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MODIFICATION 4 ENVIRONMENTAL ASSESSMENT

Project

Appendix H

Alternative Water Pipeline Alignment Baseline Flora Report

Clean TeQ Holdings Limited

SYERSTON PROJECT MODIFICATION 4 ALTERNATIVE WATER PIPELINE ALIGNMENT BASELINE FLORA REPORT

October 2017

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EXECUTIVE SUMMARY

Scandium21 Pty Ltd (a wholly owned subsidiary of Clean TeQ Holdings Limited) proposes to seek a realignment of an approximately three kilometre section of the currently approved water pipeline associated with the approved Syerston Project. This realignment will form part of a Section 75W Modification to Development Consent (DA 374-11-00) for the Syerston Project, issued under Part 4 of the New South Wales *Environmental Planning and Assessment Act 1979* in 2001.

This is a report on the flora and vegetation communities in and around the proposed realignment.

The study area consisted of just over three kilometres of approximately 60 metres wide road easement, both sides of the road, starting to the west of Fifield and through Fifield by way of side streets then along Fifield Road to the south. The section of the study area from the west and through Fifield was not vegetated, consisting of maintained and disturbed areas. The vegetated areas of interest started just under 200m south down Fifield Road. In the vegetated areas the overall arrangement from the outer edge of the study area was vegetation (woodland/grassland) for approximately two thirds of the road easement width, then a grassy verge between the wooded areas and the edge of the sealed road.

Within the study area, the disturbance area in which the pipeline would be laid lies within 5 m from the edge of the sealed road (either side), an area consisting of native grasses, exotic plants and bare gravel. The disturbance area is not part of the original landform having been part of the initial road construction.

Three threatened flora species were recorded in the wider study area by AMBS Ecology and Heritage, *Tylophora linearis*, *Lepidium monoplocoides* (Winged Peppercress) and *Austrostipa wakoolica*. One endangered ecological community, a Western Grey Box community, was recorded within the study area but is located outside the extent of disturbance associated with the Modification.

1 INTRODUCTION

1.1 Background

The Syerston Project is situated approximately 350 kilometres (km) west-northwest of Sydney, near the village of Fifield, New South Wales (NSW). Scandium21 Pty Ltd owns the rights to develop the Project. Scandium21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ). Development Consent (DA 374-11-00) for the Project was issued under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) in 2001.

Clean TeQ proposes to realign approximately 3 km section of the currently approved 60 km water pipeline associated with the approved Syerston Project (Figure 1). This realignment will form part of a Section 75W Modification to Development Consent (DA 374-11-00) under the EP&A Act. The realignment is located in and near the town of Fifield in central western NSW, just over 40 km north east of Condobolin.

1.2 Flora and Vegetation Survey Objectives

Objectives of the flora and fauna surveys were to:

- document plant species growing across the study area by drawing on the results of past surveys and augmenting this information with that from the current survey;
- classify and map the distribution of vegetation communities across the study area; and
- target species, communities and populations listed as threatened both in the *NSW Threatened Species Conservation Act 1995* (TSC Act) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The following guidelines and policies were used to inform the methodology and outcomes of the surveys:

- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (Department of Environment and Conservation [DEC], 2004).
- *NSW Guide to Surveying Threatened Pants* (State of NSW and NSW Office of Environment and Heritage [OEH], 2016).
- *Survey Guidelines for Australia's Threatened Orchids* (Commonwealth of Australia, 2013).
- Profiles and guidelines specific to threatened species and communities (e.g. BioNet [OEH, 2016a] and the Vegetation Information System Classification 2.1 [OEH, 2015a]).
- *Threatened Species Survey and Assessment Guidelines* (OEH, 2015b).
- *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Department of Environment, Water Heritage and the Arts, 2009).

- *Guidelines for Threatened Species Assessment* (DEC and Department of Primary Industries [DPI], 2005).

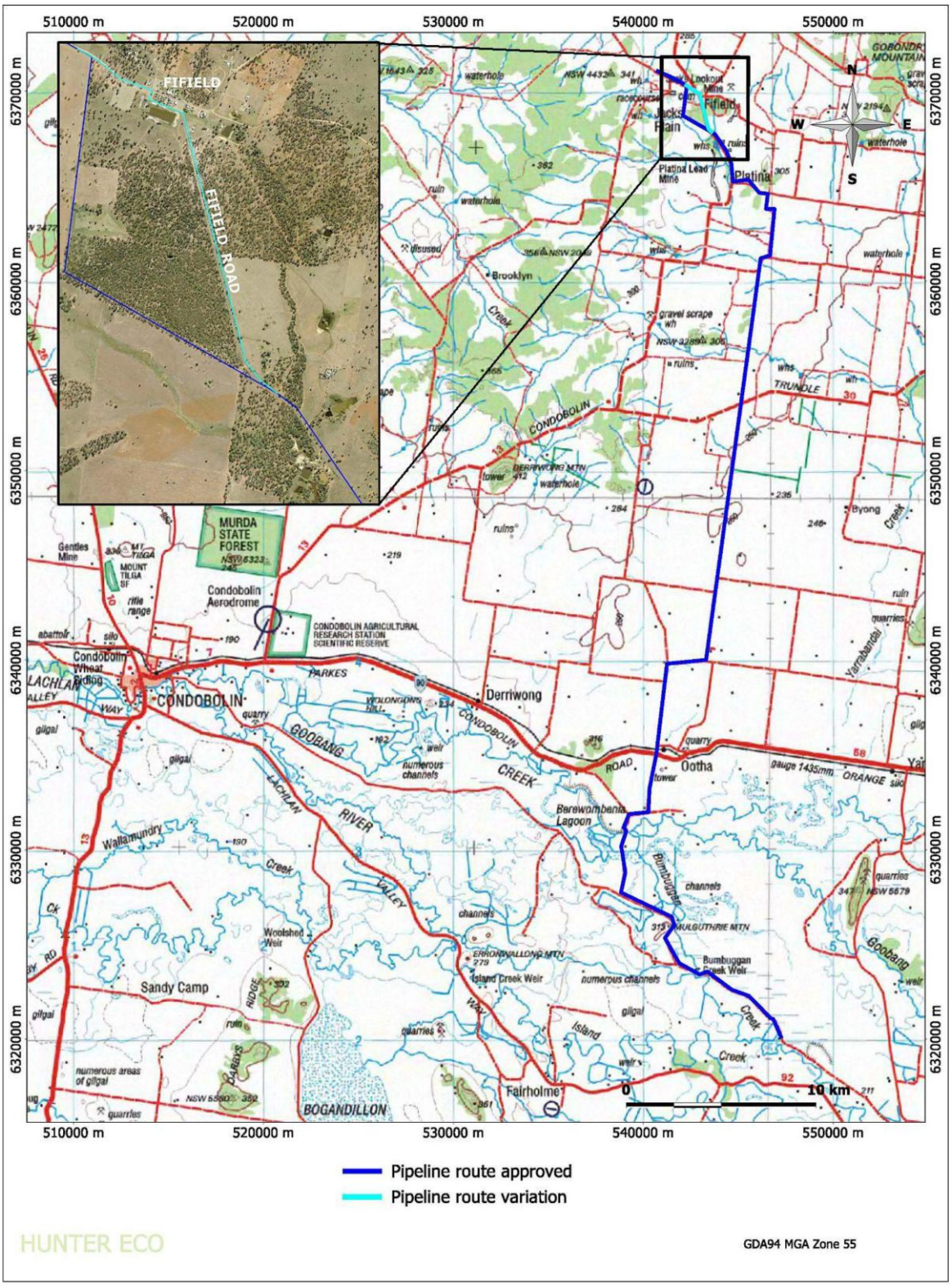

Figure 1 Regional Location

2 THE STUDY AREA REGION

2.1 Regional Setting

The study area is located in:

- Cobar Peneplain IBRA Region, Lachlan Plains subregion;
- Central West Local Land Services, Nymagee Rankins Springs subregion;
- Central Western Slopes Botanical Division; and
- Lachlan Local Government Area.

2.2 Mitchell Landscapes

Mitchell landscapes are areas of land with relatively homogenous geomorphology, soils and broad vegetation types which have been mapped at 1:250,000 scale. Each Mitchell landscape includes an estimate of the percent of native vegetation that has been cleared within the landscape (OEH 2016b).

The majority of the study area (central 2.4 km) is located in the 82% cleared Fifield Intrusives Mitchell Landscape. A small section (0.7 km) at the southern end is located in the 71% cleared Belmont Hills landscape and a smaller section (0.2 km) at the northern end is located in the Bogan Alluvial Plains landscape.

2.3 Topography and Drainage

The study area is located in a low relief widely undulating landscape with elevation from 208 to 300 m.

2.4 Geology and Soils

Geology across the study area is from the Ordovican period Palaeozoic era, Girilambone Group. The lithology is described as variously deformed and metamorphosed, micaceous, quartzose and quartz-lithic sandstone, pelite, chert; minor intercalations of polymictic conglomerate, siltstone, quartzite, and mafic and intermediate volcanics; black shale (Geoscience Australia 2015).

From the Australian Soil Classification (http://www.clw.csiro.au/aclep/asc/), soils in the study area are predominantly Rudosols and Tenosols along with Chromosols.

2.5 Climate

Climate data were extracted from the Australian Bureau of Meteorology (BoM) website (http://www.bom.gov.au/climate/data/), with weather stations nearest to Fifield being selected.

Rainfall data were obtained from the Trundle (Murrumbogie) weather station which shows that the area has mean annual rainfall of 477 mm with late Autumn to early Spring being slightly drier than late Spring and Summer (Figure 2) (BoM, 2016).

Temperature data were obtained from Condobolin Ag Research Station which shows an average annual mean temperature of 24.5 °C, with a range of 12.8 °C in July to 37.8 °C in January (Figure 3) (BoM, 2016).

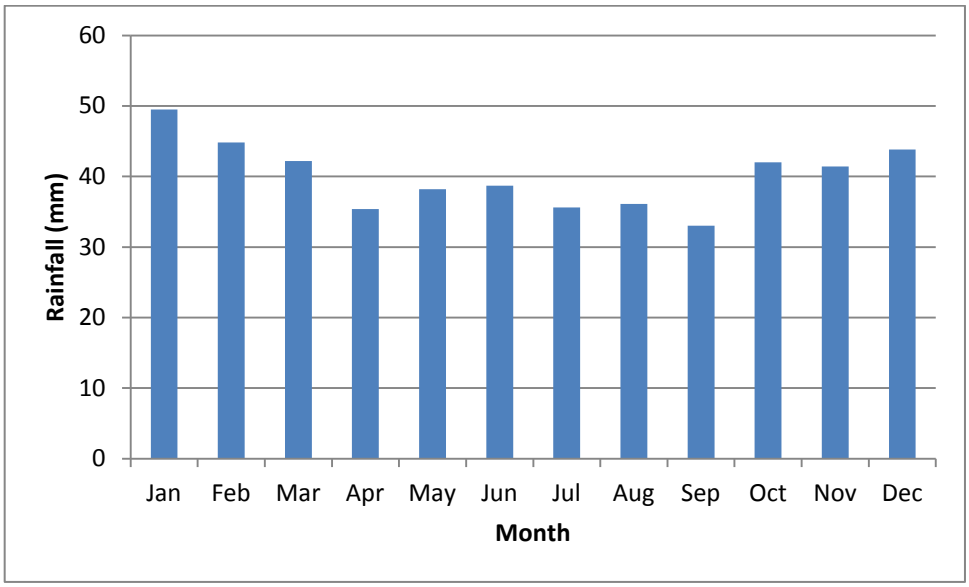

Figure 2 Average monthly rainfall at Trundle (Murrumbogie)

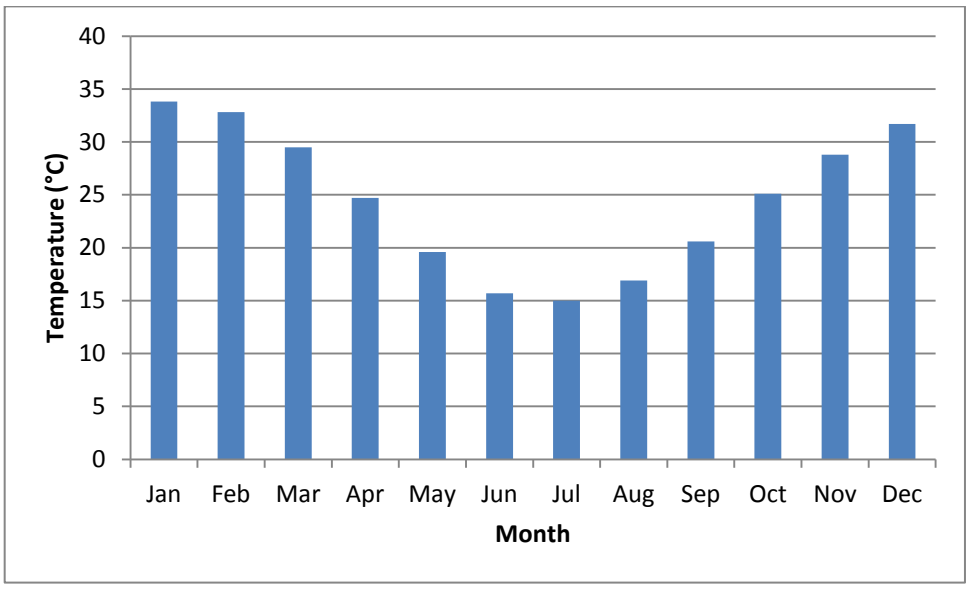

Figure 3 Average monthly temperatures at Condobolin Ag. Research Station

3 THE STUDY AREA AND DISTURBANCE AREA

The study area consisted of just over 3 km of approximately 60 m wide road easement, both sides of the road, starting to the west of Fifield, through Fifield by way of side streets then along Fifield Road to the south. The section of the study area from the west and through Fifield was not vegetated, consisting of maintained and disturbed areas. The vegetated areas of interest started just under 200 m down Fifield Road. Appendix 1 provides photographs of the study area.

Within the study area, the disturbance area in which the pipeline would be laid lies within 5 m from the edge of the sealed road (either side), an area consisting of native grasses, exotic plants and bare gravel. The disturbance area is not part of the original landform having been part of the initial road construction.

4 METHODS

4.1 Vegetation Classification and Mapping

The shape of the study area was a long narrow strip so the entire length of each side of the road was inspected. The vegetation communities were broadly defined according to the dominant canopy species

Using the floristic composition of these communities, they were then matched to the NSW vegetation classification hierarchy as follows:

1. Local Classification.
2. NSW BioMetric Vegetation Types (BVTs).
3. NSW Plant Community Types (PCTs).
4. NSW Vegetation Class (Keith, 2004).
5. NSW Vegetation Formation (Keith, 2004).

Where appropriate, classified communities were further stratified into condition classes.

Data from each community were collected from standard 20 m x 20 m floristic plots, from which each species was recorded and its cover/abundance scored using the Braun-Blanquet cover scale: 1 = <1%, 2 = 1 – 5%, 3 = 5 – 25%, 4 = 25 – 50%, 5 = 50 – 75% and 6 = 75 – 100%.

4.1.1 BioMetric Data

In addition to collecting floristic cover abundance data, BioMetric data were collected at each plot location in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014a) and the OEH policy Framework for Biodiversity Assessment (OEH, 2014b). BioMetric data provides input into the NSW BioBanking credit calculator (Department of Environment and Climate Change (DECC), 2008; Department of Environment, Climate Change and Water (DECCW), 2009). Collecting BioMetric data includes an extension to the 20 m x 20 m floristic plot to form a 20 m x 50 m plot. Data collected are:

- Total number of native plant species — 20 m x 20 m plot
- Native overstorey cover % — 50 m transect
- Native mid-storey cover % — 50 m transect
- Native ground cover grasses % — 50 m transect
- Native ground cover shrubs % — 50 m transect
- Native ground cover other % — 50 m transect
- Exotic plant cover % — 50 m transect
- Number of trees with hollows — 20 m x 50 m plot
- Overstorey regeneration % — entire stratified unit
- Length of fallen logs — 20 m x 50 m plot

4.2 Threatened Ecological Communities

Threatened ecological communities (TECs), both State and Commonwealth, likely to occur in the region were extracted from BioNet (OEH 2016a) and the EPBC Protected Matters search (Department of the Environment (DotE), 2016) site. Following vegetation community classification and mapping from field survey results, the floristic content of communities was compared with descriptions in the listed community determinations.

Three TECs (protected at the State and Commonwealth levels) were predicted to occur within the study area:

- NSW endangered ecological community *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions.*
- Commonwealth endangered ecological community *Grey Box* (Eucalyptus microcarpa) *Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*.
- NSW endangered ecological community *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes bioregions.*
- Commonwealth endangered ecological community *Weeping Myall Woodlands.*
- NSW endangered ecological community *White Box Yellow Box Blakely's Red Gum Woodland*.
- Commonwealth critically endangered *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, to be known informally as Box – Gum Grassy Woodland and Derived Grassland*.

4.3 Endangered Populations

No endangered populations were known or predicted for the Nymagee Rankins Springs subzone (OEH 2016a) or were predicted to occur within or in proximity to the study area based on the EPBC Protected Matters Search tool (DotE, 2016).

4.4 Targeted Searches for Threatened Species and Communities

Known and predicted threatened species were extracted from BioNet (OEH 2016a) for the Lachlan – Nymagee Rankins Springs IBRA subzone and from the EPBC Protected Matters Search tool (DotE, 2016). Following initial field habitat assessment these species were evaluated for their likelihood of occurring based on known habitat preferences (Appendix 2). Targeted surveys were conducted for those species for which suitable habitat was considered to be present. However, surveys were also conducted with the possibility in mind of previously unrecorded threatened species being present.

4.5 Survey Effort

Field surveys were conducted over three days from 4 – 6 April 2016. Weather conditions were fine, warm and clear with a moderate to strong breeze. Leading up to the survey, drying winds had resulted in some grasses and small herbs dying.

5 RESULTS

5.1 Vegetation Communities/Vegetation Types

Two woodland vegetation communities were present within the study area (Figure 4), one dominated by Mugga Ironbark (*Eucalyptus sideroxylon*) (Figure 5) and the other by Western or Inland Grey Box (*Eucalyptus microcarpa*) (Figure 6). The Mugga Ironbark community was in moderate/good condition, and the Western Grey Box community was stratified as moderate/good woodland and moderate/good predominantly derived native grassland.

The remaining land within the study area was mapped as cleared or low condition land (including maintained and disturbed areas) (Section 6.1.3) (OEH, 2014a, 2014b).

Table 1 provides the community classification hierarchy for the vegetation communities mapped within the extent of the study area.

No vegetation communities were recorded within the proposed disturbance area where it is classed as cleared land.

5.2 Threatened Ecological Communities

The Western Grey Box community identified within the study area is consistent with the following TECs:

- NSW endangered ecological community *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions;* and
- Commonwealth endangered ecological community *Grey Box* (*Eucalyptus microcarpa*) *Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*.

The two other TECs listed as possibly occurring in Section 5.2 were not present within the study area. There were no *Acacia pendula* or Box-Gum species, primarily *Eucalyptus albens, Eucalyptus blakelyi* or *Eucalyptus melliodora*.

Table 1 Vegetation Community Hierarchy within the extent of the study area

Local Community	PCT	BVT	PCT Name	Formation	Class	TEC NSW	TEC Commonwealth
Western Grey Box DNG	82	LA152	Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
Western Grey Box Woodland	82	LA152	Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
Mugga Ironbark Woodland	243	LA168	Mugga Ironbark - White Cypress Pine woodland on low rises mainly in the Cobar Peneplain Bioregion	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	None	None

DNG – derived native grassland.

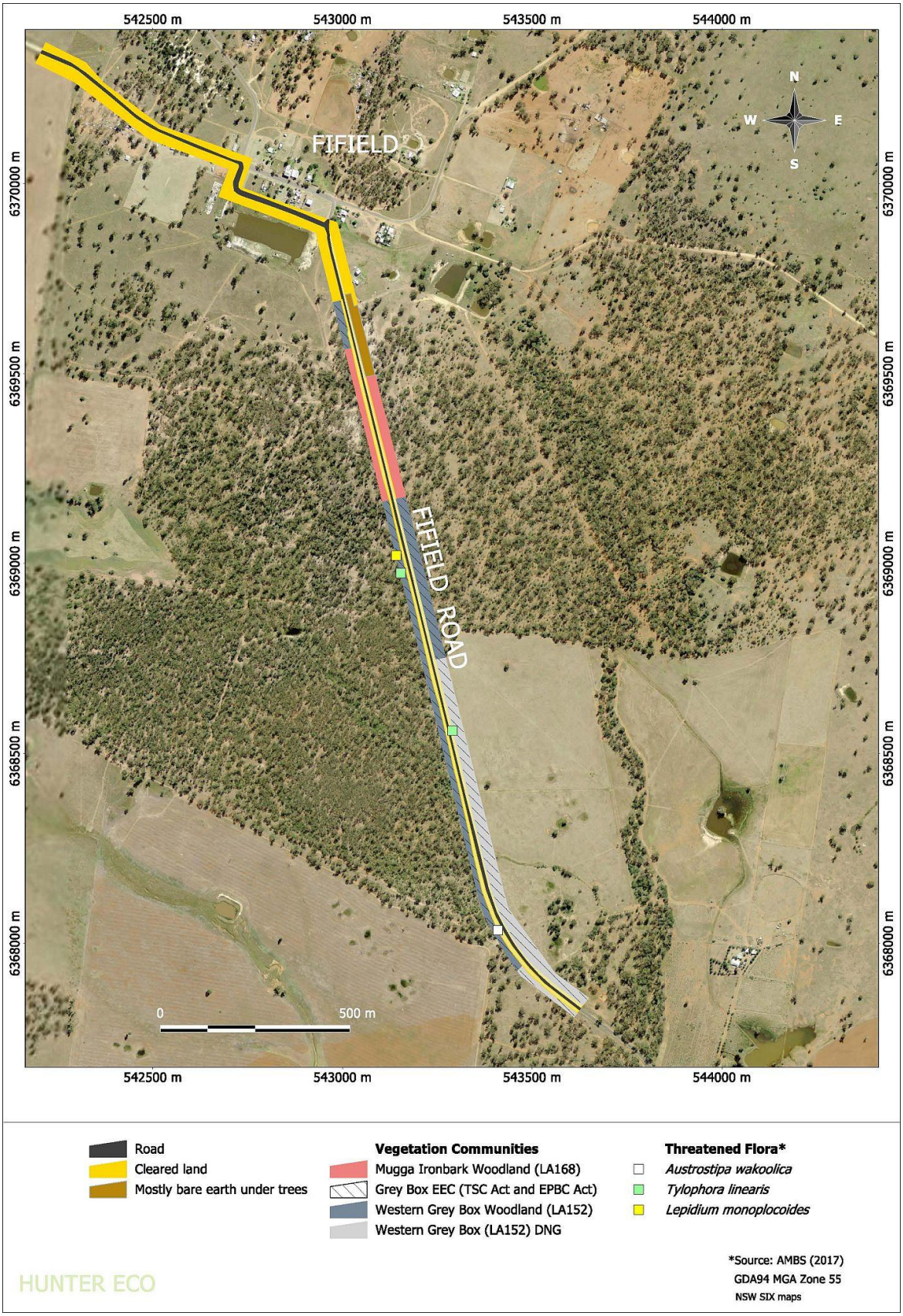

Figure 4 the study area, threatened flora and vegetation communitites

5.2.1 Mugga Ironbark Woodland

Figure 5 Mugga Ironbark Woodland

The Woodland is dominated by Mugga Ironbark (*Eucalyptus sideroxylon*) along with Dwyer's Red Gum (*Eucalyptus dwyeri*). Shrubs were *Acacia amblygona*, *Geijera parviflora, Dodonaea viscosa*, and *Pultenaea microphylla*. The ground was dominated by a variety of grass species such as *Austrostipa scabra subsp. falcata*, *Aristida ramosa, Enteropogon acicular*is and *Eragrostis elongata.*

The Mugga Ironbark Woodland is located outside of the proposed disturbance area.

5.2.2 Western Grey Box Woodland and Derived Native Grassland

Figure 6 Western Grey Box Woodland

Woodland dominated by Western Grey Box (*Eucalyptus microcarpa*). Southern portions of this community were predominantly cleared and have been stratified as native grass land derived from the original community (DNG). Shrubs included *Callitris glaucophylla, Eremophila mitchellii, Myoporum montanum, Dodonaea viscosa, Acacia dawsonii, Acacia hakeoides, Acacia oswaldii* and *Senna artemisioides.* Ground cover was predominantly grasses *Aristida leptopoda, Austrostipa blackii, Dichanthium sericeum, Echinochloa colona, Enteropogon acicularis* and *Sporobolus caroli*.

The Western Grey Box Woodland and Derived Native Grassland Communities are located outside of the proposed disturbance area.

5.2.3 Vegetation within the Disturbance Area

The vegetation within the proposed disturbance area (i.e. within 5 m of the sealed road) consisted almost entirely of native and exotic grasses, herbs and small shrubs. There were no canopy trees in this area.

Grasses: several *Aristida species, Austrostipa blackii, Austrostipa scabra subsp. scabra, Dichanthium sericeum, Echinochloa colona, Enteropogon acicularis, Eriochloa pseudoacrotricha* and *Sporobolus caroli*. Exotics: *Chloris virgata, Panicum miliaceum, Eragrostis curvula* and *Phalaris paradoxa.*

Herbs and small shrubs: *Calocephalus citreus, Calocephalus sonderi,* several *Calotis* species*, Leiocarpa panaetioides, Wahlenbergia communis, Enchylaena tomentosa, Salsola kali, Sclerolaena bicornis* var. *horrida, Sclerolaena birchii, Sclerolaena muricata, Senna artemisioides, Mentha satureioides* and *Solanum coactiliferum*. Exotics: *Bidens subalternans, Dittrichia graveolens* and *Lactuca saligna*.

5.3 Flora Species

Appendix 2 provides a list of all flora species recorded within the study area. In summary, 113 species were recorded which included 13 weed species. There were 75 genera from 33 families.

Three threatened flora species were recorded in the wider study area by AMBS Ecology and Heritage, *Tylophora linearis*, *Lepidium monoplocoides* (Winged Peppercress) and *Austrostipa wakoolica* (Figure 4) (Appendix 3). These plants were all within Western Grey Box Woodland. No threatened flora species were recorded in the cleared road verge where the proposed alternative water pipeline alignment would be located.

6 REFERENCES

AMBS Ecology and Heritage (2017). *Syerston Project Modification 4 – Water Supply Pipeline Realignment Threatened Flora Searches.*

Bureau of Meteorology (2016) *Climate Data Online.* Website: www.bom.gov.au/climate/data/

Commonwealth of Australia (2013) *Survey Guidelines for Australia's Threatened Orchids.*

Department of Environment and Conservation and Department of Primary Industries (2005). *Guidelines for Threatened Species Assessment.* NSW Government, Sydney.

Department of Environment and Climate Change (2008) *Biobanking Assessment Methodology 2014*. Website: http://www.environment.nsw.gov.au/resources/biobanking/140661BBAM.pdf

Department of Environment and Conservation (2004) *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft.*

Department of Environment, Climate Change and Water (2009) *Biobanking Assessment Methodology and Credit Calculator Operation Manual*. Website: http://www.environment.nsw.gov.au/resources/biobanking/09181bioopsman.pdf

Department of Enviornment, Water Heritage and the Arts (2009) *Matters of National Environmental Significance Significant Impact Guidelines 1.1*

Department of the Environment (2016) *EPBC Protected Matters Search Tool.*

Geoscience Australia (2015) Australian Stratigraphic Units Database. http://dbforms.ga.gov.au/pls/www/geodx.strat_units.sch_full?wher=stratno=27158

Keith D. (2004) *Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT.* NSW Government.

Office of Environment and Heritage (2014a) *NSW Biodiversity Offsets Policy for Major Projects*. Website: www.environment.nsw.gov.au/biodivoffsets/bioffsetspol.htm

Office of Environment and Heritage (2014b) *Framework for Biodiversity Assessment.* Website: http://www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf

Office of Environment and Heritage (2016a) *NSW BioNet the Website for the Atlas of NSW Wildlife.* Website: http://www.bionet.nsw.gov.au/

Office of Environment and Heritage (2015a) *Vegetation Information System: Classification*.
Website: http://www.environment.nsw.gov.au/research/Visclassification.htm

Office of Environment and Heritage (2015b) *Threatened species survey and assessment guidelines.*
Website: www.environment.nsw.gov.au/threatenedspecies/surveyassessmentgdlns.htm

Office of Environment and Heritage (2016b) Biodiversity Assessment Tools Databases.
http://www.environment.nsw.gov.au/biobanking/vegtypedatabase.htm

State of NSW and Office of Environment and Heritage (2016) *NSW Guide to Surveying Threatened Pants.*

APPENDIX 1 Site Photographs

Leading into Fifield from the north west

A disturbed work area at the northern end of Fifield road

The vegetation distribution on the western side of Fifield Road

The vegetation distribution on the eastern side of Fifield Road showing predominantly derived native grassland

APPENDIX 2 Flora Species Recorded

Family and Species	Mugga Ironbark	Western Grey Box
Acanthaceae		
Rostellularia adscendens		✓
Adiantaceae		
Cheilanthes sieberi	✓	✓
Amaranthaceae		
**Gomphrena celosioides*		✓
Alternanthera denticulata		✓
Ptilotus atriplicifolius		✓
Ptilotus obovatus var. *parviflorus*		✓
Asclepiadaceae		
Rhyncharrhena linearis		✓
Asteraceae		
**Bidens subalternans*		✓
**Conyza albida*		✓
**Conyza bonariensis*		✓
**Dittrichia graveolens*		✓
**Lactuca saligna*		✓
Calocephalus citreus		✓
Calocephalus sonderi		✓
Calotis cuneifolia		✓
Calotis hispidula		✓
Calotis lappulacea		✓
Cassinia aculeata	✓	
Cassinia laevis	✓	
Chrysocephalum apiculatum	✓	
Cotula australis		✓
Leiocarpa panaetioides		✓
Ozothamnus obcordatus		✓
Rhodanthe floribunda	✓	✓
Vittadinia cervicularis var. *subcervicularis*		✓
Vittadinia pterochaeta		✓
Vittadinia sp.		✓
Xerochrysum bracteatum		✓
Brassicaceae		
Lepidium pseudohyssopifolium		✓
Campanulaceae		
Wahlenbergia communis	✓	✓
Capparaceae		
Apophyllum anomalum		✓

Casuarinaceae		
Allocasuarina luehmannii	✓	✓
Chenopodiaceae		
Chenopodium glaucum	✓	
Einadia hastata	✓	
Einadia nutans		✓
Einadia nutans subsp. *linifolia*		✓
Einadia polygonoides		✓
Enchylaena tomentosa		✓
Salsola kali		✓
Sclerolaena bicornis var. *horrida*		✓
Sclerolaena birchii		✓
Sclerolaena muricata		✓
Convolvulaceae		
Convolvulus erubescens		✓
Cupressaceae		
Callitris glaucophylla		✓
Cyperaceae		
Carex inversa		✓
Cyperus fulvus		✓
Eleocharis acuta		✓
Fimbristylis dichotoma		✓
Euphorbiaceae		
Chamaesyce drummondii		✓
Fabaceae (Caesalpinioideae)		
Senna artemisioides subsp. *filifolia*		✓
Senna artemisioides subsp. *zygophylla*		✓
Fabaceae (Faboideae)		
Glycine clandestina		✓
Glycine tabacina		✓
Pultenaea microphylla	✓	
Fabaceae (Mimosoideae)		
Acacia amblygona	✓	
Acacia dawsonii		✓
Acacia deanei	✓	
Acacia doratoxylon	✓	
Acacia hakeoides	✓	✓
Acacia oswaldii		✓
Juncaceae		
Juncus flavidus		✓
Juncus remotiflorus		✓
Lamiaceae		
Mentha satureioides		✓

Lomandraceae		
Lomandra effusa		✓
Lomandra multiflora	✓	
Malvaceae		
Sida corrugata		✓
Myrtaceae		
Eucalyptus dwyeri	✓	
Eucalyptus microcarpa	✓	✓
Eucalyptus sideroxylon	✓	
Nyctaginaceae		
Boerhavia dominii		✓
Phormiaceae		
Dianella longifolia	✓	✓
Poaceae		
**Chloris virgata*		✓
**Eragrostis curvula*		✓
**Panicum miliaceum*		✓
**Paspalum dilatatum*		✓
**Phalaris paradoxa*		✓
Aristida calycina var. *calycina*	✓	
Aristida leichhardtiana	✓	
Aristida leptopoda		✓
Aristida ramosa	✓	
Austrostipa blackii		✓
Austrostipa scabra subsp. *falcata*	✓	✓
Chloris virgata		✓
Dichanthium sericeum		✓
Echinochloa colona		✓
Elymus scaber		✓
Enneapogon gracilis		✓
Enteropogon acicularis	✓	✓
Eragrostis alveiformis		✓
Eragrostis elongata	✓	
Eragrostis lacunaria		✓
Eriochloa pseudoacrotricha		✓
Panicum effusum	✓	
Panicum queenslandicum		✓
Paspalidium constrictum		✓
Poa tenera		✓
Rytidosperma bipartitum		✓
Rytidosperma caespitosum	✓	✓
Rytidosperma sp.		✓
Sporobolus caroli		✓

Polygonaceae		
**Polygonum aviculare*		✓
Rumex brownii		✓
Portulacaceae		
Portulaca oleracea		✓
Rubiaceae		
Asperula cunninghamii		✓
Rutaceae		
Geijera parviflora	✓	✓
Sapindaceae		
Dodonaea viscosa subsp. *angustifolia*		✓
Dodonaea viscosa subsp. *angustissima*	✓	
Dodonaea viscosa subsp. *cuneata*	✓	✓
Scrophulariaceae		
Eremophila mitchellii		✓
Myoporum montanum		✓
Solanaceae		
**Lycium ferocissimum*		✓
Solanum coactiliferum		✓
Stackhousiaceae		
Stackhousia muricata	✓	✓

APPENDIX 3 Syerston Project Modification 4 – Water Supply Pipeline Realignment Threatened Flora Searches

18 August 2017

John Hanrahan
Clean TeQ Holdings Limited – Syerston Project
PO Box 227
Mulgrave Victoria 3170

Dear John,

Syerston Project Modification 4 – Water Supply Pipeline Realignment Threatened Flora Searches

Scandium21 Pty Ltd (a wholly owned subsidiary of Clean TeQ Ltd) proposes to seek a realignment of the currently approved water pipeline associated with the approved Syerston Project.

Between 30 October and 4 November 2016, botanists Belinda Pellow and Ryan Sims from AMBS Ecology & Heritage Pty Ltd (AMBS) undertook targeted searches for threatened flora species listed under the New South Wales (NSW) *Threatened Species Conservation Act, 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) within a study area covering the proposed water supply pipeline realignment and surrounding vegetation. The study area followed Fifield Road and was approximately 20 metres (m) wide (including the hard road surface) and 3 km long (approximately 6 ha in total) (Figure 1).

Searches for threatened plant species were undertaken using techniques outlined in the NSW *Guide to Surveying Threatened Plants* (Office of Environment and Heritage [OEH] 2016a) and Cropper (1993).

No threatened flora species were recorded in the cleared road verge where the proposed water supply pipeline realignment would be located. Three threatened plant species were recorded within the study area in native woodland vegetation; *Tylophora linearis*, *Lepidium monoplocoides* (Winged Peppercress) and *Austrostipa wakoolica* (Figure 1). Confirmation of the identity of these species was made by the National Herbarium of NSW.

Tylophora linearis

Tylophora linearis is a slender twiner to herbaceous or woody small bush with rhizomatous roots. It has clear sap, cylindrical stems up to 3 millimetre (mm) diameter and opposite, dark green, linear leaves, 1-5 cm long and 0.5-3 mm wide. The stems and leaves are glabrous to sparsely haired, often with long white hairs on the bracts. The flowers which occur in Spring are 6-7 mm in diameter and are formed in umbels of between 2-8 (PlantNET 2016). They are often olive on the outside and purple to dark purple inside with dense to sparse hairs. The fruit is hairless, cigar shaped and approximately 100 mm long by 5 mm wide (PlantNET 2016).

Classified as Vulnerable in NSW (TSC Act) and Endangered Federally (EPBC Act), *Tylophora linearis* occurs on the western slopes of NSW in dry scrub and open forest on sedimentary flats (OEH 2016b).

Tylophora linearis were recorded in two locations in the study area. The first location (-32.8163, 147.4609) had 50 individuals and the second location (-32.8201, 147.4625) had 10 individuals. *Tylophora linearis* was found in Western Grey Box Woodland and was well shaded. The Western Grey Box Woodland was in moderate to good condition, being dominated by native species in all structural layers.

Lepidium monoplocoides

Lepidium monoplocoides is an erect, annual herb between 15-20 cm in height and varies between glabrous to scabrous. Leaves are also variable being 2-7 cm long and pinnatisect to entire. The inflorescence occurs in late winter to spring (OEH 2016b) and is borne on an elongated raceme and the petals are rudimentary to absent. Fruit or silicula is broad ovate to circular approximately 5 mm long and 4 mm wide, has an acute wing spreading the entire circumference and is notched at the apex (PlantNET 2016).

Classified as Endangered (TSC Act, EPBC Act), *Lepidium monoplocoides* is found in scattered locations on seasonally inundated heavy fertile soils of the western NSW plains. An ephemeral species, it is reliant on seasonal conditions of flooding or waterlogging and is often recorded periodically in concentrated local populations (OEH 2016b).

Lepidium monoplocoides was recorded in one location in native woodland (-32.8159, 147.4608). It was growing in Western Grey Box Woodland along the edge of a shallow drainage depression. Soils were brown clay and gravelly. Approximately 50 individuals were recorded in an area 20 m^2.

The condition of the vegetation at the population site was moderate to poor.

Austrostipa wakoolica

Austrostipa wakoolica is a perennial tussock grass. Growing to 1 m in height the leaves are 1.5-2.5 mm wide and densely hairy. Flowering occurs in Spring to Summer, but this varies in response to rain. The inflorescence is a spreading to moderately dense panicle up to 36 cm in length. Spikelets are 11-15 mm long excluding the awn and gaping, the lemma is 5.5-6.5 mm long and deep brown at maturity with a coma of erect hairs 2-2.5 mm long. Awns are 3.6-6 cm long and twice bent (PlantNET 2016).

Classified as Endangered (TSC Act, EPBC Act), this grass occurs in open woodland, swamp edges and flood plains associated with the Murray River tributaries in Central West and South West NSW (OEH 2016b).

Austrostipa wakoolica was recorded in one location in Western Grey Box Woodland (-32.8248, 147.4637). The condition of the vegetation at the population site was moderate to poor.

One individual was noted among several other species of the *Austrostipa* genus. It is likely that more individuals of this species occur in Western Grey Box Woodland; however, confirmation of the identification of this species from the others present is difficult in the field without a light source and microscope to examine the seed.

Yours sincerely

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References

Cropper, S.C. (1993). *Management of Endangered Plants*. CSIRO Publications Victoria.

Office of Environment and Heritage (2016a) *NSW Guide to Surveying Threatened Plants*. Office of Environment and Heritage, Hurstville, NSW

Office of Environment and Heritage (2016b) *NSW Vegetation Information System: Classification*. NSW Office of Environment and Heritage. http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx [accessed December 2016]

PlantNET (2016). *The NSW Plant Information Network System*. Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au [accessed November 2016]

Figure 1 Location of threatened plants, pipeline variation site