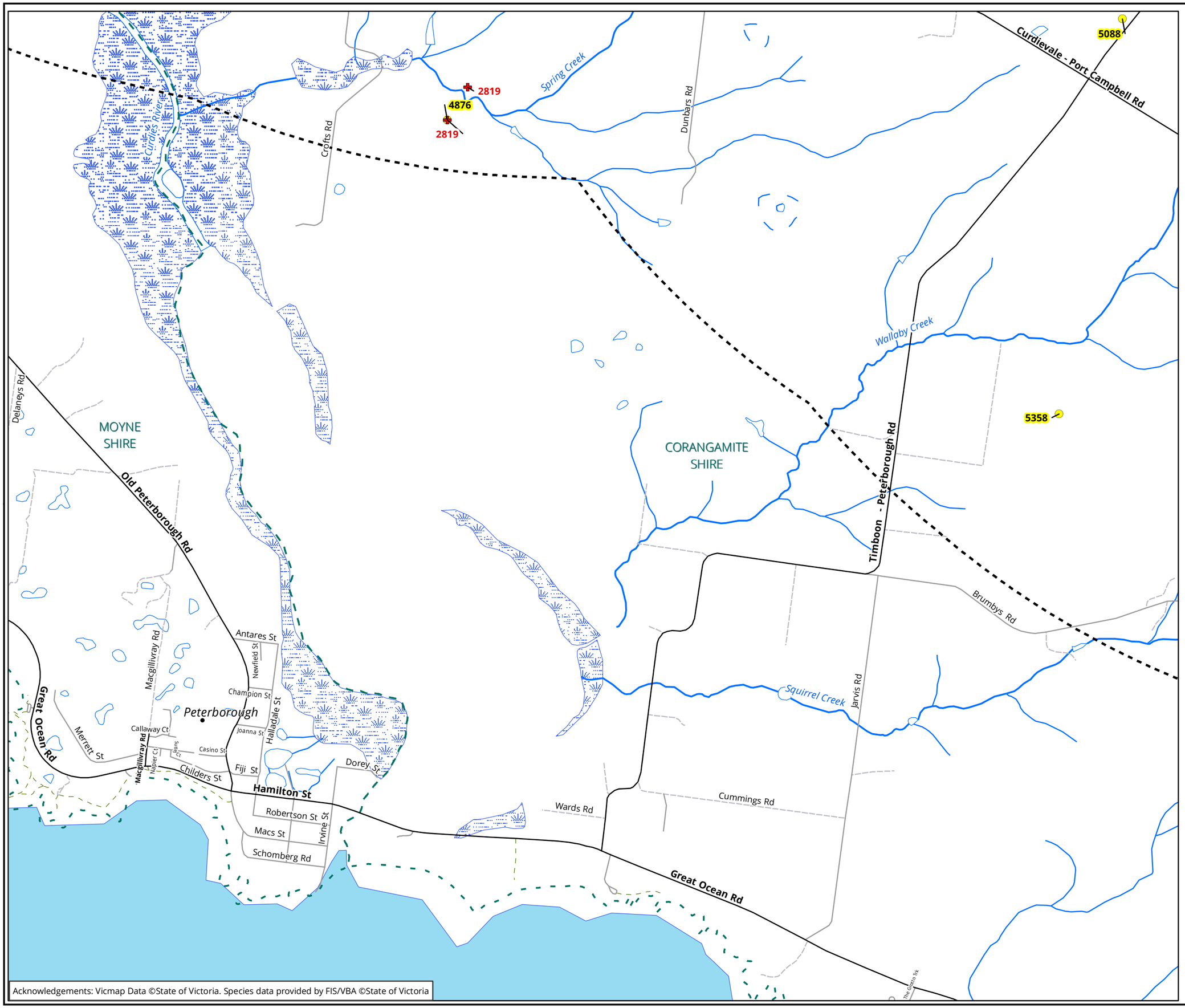

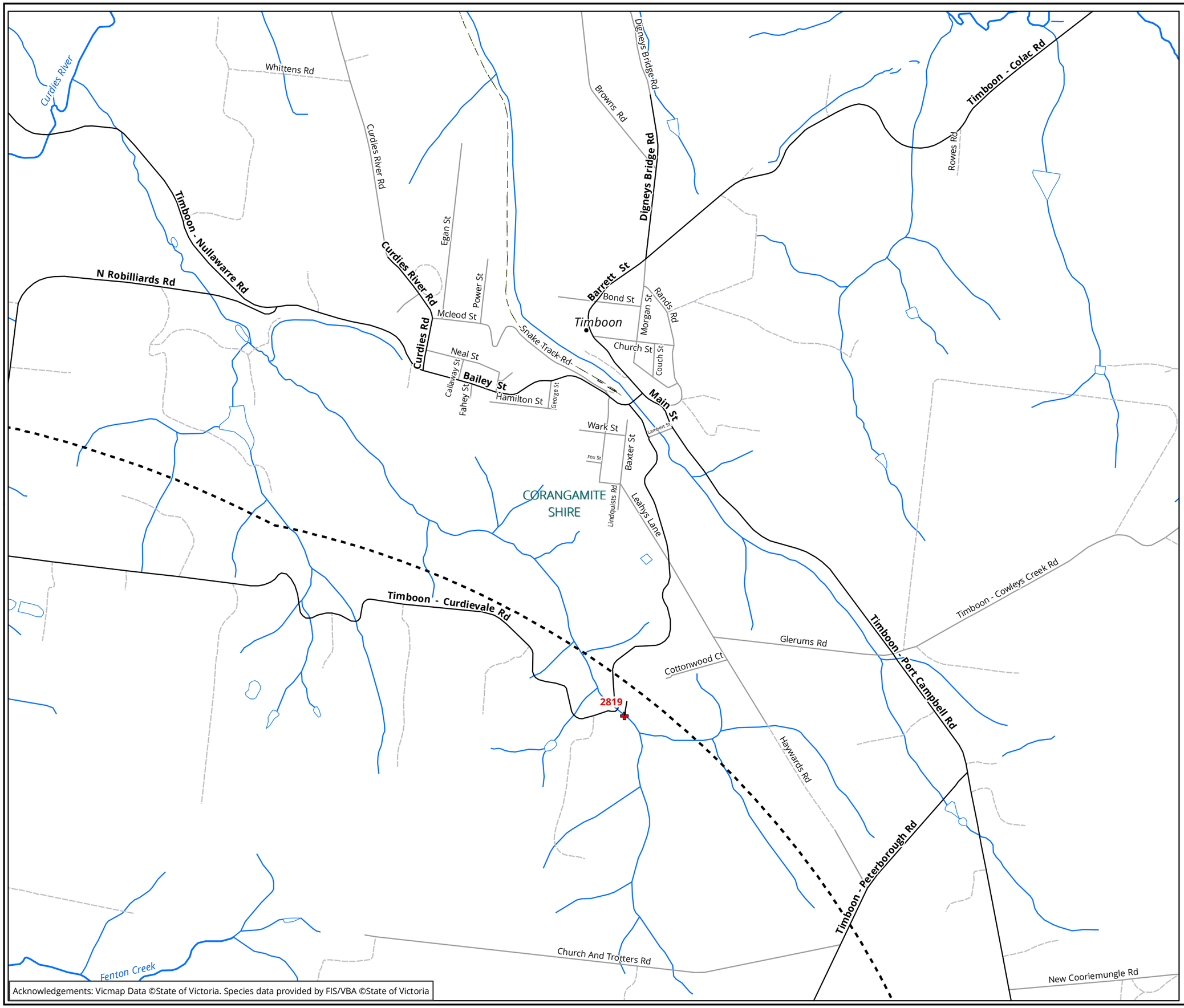

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Species list

5km buffer on Study area

Nationally significant flora

2819 - Swamp Greenhood

Figure 3.10 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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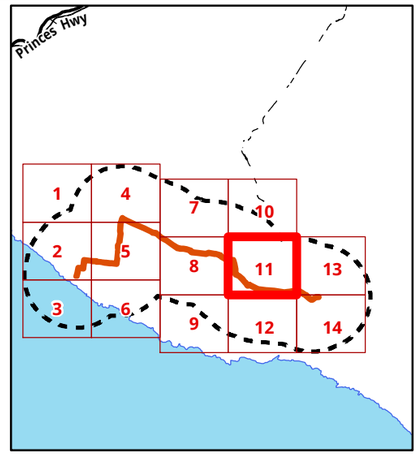
Ford And Fells Rd
Cashmores Rd
Grays Rd
Timboon - Port Campbell Rd
Leech Creek
Squibbs Rd
Paaratte
CORANGAMITE SHIRE
Timboon - Peterborough Rd
Wild Dog Rd
Skull Creek
North South Rd
Port Campbell Creek
Gas Works Rd
Camerons Hill Rd
Cheynes North Rd
Newfield Lane
Newfield
5441
3625
Wallaby Creek
Cheynes South Rd



Species list

- Study area
- 5km buffer on Study area

State significant flora

- 3625 - Wavy Swamp Wallaby-grass
- 5441 - Port Campbell Guinea-flower

Figure 3.11 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres
Scale: 1:20,000 @ A3
Coordinate System: GDA 1994 VICGRID94

N

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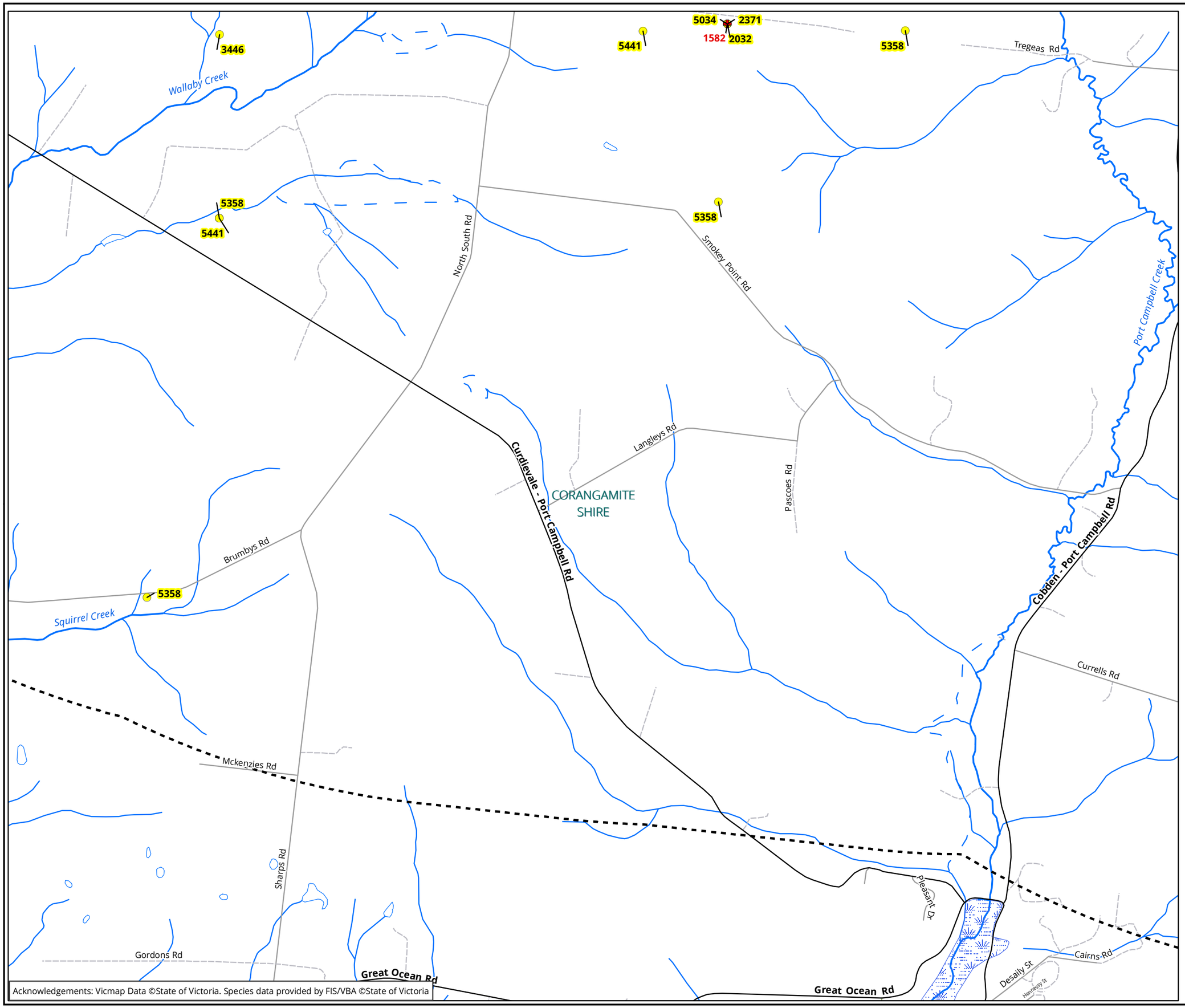

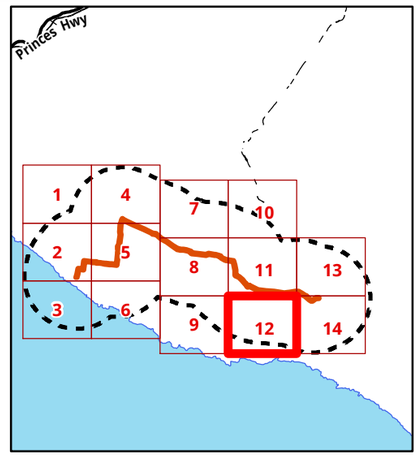

Species list

5km buffer on Study area

Nationally significant flora

1582 - Square Raspwort

State significant flora

2032 - Oval-leaf Logania
2371 - Morning Flag
3446 - Tiny Arrowgrass
5034 - Forest Bitter-cress
5358 - Western Peppermint
5441 - Port Campbell Guinea-flower

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria

Figure 3.12 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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New Cooriemungle Rd
Cowleys Creek
Coorieiong Rd
Princes Hwy
Guys Rd
Bornong Rd
Cooriemungle Creek
2145
Cobden - Port Campbell Rd
Collins Rd
Cooriemungle Rd
Cooriemungle
Boorook Rd
CORANGAMITE SHIRE
Little Cooriemungle Creek
Alsops Rd
Melrose Rd
Parkers Rd
McKenzies Lane
Waarre Rd

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Species list

5km buffer on Study area

State significant flora

2145 - Giant Honey-myrtle

Figure 3.13 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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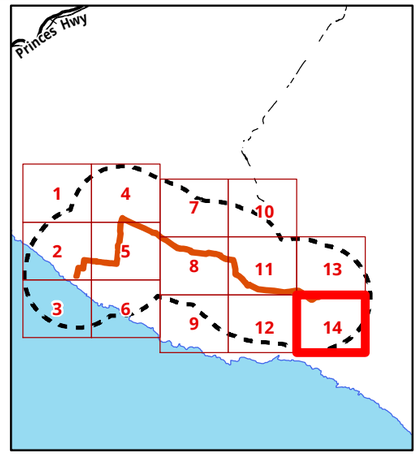
Tregeas Rd
Bognars Lane
Cobden - Port Campbell Rd
Waarre Rd
Melrose Rd
Kolong Rd
Hawkins Rd
7749
Waarre
Eastern Creek
CORANGAMITE SHIRE
Eastern Creek Rd
Splitter Creek
Sherbrook River
Gilsons Rd
Currells Rd
Rounds Rd
Otra Creek
Yaruck Rd
Locks Rd
Sherbrook River
2032

Acknowledgements: Vicmap Data ©State of Victoria. Species data provided by FIS/VBA ©State of Victoria



Species list

5km buffer on Study area

State significant flora

2032 - Oval-leaf Logania

Figure 3.14 Significant flora within 5km of the Study Area

0 200 400 600 800 1,000

Metres

Scale: 1:20,000 @ A3

Coordinate System: GDA 1994 VICGRID94

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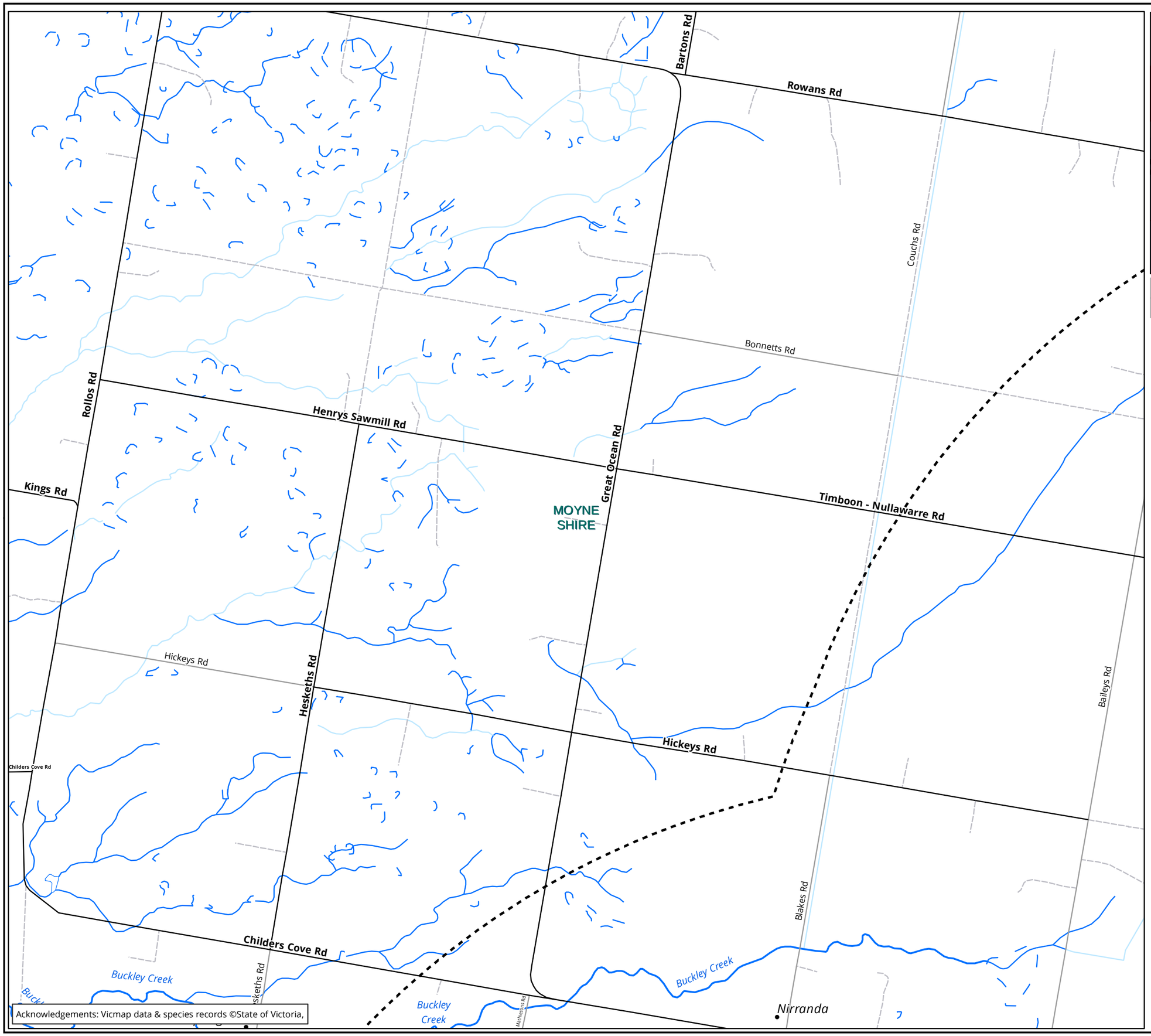

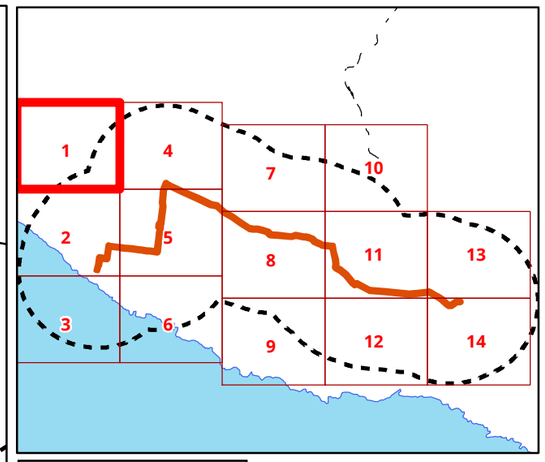

Figure 4.1: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres

Scale: 1:22,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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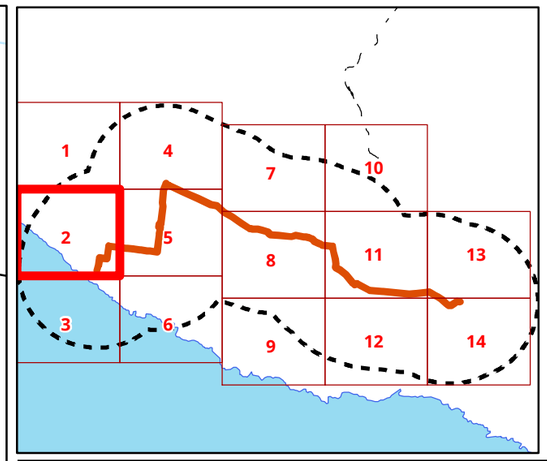
Location:P:\17900s\17973\Mapping
17973_F4_ThrFauna_20140506

Childers Cove Rd
Springvale
Hesketh Rd
Buckley Creek
Nirranda
Great Ocean Rd
Cemetery Rd
Blakes Rd
Andersons Rd
Mathiesons Rd
MOYNE SHIRE
Baileys Rd
Borthwicks Rd
Lanes Rd

15006
13125
11175
10220; 11069; 19011
10187; 61341
10181; 10187
10187; 10215
10305
10111; 10215
10131
10086
10521
10111; 10521
10050; 10131; 10521; 10652
10098; 10131; 10138; 10521
10131; 10138
10071; 10131; 10521; 10521; 61341
10071; 10131; 10521; 10521; 61341
10050; 61341
11561
10168; 10181; 10187



Study Area
5 km search area

Nationally significant fauna
- Bird
- Mammal

State significant fauna
- Amphibian
- Bird
- Mammal

Amphibians
Taxon ID & Common name
13125; Southern Toadlet

Invertebrates
Taxon ID & Common name
15006; Large Ant-blue Butterfly

Mammals
Taxon ID & Common name
11069; White-footed Dunnart
11175; Long-nosed Potoroo
11561; Southern Right Whale
61341; Common Bent-wing Bat

Birds
Taxon ID & Common Name
10050; Baillon's Crake
10071; Short-tailed Shearwater
10086; Wandering Albatross
10088; Black-browed Albatross
10098; Black-faced Cormorant
10111; Gull-billed Tern
10131; Sooty Oystercatcher
10138; Hooded Plover
10181; Royal Spoonbill
10187; Eastern Great Egret
10215; Hardhead
10220; Grey Goshawk
10305; Orange-bellied Parrot
10521; Rufous Bristlebird
10652; Diamond Firetail
19011; Rufous Bristlebird (Otways subsp.)

Acknowledgements: Vicmap data & species records ©State of Victoria,

Figure 4.2: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100
Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

N

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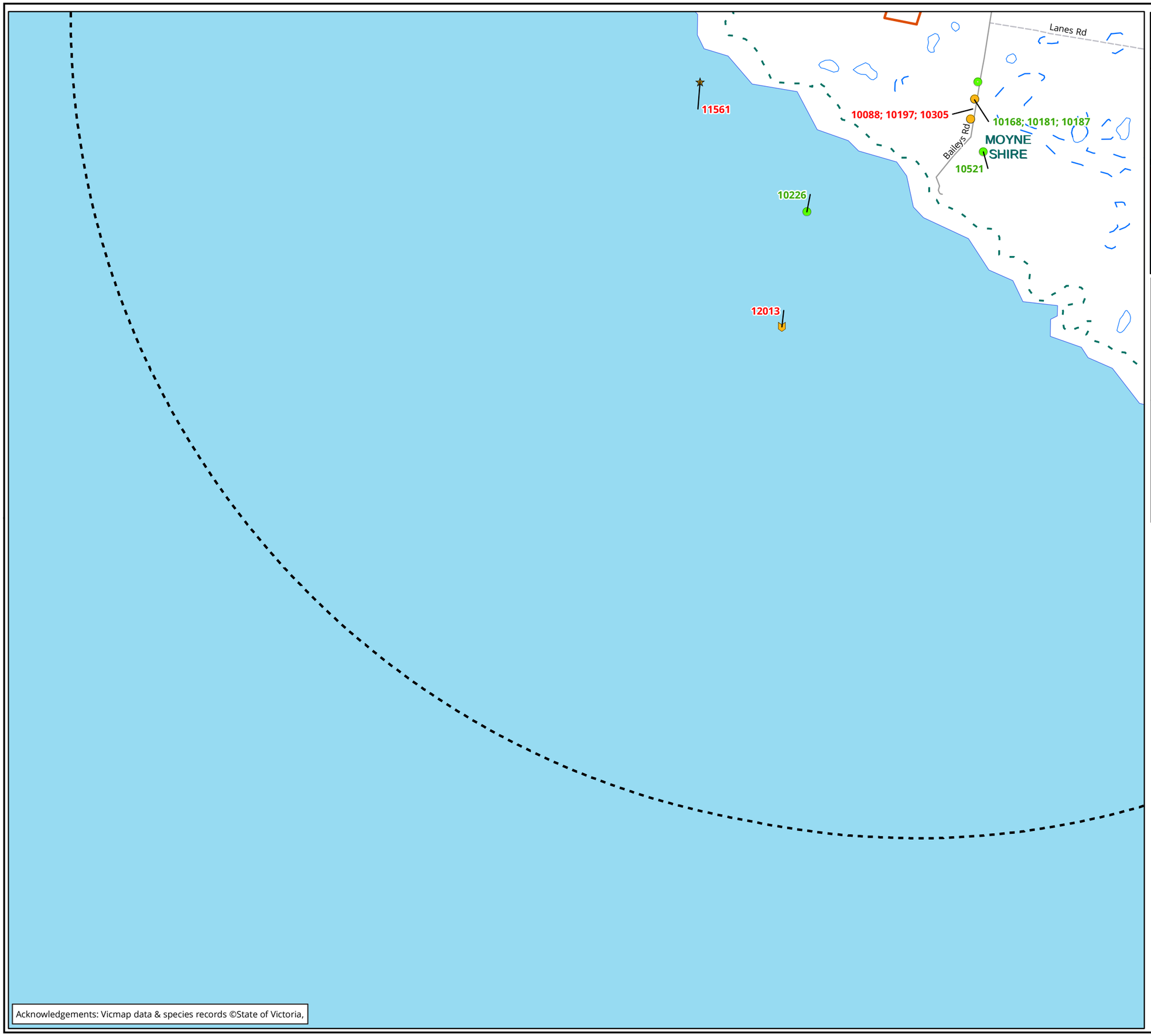

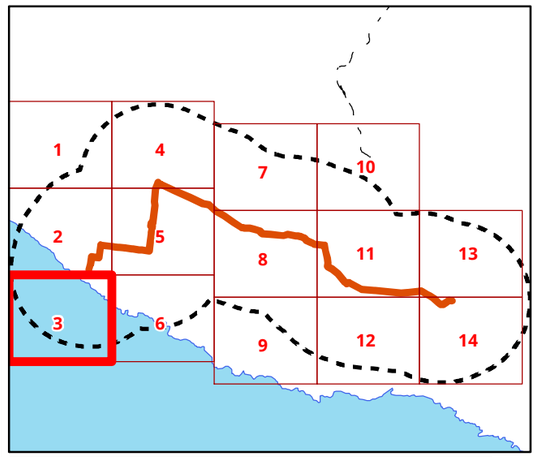

Study Area
5 km search area

Nationally significant fauna

Bird
Mammal
Reptile

State significant fauna

Bird

Mammals

Taxon ID & Common name
11561; Southern Right Whale

Reptiles

Taxon ID & Common name
12013; Leathery Turtle

Birds

Taxon ID & Common Name
10088; Black-browed Albatross
10168; Latham's Snipe
10181; Royal Spoonbill
10187; Eastern Great Egret
10197; Australasian Bittern
10226; White-bellied Sea-Eagle
10305; Orange-bellied Parrot
10521; Rufous Bristlebird

Acknowledgements: Vicmap data & species records ©State of Victoria,

Figure 4.3: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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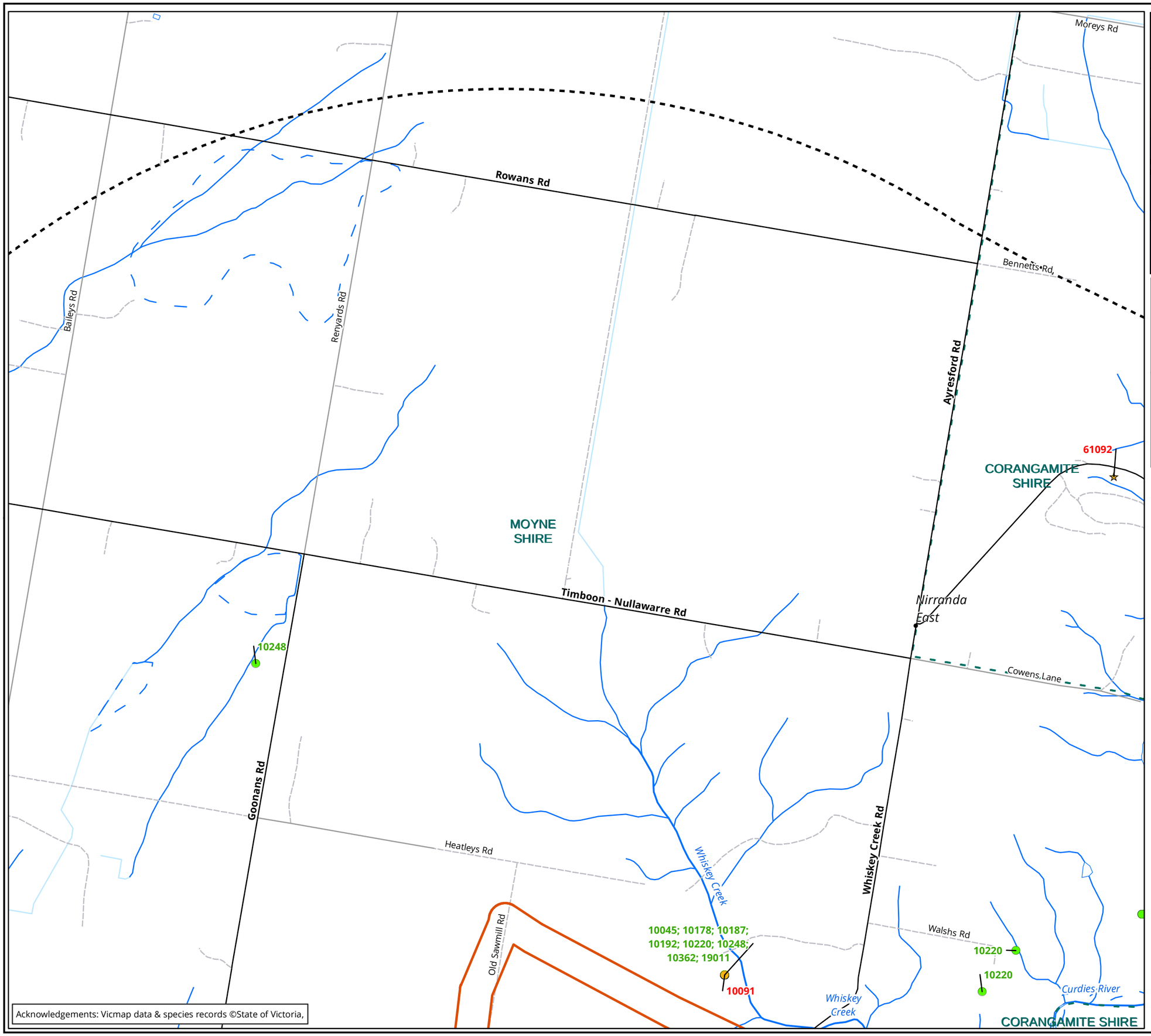

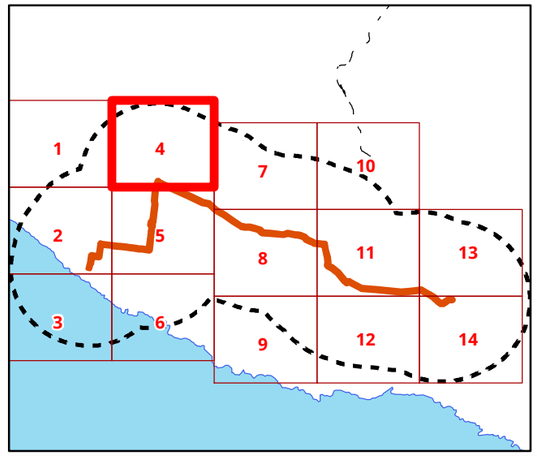

Study Area

5 km search area

Nationally significant fauna

Bird

Mammal

State significant fauna

Bird

Mammals

Taxon ID & Common name

61092; Southern Brown Bandicoot

Birds

Taxon ID & Common Name

10045; Lewin's Rail

10091; Shy Albatross

10178; Glossy Ibis

10187; Eastern Great Egret

10192; Nankeen Night Heron

10220; Grey Goshawk

10248; Powerful Owl

10334; White-throated Needletail

10362; Rufous Fantail

10521; Rufous Bristlebird

19011; Rufous Bristlebird (Otways subsp.)

Figure 4.4: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres

Scale: 1:22,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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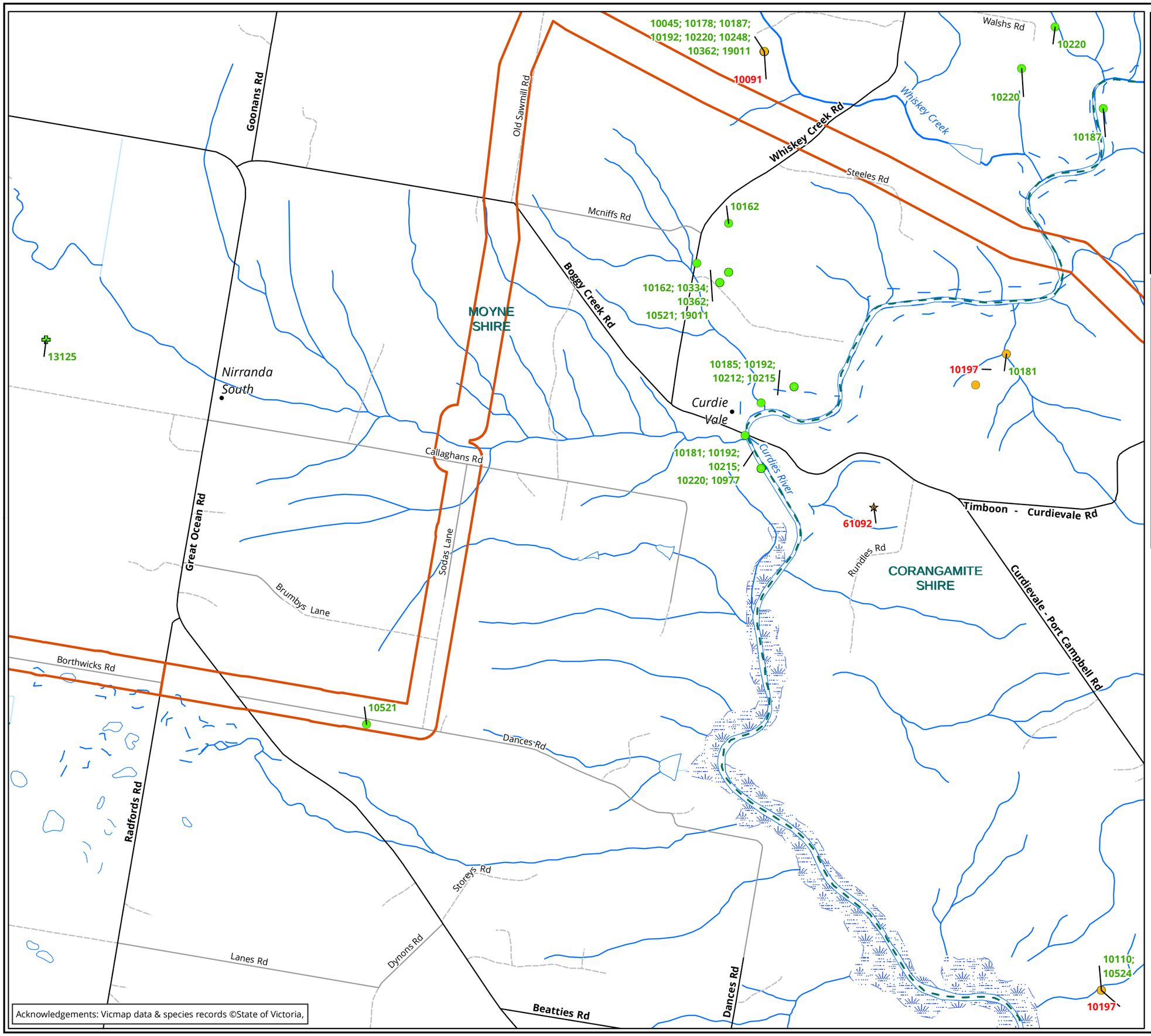

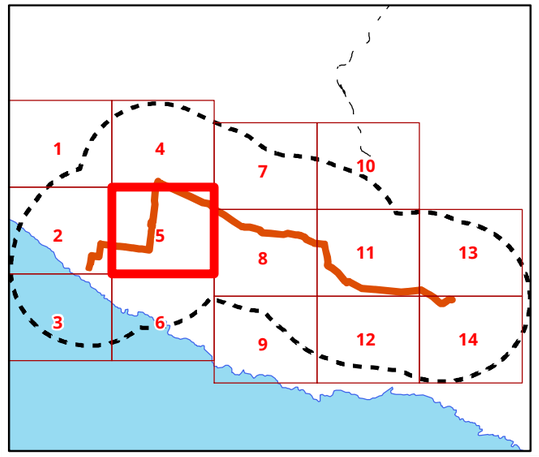

Study Area
5 km search area

Nationally significant fauna
- Bird
- Mammal

State significant fauna
- Amphibian
- Bird

Amphibians
Taxon ID & Common name
13125; Southern Toadlet

Mammals
Taxon ID & Common name
61092; Southern Brown Bandicoot

Birds
Taxon ID & Common Name
10045; Lewin's Rail
10091; Shy Albatross
10110; Whiskered Tern
10162; Red-necked Stint
10178; Glossy Ibis
10181; Royal Spoonbill
10185; Little Egret
10187; Eastern Great Egret
10192; Nankeen Night Heron
10197; Australasian Bittern
10212; Australasian Shoveler
10215; Hardhead
10220; Grey Goshawk
10248; Powerful Owl
10334; White-throated Needletail
10362; Rufous Fantail
10521; Rufous Bristlebird
10524; Clamorous Reed Warbler
10977; Cattle Egret
19011; Rufous Bristlebird (Otways subsp.)

Figure 4.5: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100
Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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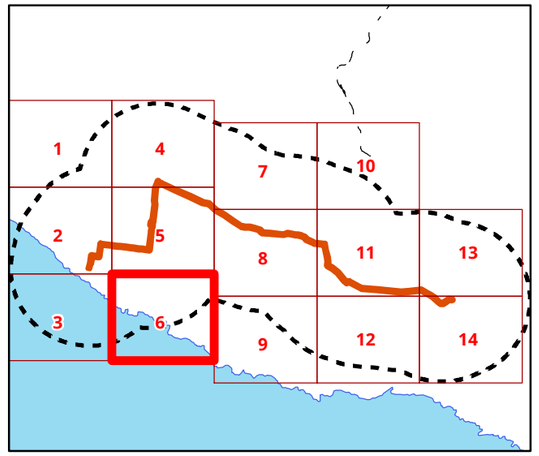
Location:P:\17900s\17973\Mapping\17973_F4_ThrFauna_20140506

Lanes Rd
Radfords Rd
Beatties Rd
Dances Rd
Dynons Rd
Curdies River
CORANGAMITE SHIRE
MOYNE SHIRE
Old Peterborough Rd
Great Ocean Rd
Boat Bay Rd
Bay Of Islands Trk
Delaneys Rd

10110; 10524
10197
10163
10181; 10187
11561
10088
10163; 10168; 10212
10212
10088
10197
13125
10215
19011
10098
10098
10071
10187; 10521; 19011



5 km search area

Nationally significant fauna

- Bird
- Mammal

State significant fauna

- Amphibian
- Bird

Amphibians

Taxon ID & Common name
13125; Southern Toadlet

Mammals

Taxon ID & Common name
11561; Southern Right Whale

Birds

Taxon ID & Common Name
10071; Short-tailed Shearwater
10088; Black-browed Albatross
10098; Black-faced Cormorant
10110; Whiskered Tern
10163; Sharp-tailed Sandpiper
10168; Latham's Snipe
10181; Royal Spoonbill
10187; Eastern Great Egret
10197; Australasian Bittern
10212; Australasian Shoveler
10215; Hardhead
10521; Rufous Bristlebird
10524; Clamorous Reed Warbler
19011; Rufous Bristlebird (Otways subsp.)

Acknowledgements: Vicmap data & species records ©State of Victoria,

Figure 4.6: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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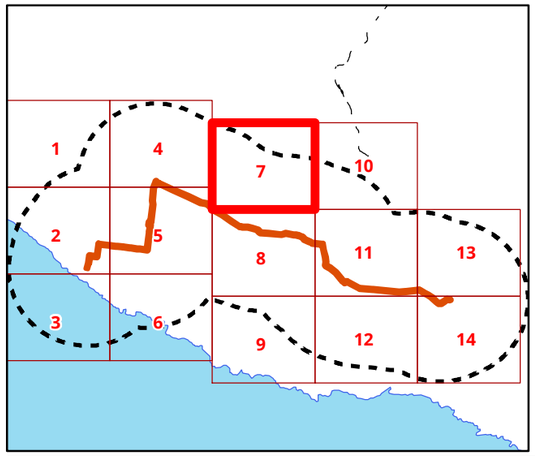

Study Area
5 km search area

Nationally significant fauna

Bird
Mammal

State significant fauna

Amphibian
Bird

Amphibians

Taxon ID & Common name
13125; Southern Toadlet

Mammals

Taxon ID & Common name
61092; Southern Brown Bandicoot

Birds

Taxon ID & Common Name
10099; Pied Cormorant
10177; Brolga
10181; Royal Spoonbill
10187; Eastern Great Egret
10192; Nankeen Night Heron
10195; Little Bittern
10215; Hardhead
10220; Grey Goshawk
10248; Powerful Owl
10334; White-throated Needletail
10402; Red-lored Whistler
10521; Rufous Bristlebird
10524; Clamorous Reed Warbler
10977; Cattle Egret
19011; Rufous Bristlebird (Otways subsp.)

Figure 4.7: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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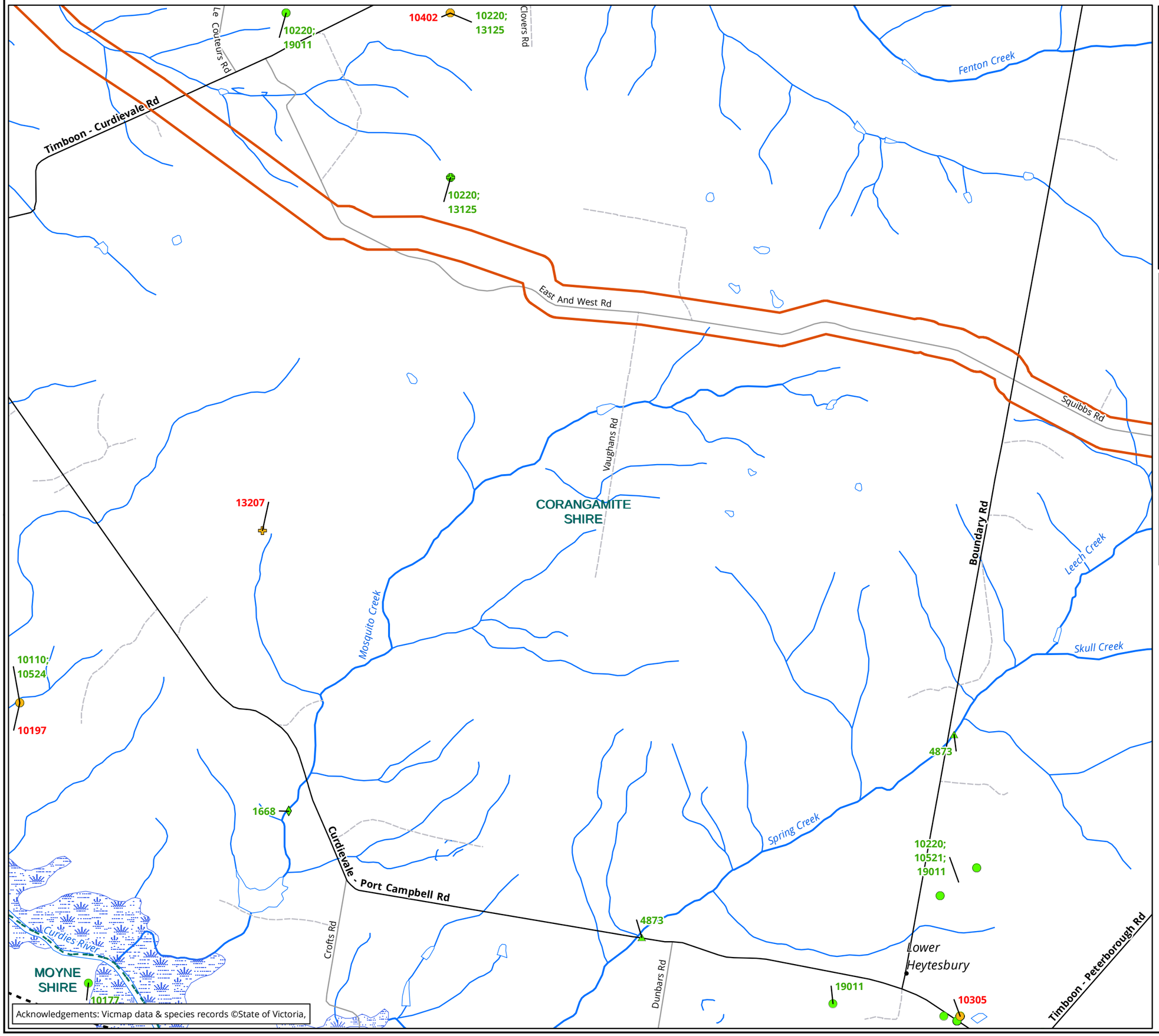
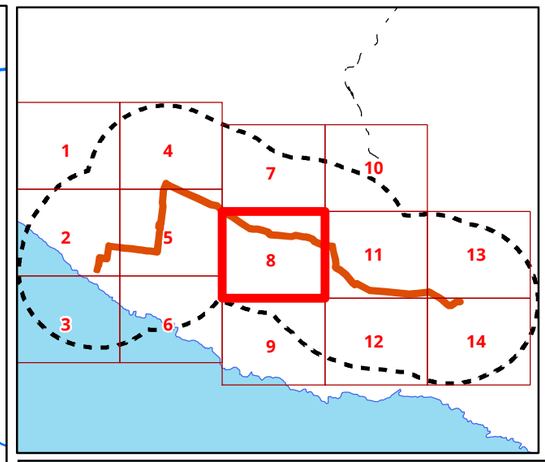
od, crustacean





Study Area
5 km search area

Nationally significant fauna
- Amphibian
- Bird

State significant fauna
- Amphibian
- Bird
- Fish
- Mussel, decopod, crustacean

Amphibians
Taxon ID & Common name
13125; Southern Toadlet
13207; Growling Grass Frog

Fish
Taxon ID & Common Name
4873; Golden Perch

Birds
Taxon ID & Common Name
10110; Whiskered Tern
10177; Brolga
10187; Eastern Great Egret
10197; Australasian Bittern
10220; Grey Goshawk
10305; Orange-bellied Parrot
10334; White-throated Needletail
10335; Fork-tailed Swift
10366; Satin Flycatcher
10402; Red-lored Whistler
10521; Rufous Bristlebird
10524; Clamorous Reed Warbler
19011; Rufous Bristlebird (Otways subsp.)

Figure 4.8: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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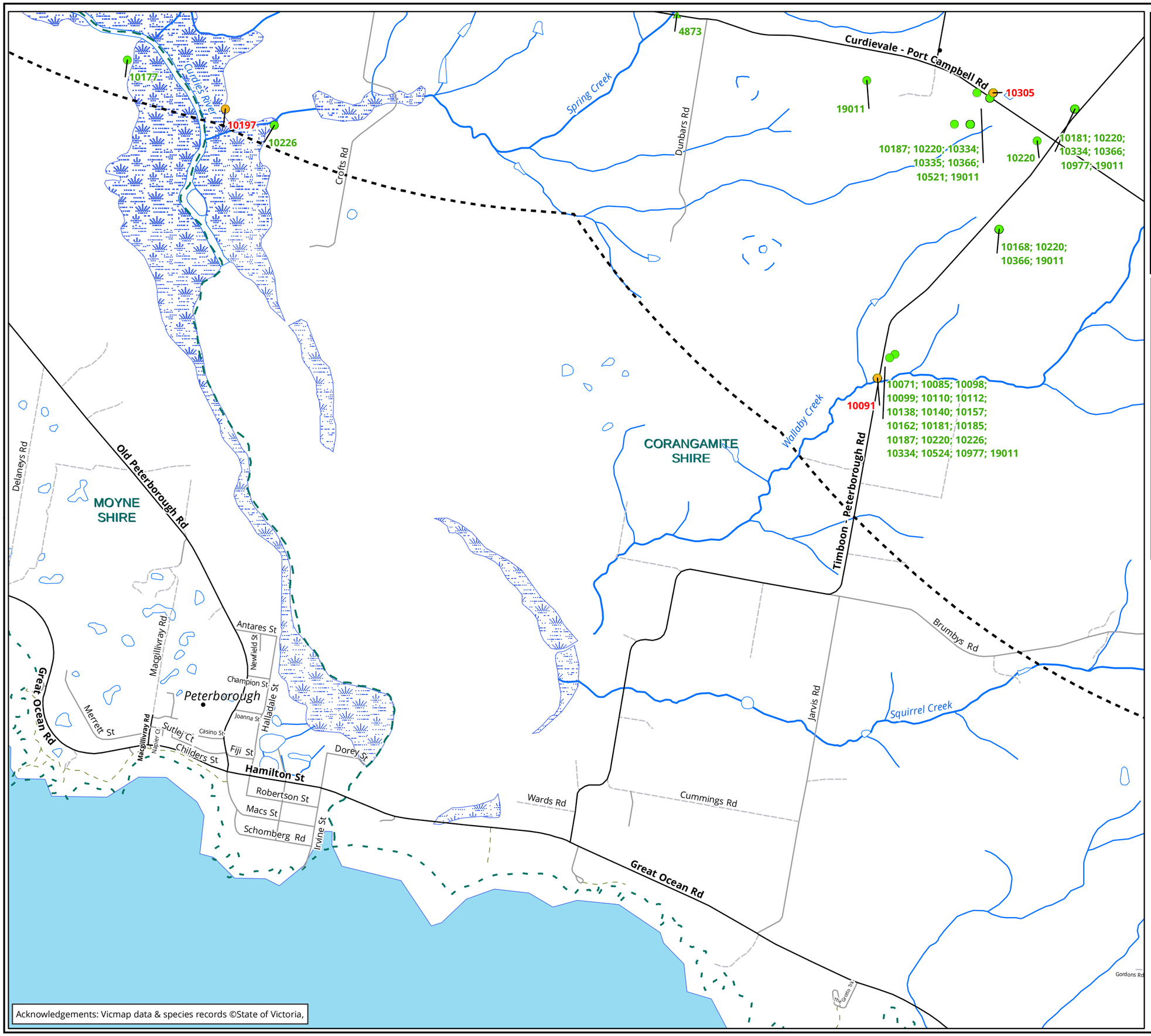

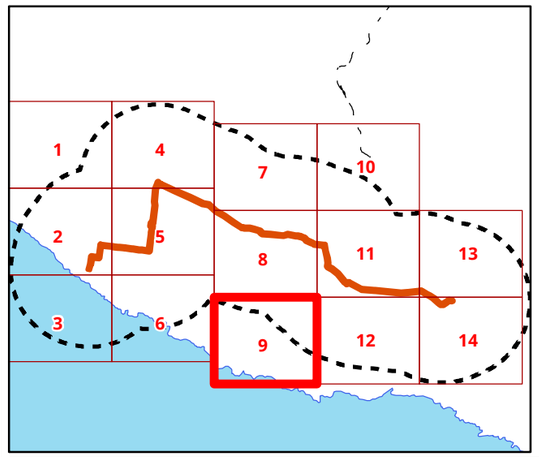

5 km search area

Nationally significant fauna

Bird

State significant fauna

Bird

Fish

Fish

Taxon ID & Common Name

4873; Golden Perch

Birds

Taxon ID & Common Name

10071; Short-tailed Shearwater
10085; Common Diving-Petrel
10091; Shy Albatross
10098; Black-faced Cormorant
10099; Pied Cormorant
10110; Whiskered Tern
10112; Caspian Tern
10138; Hooded Plover
10140; Double-banded Plover
10157; Common Sandpiper
10162; Red-necked Stint
10168; Latham's Snipe
10177; Brolga
10181; Royal Spoonbill
10185; Little Egret
10187; Eastern Great Egret
10197; Australasian Bittern
10220; Grey Goshawk
10226; White-bellied Sea-Eagle
10305; Orange-bellied Parrot
10334; White-throated Needletail
10335; Fork-tailed Swift
10366; Satin Flycatcher
10521; Rufous Bristlebird
10524; Clamorous Reed Warbler
10977; Cattle Egret
19011; Rufous Bristlebird (Otways subsp.)

Acknowledgements: Vicmap data & species records ©State of Victoria,

Figure 4.9: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres

Scale: 1:22,000 @ A3

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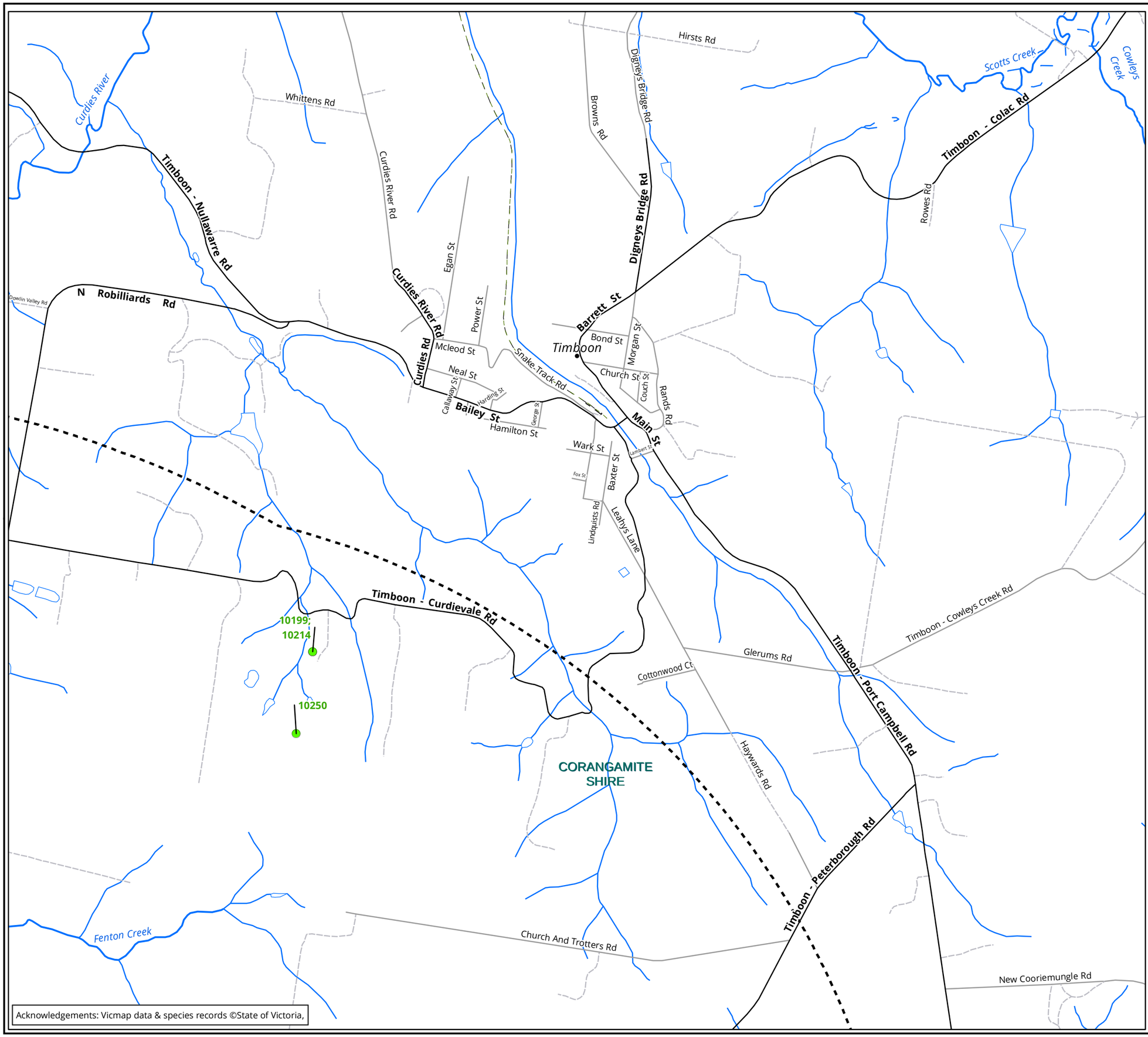

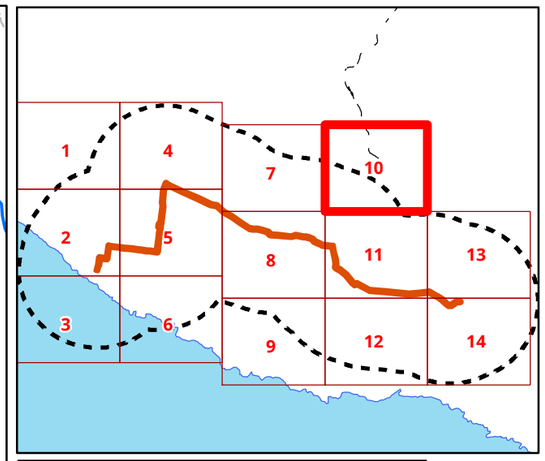

5 km search area

State significant fauna

Bird

Birds

Taxon ID & Common Name
10199; Magpie Goose
10214; Freckled Duck
10250; Masked Owl

Figure 4.10: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres

Scale: 1:22,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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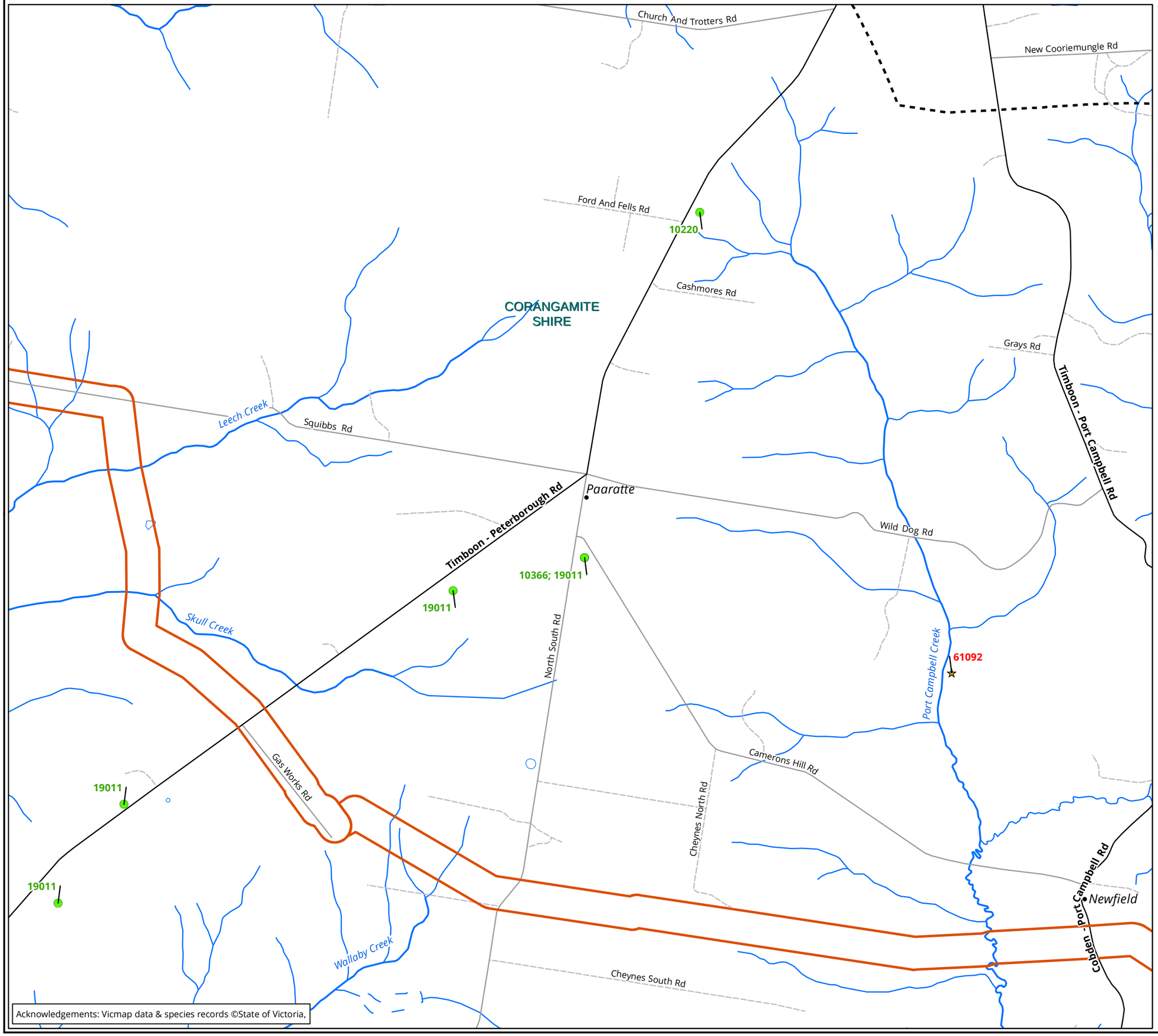

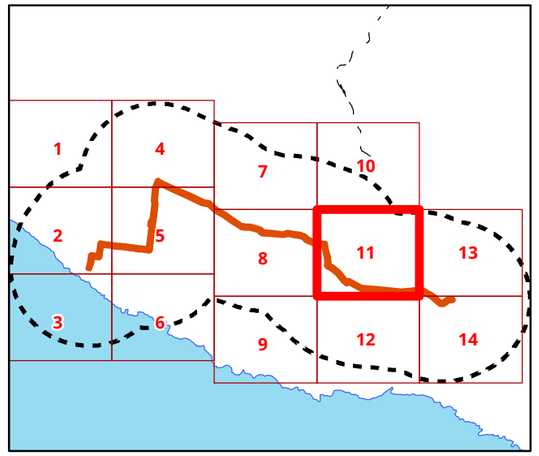

Study Area
5 km search area

Nationally significant fauna
Mammal

State significant fauna
Bird

Mammals
Taxon ID & Common name
61092; Southern Brown Bandicoot

Birds
Taxon ID & Common Name
10220; Grey Goshawk
10366; Satin Flycatcher
19011; Rufous Bristlebird (Otways subsp.)

Figure 4.11: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100
Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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Location:P:\17900s\17973\Mapping
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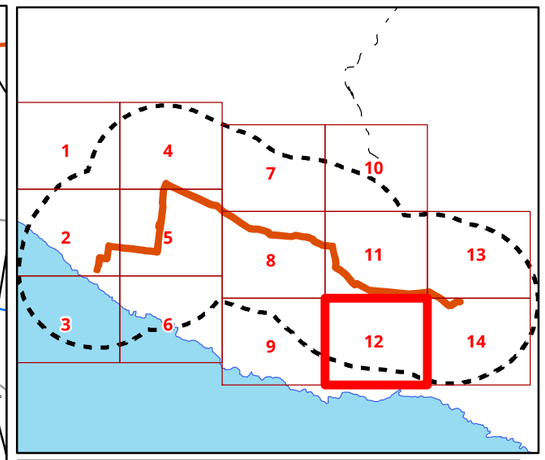
Wallaby Creek
Cheynes South Rd
Tregeas Rd
10192; 10561
North South Rd
19011
19011
19011
10521; 19011
10334
Smokey Point Rd
10220
Eastern Creek
Bognars Lane
Langleys Rd
CORANGAMITE SHIRE
Curdievale - Port Campbell Rd
Pascoes Rd
Brumbys Rd
Squirrel Creek
Port Campbell Creek
Cobden - Port Campbell Rd
Currells Rd
Mckenzies Rd
Sharps Rd
Gordons Rd
Two Mile Bay West Trk
Great Ocean Rd
Bradshaw Dr
Cairns Rd
Desailly St
Hennessy St
Pitcher St
Tregea St
Lord St



Study Area
5 km search area
State significant fauna
Bird
Birds

Taxon ID & Common Name
10192; Nankeen Night Heron
10220; Grey Goshawk
10334; White-throated Needletail
10521; Rufous Bristlebird
10561; White-browed Treecreeper
19011; Rufous Bristlebird (Otways subsp.)

Acknowledgements: Vicmap data & species records ©State of Victoria,

Figure 4.12: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100
Metres
Scale: 1:22,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

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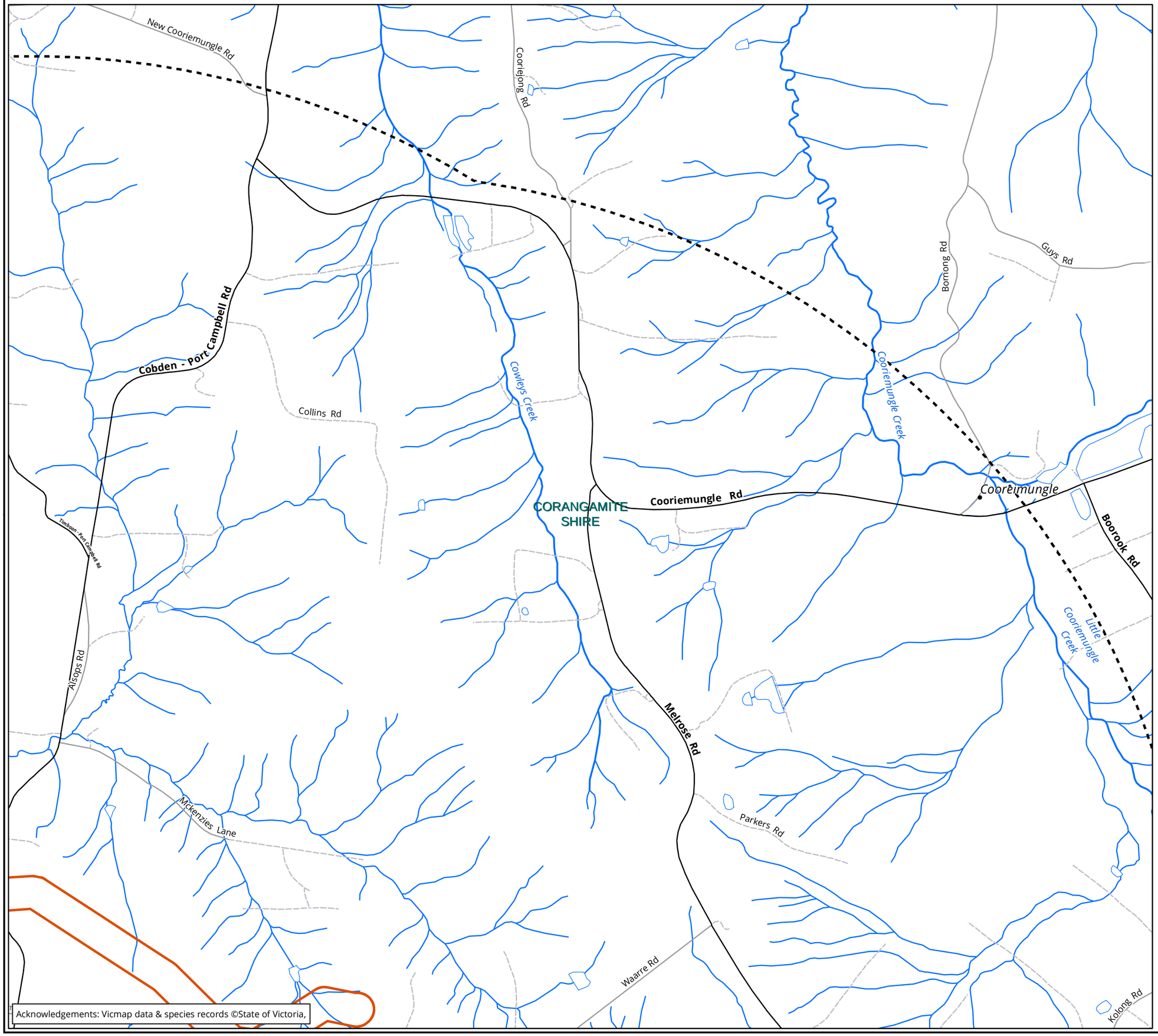

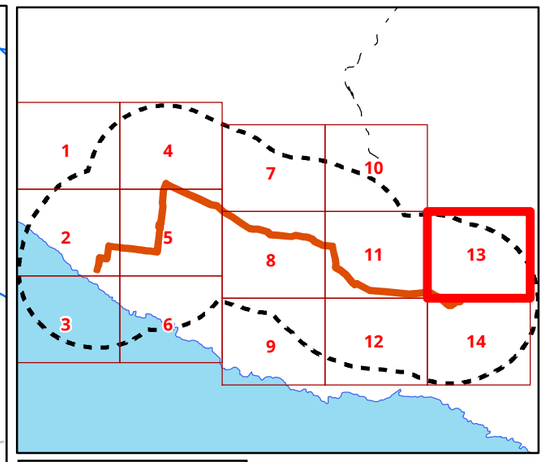

Figure 4.13: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres

Scale: 1:22,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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Date: 28 August 2014,
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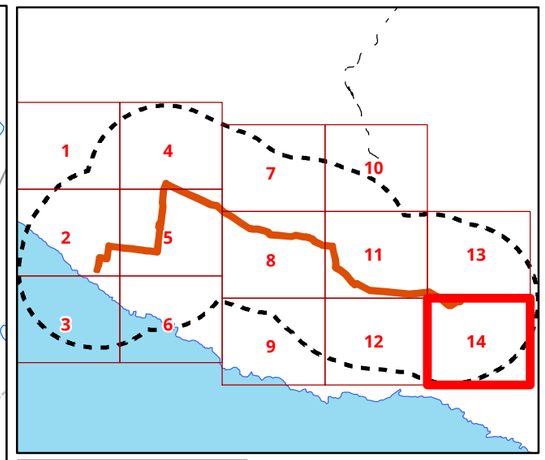
Location:P:\17900s\17973\Mapping
17973_F4_ThrFauna_20140506

Tregeas Rd
Bognars Lane
Port Campbell Creek
Waarre Rd
Waarre
Eastern Creek
CORANGAMITE SHIRE
Eastern Creek Rd
Melrose Rd
Kolong Rd
Hawkins Rd
Splitter Creek
Sherbrook River
Gilsons Rd
Currells Rd
Yaruck Rd
Otra Creek
Locks Rd
No1 Rd
Rounds Rd
Fireline Trk



Acknowledgements: Vicmap data & species records ©State of Victoria,

Figure 4.14: Threatened Fauna records within 5km of the Study Area

0 220 440 660 880 1,100

Metres

Scale: 1:22,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

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17973_F4_ThrFauna_20140506

4. Biodiversity Legislation and Government Policy

This section provides an assessment of the project in relation to key biodiversity legislation and government policy. The assessment is based on the current proposed construction impact area (footprint), which includes the temporary construction ROW and the AWS areas, as shown in Figure 2. The current construction footprint provided by Origin Energy also proposes to use trenchless technology for all bitumen road crossings and the crossing of Curdies River.

Where available, links to further information are provided. This section does not describe the legislation and policy in detail and guidance provided here does not constitute legal advice.

4.1 Commonwealth

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (NES) protected under the Act.

Link for further information including a guide to the referral process is available at: http://www.environment.gov.au/epbc/index.html

Matters of National Environmental Significance relevant to the project are summarised in Table 4. It includes an assessment against the EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

On the basis of criteria outlined in the relevant *Significant Impact Guidelines* it is considered unlikely that a significant impact on a Matter of National Environmental Significance would result from the proposed action based on the current proposed construction footprint. Depending on the final footprint of the MEG pipeline, a further assessment of impact significance may need to be considered. Once the footprint has been finalised, Origin Energy may choose to refer the proposed action to the Australian Government Minister for the Environment to determine whether the action requires approval under the EPBC Act as a project risk management strategy.

4.2 State

4.2.1 Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DSE to 'take' protected flora species from public land. A permit is generally not required for removal of protected flora from private land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish.

Link for further information: http://www.depi.vic.gov.au/environment-and-wildlife/threatened-species-and-communities/flora-and-fauna-guarantee-act-1988.

Native vegetation on site is not part of a listed community and is largely on private property. However the proposed route does intersect public land in association with various road reserves. If directional boring is used to install the pipeline under these road reserves it is likely that any impact to remnant native vegetation would be completely avoided.

Table 4: Assessment of project in relation to the EPBC Act

Matter of NES	Project specifics	Assessment against Guidelines
Threatened species and ecological communities	No threatened ecological communities are recorded or predicted to occur within the study area.	All plant species except Square Raspwort were assessed to have a low likelihood of occurrence. Any potential impact on this species is unlikely to constitute a significant impact.
	Forty-five species have been recorded or predicted to occur in the project search area. The likelihood of these species occurring in the study area is assessed in Appendix 2 (flora) and Appendix 3 (fauna).	Potential habitat for Southern Brown Bandicoot, Long-nosed Potoroo, Southern Bent-wing Bat and Growling Grass Frog is identified within the study area (Figure 2). The current proposed construction footprint minimises and avoids impacts to areas of potential habitat for these species. Therefore, the project is unlikely to constitute a significant impact on these species, however, targeted survey for Southern Brown Bandicoot, Long-nosed Potoroo, and Growling Grass Frog may provide further certainty to likely impacts.
Migratory species	Fifty-six migratory species have been recorded or predicted to occur in the project search area (Appendix 3).	While some of these species would be expected to use the study area on occasions, and some of them may do so regularly or may be resident, it does not provide important habitat for an ecologically significant proportion of any of these species.
Wetlands of international importance (Ramsar sites).	The study area is not within the catchment of any wetlands of international importance.	The study area does not drain directly into any Ramsar site and the development is not likely to result in any impact on this matter of national environmental significance.

The land otherwise impacted by the proposed works is privately owned, is not declared 'critical habitat' for the purposes of the FFG Act and the flora species are not being taken for the purpose of commercial sale. Therefore a protected flora permit would not be required. However the presence of rare or threatened flora and habitat for threatened fauna will be considered by the Responsible Authority in determining its response to an application for vegetation clearance under Clause 52.17 (see below).

If vegetation within road reserves or other public land were impacted then it is likely that some protected flora would be impacted. In this situation a protected flora permit from DEPI would be required. If the proponent has been granted a licence or any other authority necessary from the Minister for Environment and Climate Change (the relevant Crown Land Minister) under section 86(1) of the Pipelines Act then the FFG Act may not apply.

The potential impact of Cinnamon Fungus *Phytophthora cinnamomi* is a listed threatening process under the FFG Act. The occurrence of this disease within the study area is unknown. None of the native vegetation was observed appeared to be suffering symptoms of this disease and sensitive species (such as Austral Grass-tree *Xanthorrhoea australis*) were observed in some areas of remnant native vegetation. Despite this it is considered likely that regulatory authorities would require construction works to implement hygiene

protocols during construction works to ensure any undetected infections of this disease are not spread throughout the landscape.

4.2.2 Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species.

Declared noxious weeds identified in the study area are listed in Appendix 2 and established pest animals are listed in Appendix 3.

Origin Energy must take all reasonable steps to prevent the growth and spread of regionally controlled weeds, and, as far as possible, prevent the spread of and pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.

Link for further information: http://www.depi.vic.gov.au/agriculture-and-food/pests-diseases-and-weeds/weeds/invasive-plant-classifications/weed-classification-victoria.

4.2.3 Pipelines Act 2005

The Pipelines Act has the objective to facilitate the development of pipelines for the benefit of Victoria, and—in general—to govern process for their construction including environmental considerations. If a licence has been issued under the Act for the construction and operation of a pipeline, the proponent is not required to obtain planning permission under the *Planning and Environment Act 1987*, including relevant local planning schemes.

4.2.4 Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities.

If the proposed works are to be conducted under the *Pipelines Act 2005* then the *Planning and Environment Act 1987* does not apply. This report, however, provides an assessment of the project against relevant planning schemes, and documents the vegetation loss and offset requirements if such an assessment is required, either in full or in part.

Even if the final construction easement avoids all identified patches of native vegetation it is likely that the proposed works would remove other native vegetation (defined under the Clause 72 of all Planning Schemes as plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses). Therefore if planning controls are relevant, permit requirements contained within the relevant Planning Scheme in relation to native vegetation removal would be relevant to the proposal.

Reforms to the native vegetation permitted clearing regulations were gazetted on 20 December 2013 through planning scheme amendment VC105. The reforms made changes to the Victoria Planning Provisions including the State Planning Policy Framework (SPPF), Clause 52.16 and 52.17 of all planning schemes within Victoria and introduced the Permitted clearing of native vegetation: Biodiversity Assessment Guidelines (the Guidelines, DEPI 2013).

Of particular relevance to the development proposal are controls relating to the removal, destruction or lopping of native vegetation contained within the relevant Planning Scheme (Moyne and Corangamite), including permit requirements. The Schemes (Clause 72) define 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. It is an objective of Clause 12.01-2 of the SPPF (Native Vegetation Management) that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. For more information on these reforms refer to www.depi.vic.gov.au/nativevegetation.

Clause 52.17 (Native Vegetation) requires a planning permit to remove, destroy or lop native vegetation including some dead native vegetation. Decision guidelines are contained in Clause 52.17-5. . It should be noted that where native vegetation does not meet the definition of a remnant patch or scattered trees, the Guidelines do not apply. However, a permit may still be required to remove, destroy or lop native vegetation under the provisions of the Planning Scheme, if applicable.

Under Clause 66.02 a permit application to remove, destroy or lop native vegetation is required to be referred to DEPI as a recommending referral authority if any of the following apply:

- the area of native vegetation to be removed is greater than 0.5 hectares;
- the class of application is on the high risk-based pathway ;
- a property vegetation precinct plan applies to the site; or
- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

An assessment of the proposed development in relation to the Guidelines is provided in Section 5.

The study area is covered by the following overlays relevant to biodiversity under either the Moyne or Corangamite Planning Schemes:

- Significant Landscape Overlay (SLO) – occurs along the coast and is relevant to the drill pad site.
- Environmental Significance Overlay (ESO) – relevant to the study area covered by the drill pad site and Curdies River.
- Vegetation Protection Overlay (VPO) – covers many of the vegetated roadsides (including Timboon-Curdievale Rd, Timboon-Peterborough Rd and North South Rd) and Curdies River.
- Bushfire Management Overlay (WMO) –relevant to the study area where it is connected to woodland, including north of Borthwicks Road, east of Curdies River, and a section of East and West Rd.

4.2.5 Wildlife Act 1975 and associated Regulations

The *Wildlife Act 1975* (Wildlife Act) is the primary piece of legislation in Victoria providing for protection and management of wildlife. The Wildlife Act does not apply to fish, as defined under the *Fisheries Act 1995*.

The Wildlife Regulations 2002 prescribe penalties for persons who wilfully damage, disturb or destroy any wildlife habitat without appropriate authorisation. DEPI advise that a planning permit (under the planning scheme) constitutes appropriate authorisation and therefore the habitat protection provisions under the Wildlife Regulations 2002 are not applicable once the planning permit has been granted for this project. In this case, approval under the *Pipelines Act 2005* may also negate the requirement for approval under the *Wildlife Act 1975* and associated regulations.

4.2.6 Environment Effects Act 1978

The *Environment Effects Act 1978* establishes a process to assess the environmental impacts of a project. If applicable, the Act requires that an Environment Effects Statement (EES) be prepared by the proponent. The EES is submitted to the Minister for Planning and enables them to assess the potential environmental effects of the proposed development.

The general objective of the assessment process is *to provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant effect on the environment* (DSE 2006).

The 'Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978' (DSE 2006a) provide a range of criteria that can be used to determine whether an EES may be required for a

project. These criteria relate to individual potential environmental effects and a combination of (two or more) potential environmental effects.

An assessment of the project against the individual potential effects and a combination of potential environmental effects criteria, where these related to biodiversity values (i.e. habitat values, threatened species and threatened communities) indicates that the proposed pipeline does not meet the triggers to require an EES. However, the guidelines are not binding, and the decision as to whether an EES is required is ultimately at the discretion of the Minister for Planning.

4.2.7 Fisheries Act 1995

The Fisheries Act 1995 provides a legislative frame work for the regulation, management and conservation of Victorian fisheries including aquatic habitats.

A person must not take, injure, damage, destroy or release any protected aquatic biota. Protected aquatic biota (PAB) includes all species of the family Syngnathidae (seahorses, sea dragons and pipefish), and any fish or aquatic invertebrate or community that is listed under the FFG Act.

Protected aquatic biota that are considered likely to occur within the alignment include:

- Australian Grayling *Prototroctes maraena*
- Spotted Pipefish *Stigmatopora argus*
- Wide-bodied Pipefish *Stigmatopora nigra*
- Ring-backed Pipefish *Stipecampus cristatus*
- Port Phillip Pipefish *Vanacampus phillipi*
- Hairy Pipefish *Urocampus carinirostris*
- Long-snout Pipefish *Vanacampus poecilolaemus*
- Knife-snouted pipefish *Hypselognathus rostratus*
- Mother-of-Pearl Pipefish *Vanacampus margaritifer*

All of the listed PAB are considered likely to occur within the Curdies River. At the time of assessment it was proposed that this section of the alignment will be horizontally directionally drilled, and therefore avoiding impacts to these species. Providing mitigation measures outlined in this report are adhered to, the potential for protected aquatic biota as listed above to be injured, damaged or destroyed is considered to be negligible and no permit is required from DEPI.

4.2.8 Water Act 1989

The primary purpose of the *Water Act 1989* is to provide a framework for the allocation and management of surface water and groundwater throughout Victoria. It provides a principal mechanism for maintenance of ecosystem functions including those of aquatic ecosystems. Under By-Laws created by the relevant Authority under the Act, the authorities regulate the works within and in the vicinity of waterways.

The proposed development will involve construction activities that may affect beds and banks of waterways, riparian vegetation or quality or quantity of water within the Otway Coast and Hopkins River Basins.

Development within the study area will require a permit from the Corangamite and Glenelg-Hopkins Catchment Management Authorities. Guidelines and application forms are available from CMAs online.

Corangamite CMA – http://www.ccma.vic.gov.au/What-we-do/Water/Works-on-Waterways.aspx.

4.2.9 Environment Protection Act 1970: State Environmental Protection Policy (Waters of Victoria) 2003

The Environment Protection Act underpins the State Environmental Protection Policy (SEPP) - Waters of Victoria which provides a legal framework for the protection and rehabilitation of Victoria's surface water environments.

The project may directly and/or indirectly impact upon numerous waterways and associated aquatic ecosystems. The SEPP requires that aquatic ecosystem values be protected. Environmental quality objectives and indicators are defined to protect beneficial uses (i.e. the uses and values of the water environment) and an attainment program provides guidance on protection of the beneficial uses.

Impacts to surface water quality must not result in changes that exceed background levels and/or the water quality objectives specified for the Open Coasts and Cleared Hills and Coastal Plains segments to protect surface water uses and values. Origin needs to ensure that direct and indirect (e.g. runoff) impacts to surface water quality do not exceed the background levels and/or water quality objectives.

Link to further information: http://www.epa.vic.gov.au/water/epa/wov.asp.

On site water quality measurements recorded all parameters (Table 5) within the SEPP water quality objectives, with the exception of electrical conductivity (EC) at Curdies River, as this site was estuarine. The water quality objectives for physical parameters, as outlined in the SEPP, are therefore sufficient to inform the development of an appropriate water quality monitoring plan.

Table 5: Water quality on-site measurements and SEPP objectives.

Site	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Electrical Conductivity (µS/cm)	Turbidity (NTU)
HS-AQ5	19.9	7.91	6.84	83.3	22,600	1.9
HS-AQ7	16.4	7.63	7.24	76.5	936	0
HS-AQ10	14.16	7.88	14.21	143	1,170	1
HS-AQ11	12.7	7.9	9.86	102.1	1,430	3
SEPP (WoV) objectives for Cleared Hills and Coastal Plains	N/A	≤ 8.3 ≥ 6.5	N/A	≥ 85	≤ 1,500	≤ 10
SEPP (WoV) objectives for Open Coasts	N/A	N/A	N/A	80	N/A	N/A

4.2.10 Regional Catchment Strategy and River Health Strategy

State Planning Policy Framework Clause 14.02-1 (Catchment planning and management) states that planning must consider as relevant, Regional Catchment Strategies (RCS) and any associated implementation plan or strategy including any regional river health and wetland strategies.

Strategies of relevance to the study area are the:

- Corangamite CMA Regional Catchment Strategy 2012-2018
- Corangamite CMA Regional River Health Strategy 2006-2011 (2014-2022 in development)
- Glenelg-Hopkins CMA Regional Catchment Strategy 2013-2019

These documents provide recommendations on the protection of existing high-value rivers and creeks that are in good condition and strategic improvement of other rivers and creeks. Within the current RCS Curdies River has been identified as containing habitat for significant fauna, however this species occurs greater than 10 kilometres upstream of the alignment.

5. Victoria's Biodiversity Assessment Guidelines

The Permitted clearing of native vegetation: Biodiversity assessment guidelines (the Guidelines) were introduced in December 2013. The Guidelines describe the following objective for permitted clearing of native vegetation in Victoria:

"No net loss in the contribution made by native vegetation to Victoria's biodiversity"

This objective is to be achieved through Victoria's planning system using a risk-based approach that relies on strategic planning and the permit and offset system. The key strategies for achieving no net loss at the permit level are:

- Avoiding the removal of native vegetation that makes a significant contribution to Victoria's biodiversity.
- Minimising impacts to Victoria's biodiversity from the removal of native vegetation.
- Where native vegetation is permitted to be removed, ensuring it is offset in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.

DEPI has provided biodiversity information tools to assist with determining the risk associated with permitted clearing and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

All planning permit applications to remove native vegetation are assigned to a risk-based pathway determined by the extent and location of proposed clearing. The risk-based pathway will dictate the information to be provided in a planning permit application and the decisions guidelines the responsible authority (e.g. Council) and/or DEPI as a referral authority will use to assess the permit application. These concepts are described further in this section. The biodiversity information tools have two components:

- Site-based information which is observable at a particular site.
- Landscape scale information which requires consideration of information beyond the site.

The following section assesses the contribution that the native vegetation within the study area makes to Victoria's biodiversity.

Note: a glossary of terms used in relation to the Guidelines and Habitat Hectares assessment is provided in Appendix 7.

5.1 Site based information

The extent of native vegetation patches and the number of scattered trees were mapped within the study area (Figure 2) and the condition was assessed in relation to standard methods provided by DSE (2004). The condition of native vegetation was assessed using the DSE Vegetation Quality Assessment Sheet (DSE 2004) and pre-determined EVC benchmarks: http://www.dse.vic.gov.au/conservation-and-environment/ecological-vegetation-class-evc-benchmarks-by-bioregion.

A total of 50 scattered trees were also recorded within the study area (100 m buffer). While assessments under the guidelines no longer consider the size of a scattered tree in the offsets prescription, the species and diameter at breast height for each scattered tree observed is presented in Appendix 2. Each scattered tree is also mapped and displayed in Figure 2.

Where scattered trees are impacted or removed, the loss of each tree will be accounted for as the loss of 0.071 ha of native vegetation. To avoid the loss of any tree, an area equivalent to 12 times the diameter at breast height of that tree need to be identified and treated as a tree protection zone (TPZ). Any construction impact effecting more than 10% of a TPZ will result in that tree being considered lost.

5.1.1 Habitat Hectares

Areas of uniform quality for each EVC within the patches are termed 'habitat zones' and are assessed separately. The condition score of the habitat zone is multiplied by the extent of the zone to give a value in habitat hectares.

Twenty four patches of native vegetation, including 23 habitat zones are identified (Table 6). The results of the condition assessment are provided in Table 6, with the number of habitat hectares in each habitat zone.

Note that the impact of the proposed pipeline was defined after the information provided in this report was incorporated into the route alignment/footprint design process.

There are a number of scattered remnant trees within the study area (Figure 2).

Summary of Habitat Hectares within the study area

In summary, the study area supports 15.08 habitat hectares.

5.2 Landscape scale information

5.2.2 Strategic biodiversity score

The strategic biodiversity score is derived using a spatial prioritisation tool that ranks locations in Victoria for their conservation priority on the basis of rarity and level of depletion of the Ecological Vegetation Class, species habitats and condition and connectivity of vegetation. Strategic biodiversity scores for any native vegetation within the study area to be impacted is derived from the NVIM/or otherwise be provided by DEPI's transitional support team. These scores are used to calculate offset amounts for general offsets only. If a specific offset is required for the proposed clearing, the strategic biodiversity score is not used in calculating offsets.

5.2.3 Habitat importance score

Habitat importance score is a measure of the importance of a location in the landscape as habitat for a particular rare or threatened species in relation to other suitable habitat for that species (DEPI 2013a). Only species listed as threatened or rare under the DEPI Advisory lists (DSE 2005, 2007a) are considered. The term 'threatened' is used to describe species that are classified as vulnerable, endangered or critically endangered. Species classified as data deficient or near threatened are not considered to be 'threatened' (DSE 2013). The term 'rare' has application for flora species only (DSE 2005).

Only native vegetation that is modelled as habitat for rare or threatened species is assigned a habitat importance score. The habitat is divided into two categories depending on their area of occupancy: dispersed habitat, or highly localised habitat. The habitat importance score is calculated differently for each of these groups.

The score is generated by DEPI's Habitat importance mapping of the study area. The results of any habitat importance scores are provided if the proposed alignment generates any requirement for a specific offset.

Table 6: Habitat Hectares of native vegetation within the study area

Habitat Zone			1	2	4	5	6	7a	7b	8	9	10	11	12	13	14	15	16	17a	17b	18	19	20	21	22	23	TOTAL
Bioregion			Warrnambool Plain																								
EVC #: Name			DHW	PSW	DHW	DHW	HW	DS	DHW	DHW	LF	LF	SS	DHW	DHS	PGW	DHW	PGW	DHS	SRW	SRW	DHW	TM	SS	LF	LF	
Max Score																											
Condition Score	Large Old Trees	10	6	na	0	6	6	0	0	4	6	6	na	6	na	na	6	na	na	6	4	0	na	na	0	10	
	Canopy Cover	5	3	na	0	3	5	0	0	5	5	5	5	3	na	na	3	na	na	3	5	0	na	5	5	5	
	Lack of Weeds	15	6	6	0	6	6	9	2	6	9	2	9	2	9	6	9	2	2	6	6	6	4	0	13	0	
	Understorey	25	15	10	10	10	15	15	5	5	15	5	5	5	5	10	5	15	10	5	5	10	5	15	20	5	
	Recruitment	10	10	3	5	5	6	3	10	10	10	5	5	0	5	3	5	3	5	0	10	3	3	10	10	0	
	Organic Matter	5	5	5	5	5	5	3	4	5	5	3	5	4	3	5	5	4	5	4	5	5	3	3	3	3	
	Logs	5	4	na	2	2	2	3	0	4	2	2	na	4	na	na	2	na	na	2	2	2	na	Na	0	3	
	Total Site Score		49	24	22	37	45	33	21	39	52	28	29	24	22	24	35	24	22	26	37	26	17	33	51	26	
	EVC standardiser (x 75/55)		1	1.36	1	1	1	1	1	1	1	1	1.25	1	1.36	1.36	1	1.36	1.36	1	1	1	1.36	1.25	1	1	
	Adjusted Condition Score		49	32.6	22	37	45	33	21	39	52	28	36.2	24	30	32.7	35	32.7	30	26	37	26	23.2	41.3	51	26	
Landscape Score		25	3	3	3	3	3	3	3	3	17	7	2	2	3	3	4	2	2	2	2	3	2	2	14	14	
Habitat Score (out of 100)			52	36	25	40	48	36	24	42	69	35	38	26	33	36	39	35	32	28	39	29	25	43	65	40	
Habitat points = #/100		1	0.52	0.36	0.25	0.40	0.48	0.36	0.24	0.42	0.69	0.35	0.38	0.26	0.33	0.36	0.39	0.35	0.32	0.28	0.39	0.29	0.25	0.43	0.65	0.40	
Habitat Zone extent (ha)			9.55	0.06	0.61	0.61	0.99	0.36	0.21	0.28	4.12	0.99	1.93	0.60	1.06	0.34	2.04	0.34	4.71	0.53	0.83	0.06	0.13	0.05	1.39	1.31	33.10
Habitat Hectares (Hha)			4.97	0.02	0.15	0.24	0.48	0.11	0.05	0.12	2.84	0.35	0.73	0.16	0.35	0.12	0.80	0.12	1.51	0.15	0.32	0.02	0.03	0.02	0.90	0.52	**15.08**

DHW = Damp Heathy Woodland, PSW = Plains Sedgy Wetland, HW = Heathy Woodland, LF = Lowland Forest, DHS = Damp Heathy Scrub,
SRW = Swampy Riparian Woodland, SS = Swamp Scrub, DS = Damp Sands Herb-rich Woodland, PGW = Plains Grassy Wetland, TM = Tall Marsh

5.2.4 Proposed removal of native vegetation

Origin Energy have examined the extent and condition of native vegetation in association with the proposed construction requirements. After careful design of the proposed route and associated construction footprint the selected route would result in the removal of 1.03 ha of native vegetation patches which equates to 0.35 habitat hectares (Figure 2).

Nine scattered trees would also be impacted and this equates to an additional 0.639 ha of vegetation (each tree is allocated an area of 0.071 ha).

Therefore, under the Guidelines, a total of 1.670 ha of native vegetation would be impacted by the construction of the MEG line.

5.2.5 Determining the risk-based pathway

To determine the risk based pathway for the permit application, two factors are considered: **location risk** and **extent risk**.

Location risk has been pre-determined by DEPI for all locations in Victoria. The location of a particular site is determined using the *Native vegetation location risk map* available in the Native Vegetation Information Management (NVIM) system (http://nvim.depi.vic.gov.au).

The extent risk is based on the extent of native vegetation proposed to be removed. Extent risk is determined with reference to:

- the area of any remnant patches of native vegetation proposed to be removed
- the number of any scattered trees proposed to be removed

The final proposed design will require the removal of 1.670 ha of native vegetation (including nine scattered trees). Most of this impact is within Location A although some of the proposed clearing may also impact on areas mapped as location B and C. The application for removal of this native vegetation would therefore be assessed in either the moderate (greater than one hectare of vegetation impacted) or High (any impact on Location C) risk-based pathway.

5.3 Offsetting the loss of native vegetation

In order to ensure a gain to Victoria's biodiversity that is equivalent to the loss resulting from permitted clearing of native vegetation, compensatory offsets are required. Losses and gains are measured in biodiversity equivalence units.

Under the Moderate/High risk assessment pathway data on the extent and condition of native vegetation within the proposed alignment footprint was submitted to the DEPI Native Vegetation Support group to determine the offset prescription associated with the proposed clearing.

The specific-general offset test will determine if a general offset, specific offset or combination of both is required for moderate and high risk-based pathway applications.

5.3.2 Specific-general offset test

As the risk-based pathway is likely to be either high or moderate, and the vegetation which could be removed provides habitat for rare or threatened species, the specific-general offset test has been applied by DEPI's Native Vegetation support team to determine the offset type required (DEPI 2013a).

Where the extent of impact to native vegetation is greater than the specific offset threshold for any give rare or threatened species, a specific offset would be required. If this threshold is not exceeded for any species, a general offset would be prescribed.

5.3.3 General offsets

The size of the general offset is determined by calculating the general biodiversity equivalence score of the vegetation to be removed.

The general biodiversity equivalence score is calculated as the product of two characteristics of the native vegetation to be cleared:

- Site based condition and extent measured in habitat hectares.
- The weighted average 'strategic biodiversity score' of the vegetation which provides a landscape scale assessment of the vegetation's' importance to Victoria's biodiversity. The strategic biodiversity score is provided via the NVIM.

These characteristics are combined to obtain an overall measure of the contribution to biodiversity that is lost from removing native vegetation. The same units are used to quantity vegetation offset requirements where the biodiversity equivalence score provides a measure of the contribution to biodiversity that is gained from securing and managing an offset.

General offset requirements are calculated as the product of the general biodiversity equivalence score and an 'offset risk factor'. The offset risk factor adjusts the offset to adequately accommodate the risk that an offset may fail to make the required contribution to Victoria's biodiversity. For low risk-based pathway assessments the offset risk factor is set at 1.5.

Any offset must have the following required attributes:

- A strategic biodiversity score of at least 80 per cent of the strategic biodiversity score of the clearing site.
- Be located in the same Catchment Management Authority (CMA) boundary or municipal district as the native vegetation to be removed.

5.3.4 Specific offsets

Specific offset requirements are calculated as the product of habitat hectare removal and the habitat importance score to derive a specific biodiversity equivalence score. An 'offset risk factor' is then applied to this score. The offset risk factor adjusts the offset to adequately accommodate the risk that an offset may fail to make the required contribution to Victoria's biodiversity. For specific offsets the offset risk factor is set at 2:

Specific Biodiversity Equivalence Score = Habitat hectares to be removed x Habitat Importance Score

Offset amount required = Specific Biodiversity Equivalence Score x 2.

5.4 Offset Requirements

The offset requirements for this project are documented in the Biodiversity impact and offset requirements report provided by the DEPI Native Vegetation support team (Appendix 5). The offsets amount to the provision of 0.244 General Biodiversity Equivalence Units (GBEU).

This offset prescription will be provided as a third party offset, either using any exiting offset credits owned by Origin Energy or through the purchase of an existing offset credit through an accredited offset provider. To remain consistent with the Biodiversity Assessment Guidelines, any offset prescription must be satisfied prior to the clearing of native vegetation.

6. Key Ecological Values, Potential Impacts and Recommendations

This section identifies the key ecological values of the study area. It also provides an outline of potential implications of the currently proposed construction footprint (as shown in Figure 2) on those values for the central study area and includes recommendations which assisted Origin Energy in minimising impacts on biodiversity. The assessment of potential impacts does not include impacts associated with the operation of the drill site.

The primary measure to reduce impacts to biodiversity values within the study area is to minimise removal of native vegetation, terrestrial and aquatic habitat. The biodiversity information in this report was considered during the design phase of the project, and informed key decisions about the selected route and its construction footprint. Priority was given to highest value areas and retaining larger areas in preference to numerous smaller ones. The value of roadside vegetation as a habitat corridor within a broader agricultural landscape was also considered.

6.1 Native vegetation removal

All areas of vegetation/habitat nominated in the design plan as 'retained' are to be treated as no-go zones and are not to be encroached upon as work progresses.

Where possible, the extent of clearing should be minimised and the nominated footprint treated as the maximum extent of vegetation to be cleared. The data provided in this report covers the requirements associated with an assessment under the moderate and high risk pathway.

6.2 EPBC Act listed species

6.2.2 Square Raspwort

Potential impacts to this species are based on the presence of potential habitat associated with riparian zones impacted by construction works. This large perennial herb would have been observed in these habitats if it was present although no targeted survey has been undertaken.

Recommendations to avoid and/or minimise impacts on potential Square Raspwort habitat include the following:

- Works should be restricted to the current proposed footprint to avoid clearing of additional areas of higher quality riparian habitat mapped in Figure 2.
- Undertake targeted survey in areas of potential habitat if clearing of this habitat cannot be avoided.

6.2.3 Southern Brown Bandicoot and Long-nosed Potoroo

Potential impacts to the Southern Brown Bandicoot and Long-nosed Potoroo associated with the construction of the pipeline includes loss/disturbance to habitat, injury and/or mortality from construction activities, loss of habitat connectivity, and indirect impacts on behavior associated with disturbance.

The likely occurrence of Southern Brown Bandicoot and Long-nosed Potoroo within the study area is based on potential habitat identified through field assessments. No targeted survey has been undertaken within the Central study area.

The current proposed construction footprint reduces the amount of potential habitat to be directly impacted by the project to several small patches of vegetation, as identified on Figure 2.13, 2.25, 2.26, 2.29, 2.30 and 2.31. These areas are small and the removal of potential habitat is relatively minor compared to the overall available habitat in the surrounding landscape. The use of these habitat patches by Southern Brown Bandicoot and Long-nosed Potoroo is currently unknown; therefore the level of impact cannot be quantified with certainty.

Recommendations to further avoid and/or minimise impacts on potential Southern Brown Bandicoot and Long-nosed Potoroo habitat include the following:

- Works should be restricted to the current proposed construction footprint to avoid/minimise clearing of additional areas of higher quality habitat mapped in Figure 2.
- Undertake targeted survey in areas of potential habitat to be impacted to gain further certainty of likely impacts. Surveys using remote cameras can be undertaken year round, however, the preferred timing is in autumn when populations are likely to be at their peak following recruitment of juveniles.
- Restrict all construction activities to day-light hours to minimise disturbance (i.e. lighting, noise, vibration) to movement and foraging activities undertaken at night.
- Allow for a 30 m buffer around patches of habitat to reduce the impacts of disturbance and habitat loss/degradation (DSEWPaC 2011).
- Engage an ecologist to complete pre-clearance survey of the site immediately before clearing of vegetation to capture and release individuals or ensure they move freely from the construction area.
- Enforce hygiene protocols to reduce the risk of spread or introduction of weeds and plant and animal pathogens within areas of potential habitat.
- Avoid impacts on habitat connectivity (i.e. clearing the alignment through connected linear habitat) through the use of trenchless construction techniques. Examples of sections are where the alignment intercepts road reserves or vegetated waterways are shown in Figure 2.9, 2.13, 2.16, 2.20, 2.21, 2.25, 2.26, 2.27, 2.29, 2.31, and 2.32.
- If habitat connectivity is impacted, mitigate through the reinstatement of habitat features as soon as possible following construction.
- Install construction fencing to prohibit the access of small mammals into the construction site and close trenches overnight.
- Ensure any open trenches are inspected on a daily basis at first light to remove any captured animals.

6.2.4 Southern Bent-wing Bat

There is potential for Southern Bent-wing Bat to forage throughout the study area. However, as a highly mobile species, the study area is likely to provide a small area of habitat within a wider area of the surrounding landscape. Potential impacts from the project are expected to be minor, short-term disturbances from noise and light as a result of construction activities.

Recommendations to avoid and/or minimise impacts on Southern Bent-wing Bats include the following:

- Restrict all construction activities to day-light hours to minimise disturbance (i.e. lighting, noise, vibration) to movement and foraging activities undertaken at night.
- Any lighting should be positioned as close to the ground as is practical and should be shielded so that light is directed toward the ground only.
- To the extent practicable, all light sources should be shielded to minimise light spill toward any surrounding habitat patches.

- Use lighting that is least attractive to insects, such as orange/yellow lights. This can be achieved through low-frequency lighting as opposed to high frequency bright white lighting.

6.2.5 Growling Grass Frog

During the present assessment, potential habitat for the Growling Grass Frog is identified within the large wetland south of Squibbs Road (Figure 2.28) and the creek north of Callaghans Road (Figure 2.9). Within the previously assessed East and West sections of the study area, several additional wetlands within the landscape provide potential habitat.

If present, potential impacts associated with construction of the pipeline include direct loss off or disturbance to habitat, and injury and/or mortality from construction activities. Several indirect impacts include habitat degradation as a result of altered hydrology, sedimentation and/or pollution, and the introduction of weeds and pathogens. Disturbance to behaviour through noise and lighting has the potential to impact this primarily nocturnal species.

The current proposed footprint avoids direct impacts to the wetland south of Squibbs Road. Although works are likely to occur within potential terrestrial habitat for the Growling Grass Frog, the recommendations provided below aim to minimise impacts on the species at this location. Potential habitat identified within the creek north of Callaghans Road is likely to be impacted as a result of the current proposed footprint. The impact area is relatively small and localised and is unlikely to constitute a significant impact to the species. However, survey at this location may be undertaken to determine if the species is present and further assess the level of potential impact.

Recommendations to avoid and/or minimise impacts on potential Growling Grass Frog habitat include the following:

- Undertake targeted survey to determine presence within the creek north of Callaghans Road if construction activities cannot avoid these areas. Surveys should be undertaken during the core breeding period for the species (November-December), but this can be extended through to March when the frogs are still active.
- Ensure appropriate hygiene protocols are enforced to avoid the introduction or spread of amphibian Chytrid fungus.
- Restrict all construction activities to day-light hours to minimise disturbance (i.e. lighting, noise, vibration) to movement and foraging activities undertaken at night.
- Allow a terrestrial buffer of 200 m around wetland habitat. If works are to occur within this terrestrial buffer, engage an ecologist to complete pre-clearance survey of the site immediately before site clearing (e.g. stripping of vegetation and topsoil) to capture and release individuals to the adjacent wetland.
- If any Growling Grass Frogs are found during construction activities, implement a contingency plan to capture and release individuals to nearby suitable habitat. The contingency plan should be developed and included in a Construction Environment Management Plan (CEMP) prior to any works being undertaken.
- Protect water quality by installing sediment fences along the construction corridor where sediment laden run-off has potential to impact on waterways. Ensure they are monitored to remain effective throughout the construction period.

DEPI may consider capture and movement of threatened species to require assessment by the DEPI Translocation Evaluation Panel, depending on distance of movement and level of population impact. We consider this unlikely as potential impact is likely to be low.

6.3 Disturbance (Dust, noise & lighting)

Disturbance is a non-physical form of habitat alteration associated with human activities, and may include impacts such as dust, noise and lighting. Potential dust, noise and lighting impacts are expected to be associated with construction activities and installation of the pipeline. In general, these impacts are likely to be relatively short-term and localised to the area under construction.

6.3.2 Dust

Vehicle movements, earthworks and use of machinery generating increased levels of dust may impact on native flora and fauna and surface water ecosystems. Dust settling on vegetation affects the health of flora and has potential to impact on fauna that feed on the vegetation. An unnatural increase in dust levels may impact the health of terrestrial fauna. Dust may cause a potential deterioration in water quality (increased turbidity in particular) as a result of dust settling within or in the vicinity of waterbodies where runoff into the waterway is likely to occur (e.g. banks and riparian zones). Any contaminants that may be contained within the dust can exacerbate these effects.

Recommendations to avoid and/or minimise impacts associated with dust include the following:

- Monitoring dust levels.
- Suppressing dust with water sprays, ensuring water does not enter any nearby watercourses or areas of native vegetation.
- Minimising construction activities on days of high wind if unacceptable levels of dust are likely to be generated.
- Minimising the area of exposed ground within the construction site.
- Minimising the number of vehicle movements.
- Requiring all workers to participate in induction to ensure they are aware of the potential impacts of their activities and understand the restrictions on construction activities that generate unacceptable levels of dust.

6.3.3 Noise

Many animals detect and depend on sound to communicate, navigate, avoid danger and find food. Human-made noise can alter the behaviour of animals or interfere with their normal functioning and can harm the health of animals as well as alter reproduction, survivorship, habitat use, distribution, abundance, or genetic composition (Bowles 1997, in Forman et. al. (2002)). Noise in the sense of a disturbance can also harass an animal, threatening it or cause discomfort. Much of the research on the impacts of noise is associated with the disruption of wild animals' abilities to communicate (find a mate), navigate (movement or migration), avoid danger or find food.

The proposed construction and installation of the pipeline is likely to involve elevated levels of noise within the local landscape as a result of loud machinery and increased human activity.

Recommendations to avoid and/or minimise impacts associated with noise include the following:

- Buildings and other infrastructure where people will congregate should be located as far from areas of habitat (e.g. native vegetation and waterbodies) as practicable.
- Minimise numbers of personnel and vehicles in areas of native vegetation and other fauna habitat (e.g. wetlands, watercourses), especially at night.
- Limit construction activities to daylight hours to avoid disturbance to foraging nocturnal species.

6.3.4 Lighting

Artificial lights can have a number of deleterious effects on terrestrial fauna and this seems particularly to be the case for mammals and migrating birds. Of most concern are the nocturnal mammal species which forage and move about mostly during the night, which is generally devoid of bright or focused light sources, especially sources low to the ground. Species which rely on concealment to reduce predation risk during nocturnal foraging can be severely affected by artificial lighting (Rich and Longcore 2006). The same authors highlight the negative effect that artificial lighting can have on 'wildlife corridors', such as the linear remnants along many of the road reserves within the study area.

Diurnal rhythms and day-length are extremely important components of animal behaviour and biology. While some species avoid full moon, others are known to prefer foraging at this time. Extra lighting is known to benefit some bats, as the increased lighting attracts insects (Outen 2003, Rich and Longcore 2006). Night-length can be very important for birds, as it can determine the onset of the breeding season and migration. Artificial lighting can induce hormonal, physiological and behavioural changes that initiate breeding in birds (Farner 1964; Lofts and Merton 1968). There is little evidence of direct light attraction or repulsion in reptiles, although geckos will feed on insects attracted by light, and artificial illumination can disorient newly hatched marine turtles. Some frogs avoid light while others are attracted to light. This is generally an issue where amphibians sit under street lamps and become traffic victims (Outen 2003).

Artificial lights can be very disorienting and the cause of disabling responses that may 'trap' large numbers of birds within a light pool. Under some circumstances this can lead to large scale mortalities of birds. These effects have been documented since the introduction of lighthouses, navigation beacons and lightships. Reviews of these and other effects of artificial lighting on sea birds are provided in Gauthreaux and Belser (2006) and Montevecchi (2006). Light sources that are directed upward to illuminate buildings, bridges and other structures have been shown to attract and interfere with the behaviour of some migrating bird species. This effect is evident on occasions with Silver Gulls near the Westgate and Bolte bridges in Melbourne.

Attraction of insects to artificial light sources has in some cases increased bat activity due to increased prey numbers. While this may not necessarily have a negative impact on bats, it should be noted that this would be an altered behaviour. Opportunity for owls which prey on bats may also be increased.

Recommendations to avoid and/or minimise impacts associated with lighting includes the following:

- Restrict construction activities to daylight hours to avoid the use of lights.
- If the use of lights cannot be avoided, then lighting should be positioned as close to the ground as is practical and should be shielded so that light is directed toward the ground only. Note that light shining upward can be a cause of problems to birds, especially during nights of low cloud ceiling.
- To the extent practicable, all light sources should be shielded to minimise light spill toward any surrounding habitat patches.
- Utilise lighting that is least attractive to insects, such as orange/yellow lights. This can be achieved through low-frequency lighting as opposed to high frequency bright white lighting.

6.4 Water crossings

The results of the aquatic and physical assessments have identified assets or features that may need to be incorporated into the CEMP at the discretion of Worley Parsons. Recommendations at each waterway crossing include preferred timing, fencing, bed/bank stabilisation, erosion and/or sediment control measures, installation method and any other site specific. The relevant Catchment Management Authority may also provide recommendations for each of the waterway crossings upon receipt of the application of the Works on Waterways permits application, which is recommended to be prepared by an appropriate engineer or the project manager.

While there is no legislative requirement to avoid Burrowing Crayfish habitat within the alignment, Burrowing Crayfish burrows were observed at several sites and a proposed buffer has been identified in Figure 2. The proponent, at its discretion, may elect to avoid these areas by undertaking horizontal directional drilling.

While protection of beds and banks of waterways will lead to the improved protection and conservation of ecological values, all sites occur within a highly modified agricultural environment and any benefits gained from on site restoration activities beyond returning the terrain to its previous form will have very little ecological benefit.

6.4.2 HS-AQ1 (unnamed waterway)

It is recommended that the MEG pipeline be installed via trenching during late winter and early spring. The completion of the installation of the pipeline during this time will allow for quicker reestablishment of vegetation on the backfilled soils and reduce the need to rely on sediment fencing. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. As the site occurs within pasture it is not recommended that any site rehabilitation is undertaken beyond restoring the terrain to its previous state.

6.4.3 HS-AQ2 (Spring Creek)

It is recommended that the MEG pipeline be installed via trenching during late winter and early spring. The completion of the installation of the pipeline during this time will allow for quicker reestablishment of vegetation on the backfilled soils and reduce the need to rely on sediment fencing. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. This site within the alignment is a deeply incised channel that may require the installation of stream bed armouring post-construction although a reduction in the angle of stream batter/bank within the alignment may provide a better outcome for site rehabilitation.

6.4.4 HS-AQ3 (unnamed waterway)

It is recommended that the MEG pipeline be installed via trenching during late winter and early spring. The completion of the installation of the pipeline during this time will allow for quicker reestablishment of vegetation on the backfilled soils and reduce the need to rely on sediment fencing. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. As the site occurs within pasture it is not recommended that any site rehabilitation is undertaken beyond restoring the terrain to its previous state.

6.4.5 HS-AQ4 (unnamed waterway)

It is recommended that the MEG pipeline be installed via trenching during late winter and early spring. The completion of the installation of the pipeline during this time will allow for quicker reestablishment of vegetation on the backfilled soils and reduce the need to rely on sediment fencing. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. As the site occurs within pasture it is not recommended that any site rehabilitation is undertaken beyond restoring the terrain to its previous state.

6.4.6 HS-AQ5 (Curdies River)

It is recommended that the MEG pipeline be installed via horizontal direct drilling (HDD) to avoid impacts to the waterway and associated floodplain. It is recommended that the eastern extent of drilling commence

beyond 87 m east of the waterline and exit 12 m west of the waterline. Total distance, inclusive of stream width (19 m), is 118 m.

6.4.7 HS-AQ6 (unnamed tributary of Curdies River – east)

It is recommended that the MEG pipeline be installed via trenching during late winter and early spring. The completion of the installation of the pipeline during this time will allow for quicker reestablishment of vegetation on the backfilled soils and reduce the need to rely on sediment fencing. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. While there is no legislative requirement to avoid Burrowing Crayfish habitat within the alignment, Burrowing Crayfish burrows were observed at this site and a proposed buffer has been identified in Figure 2.19. As the site occurs within pasture it is not recommended that any site rehabilitation is undertaken beyond restoring the terrain to its previous state.

6.4.8 HS-AQ7 (Port Campbell Creek)

The MEG pipeline is proposed to be installed via trenching. It is recommended that works be undertaken at this site between late spring and early autumn. The completion of the installation of the pipeline during this time will allow for work to be undertaken during low flow scenarios and reduce the impacts of sedimentation. It is recommended that silt curtains be deployed downstream of the site to reduce the transport of sediments downstream. Rock armouring has previously been installed at this site from previous stream bed restoration activities, this should be reinstated post construction. While there is no legislative requirement to avoid Burrowing Crayfish habitat within the alignment, Burrowing Crayfish burrows were observed at this site and a proposed buffer has been identified in Figure 2.38. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary.

6.4.9 HS-AQ8 (Whiskey Creek Tributary)

A small reach of this tributary is within the alignment, with numerous Burrowing Crayfish burrows observed. While there is no legislative requirement to avoid Burrowing Crayfish habitat within the alignment, a proposed buffer has been identified in Figure 2.15. The avoidance of the area provided is unlikely to impact on the proposed alignment, but may require consideration in regards to the construction footprint.

6.4.10 HS-AQ9 (unnamed tributary of Curdies River - west)

It is recommended that the MEG pipeline be installed via trenching during late winter and early spring. The completion of the installation of the pipeline during this time will allow for quicker reestablishment of vegetation on the backfilled soils and reduce the need to rely on sediment fencing. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. This site within the alignment is a deeply incised channel that may require the installation of stream bed armouring post-construction although a reduction in the angle of stream batter/bank within the alignment may provide a better outcome for site rehabilitation.

6.4.11 HS-AQ10 (Leech Creek)

It is recommended that the MEG pipeline is to be installed via trenching. It is recommended that works be undertaken at this site between late spring and early autumn. The completion of the installation of the pipeline during this time will allow for work to be undertaken during low flow scenarios and reduce the impacts of sedimentation. It is recommended that silt curtains be deployed downstream of the site to reduce the transport of sediments downstream. A ford/culvert occurs immediately upstream of the alignment and is within the activity area. While there is no legislative requirement to avoid Burrowing Crayfish habitat within

the alignment, Burrowing Crayfish burrows were observed at this site and a proposed buffer has been identified in Figure 2.29. Periods of high rainfall should be avoided to prevent the transport of sediments downstream. The installation of sediment fencing at this site is likely to result in further disturbance of the site that may not be necessary. Restoration activities should include stream bed armouring to avoid ongoing deterioration of the stream bed post construction.

6.4.12 HS-AQ11 (Skull Creek)

It is recommended that the MEG pipeline be installed via horizontal direct drilling (HDD) to avoid impacts to the waterway and associated riparian vegetation, which is of high quality. It is recommended that the eastern extent of drilling commence beyond 5.5 m south of the waterline and exit 3.5 m north of the waterline. Total distance, inclusive of stream width (1 m), is 10 m.

6.5 Construction and post-construction management

Specific detail relating to preventing impacts to retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan (CEMP). This will include issues relating to contractors such as environmental inductions, installation of temporary fencing/signage, drainage and sediment control. The CEMP should be prepared by a qualified consultant to provide detailed advice on the habitat protection and longer-term management of retained vegetation and habitat features.

A summary of potential implications of development of the study area and recommendations to minimise impacts during the **design phase** of the project is provided in Table 7.

Table 7: Summary of key ecological values, potential implications of developing the study area and recommendations to minimise ecological impacts during the design phase.

Ecological feature (Figure 2)	Implications of development	Recommendations
Native vegetation	The permanent removal of patches of native vegetation and scattered trees. Removal of habitat for significant species: Potential loss of some individuals of Western Peppermint. Project is determined to be a moderate risk-based pathway. Potential spread of Cinnamon Fungus resulting in vegetation dieback	Minimise removal of native vegetation, in accordance with the Guidelines (no net loss). Refer to Section 5. Avoid and minimise removal of terrestrial habitat to retain habitat linkages within the local area. Avoid native vegetation along the Timboon Peterborough Road (HZ1 Figure 2.33) and HZ15 (Figure 2.23) to exclude impacts to Western Peppermint. Implement hygiene protocols along the construction alignment as directed by regulators.
Significant fauna species	Removal and/or disturbance of potential habitat for significant fauna species (as identified in Table 2).	Avoid and minimize disturbance to areas shown as potential habitat for Southern Brown Bandicoot, Long-nosed Potoroo and Growling Grass Frog (Figure 2). Restrict construction activities to daylight hours. Ensure strict hygiene protocols. Undertake pre-construction clearance checks.

Ecological feature (Figure 2)	Implications of development	Recommendations
		To provide further certainty on level if impacts, targeted survey for these species is recommended.
Aquatic habitat	Loss of, or alterations to, riparian and in-stream habitat within and in the vicinity of the study area (e.g. downstream) via direct removal, notable hydrological changes, deterioration in water quality (including pollution event) and sedimentation.	Avoid/minimise removal of terrestrial and/or aquatic habitat by designing to avoid or minimise instream works. At sites identified in Figure 3 where Burrowing Crayfish activity was recorded it is recommended that HDD be undertaken to avoid impacts to banks of identified watercourses at a minimum of 20 m from edge of watercourse and at a depth greater than 3 m below the stream bed. Place any storm water treatment/retention wetlands adjacent to waterways and not online. Protect key values (including waterways) by retaining features and including appropriate buffers into design. Develop and implement a water quality monitoring plan to maintain water quality within the SEPP Waters of Victoria objectives.
Habitat connectivity	Potential removal of vegetation / habitat that forms part of a notable habitat linkage.	Retain fauna habitat linkages within the development and the local area. A majority of the road reserves contain habitat that provide important linkages for threatened fauna. Design waterway crossings (including temporary crossings) in accordance with relevant guidelines from Melbourne Water or the Glenelg-Hopkins and Corangamite CMAs and in accordance with guidelines for fish friendly waterway crossings (Witheridge 2002, Fairfull & Witheridge 2003).
Native flora and fauna and their associated habitat	Potential introduction/dispersal of disease and pathogens, including Cinnamon Fungus *Phytophthora cinnamomi* Dieback	Ensure strict hygiene and wash-down procedures are implemented for all construction areas associated with native

Ecological feature (Figure 2)	Implications of development	Recommendations
	and Amphibian Chytrid fungus *Batrachochytrium dendrobatidis*, by plant, machinery and construction personnel.	vegetation and within close proximity to waterways and wetlands.
	Damage, injury and/or mortality of plants and animals through increased traffic and movement of construction vehicles and machinery.	Areas of retained native vegetation and fauna habitat must be protected through appropriate temporary fencing to restrict access. Additional sediment fencing is required for wetlands and waterways. Tree protection zones to be implemented prior to construction.
	Injury and/or mortality of fauna within open trenches.	Open trenches must be closed over night or have suitable egress points to allow animals to escape. Trenches remaining open overnight must be inspected each morning for any trapped fauna.
	Disturbance to fauna resulting from an increase in dust, noise and lighting from construction works.	Limit construction activities to daylight ours to reduce noise disturbance to nocturnal species and avoid the need for lighting. Implement dust suppression procedures during construction activities under dry conditions.

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