Queensland Hunter
Gas Pipeline

Appendix D
Biodiversity assessment

Queensland Hunter Gas Pipeline

Queensland
Hunter Gas Pipeline

Biodiversity Assessment

September

prepared by

ngh environmental

planning • assessment • ems • auditing

Document Verification

Job title	Queensland to Hunter Gas Pipeline

Document Title	Biodiversity Assessment
File Location	Jobs:'07 jobs:07002 Queensland Hunter Gas Pipeline Approval:07002 Documentation:Concept Plan:07002 Chapters-Public Exhibition:X - Appendicies:Appendix D:Appendix D - biodiversity:biodiversity final.doc

Revision	Date	Prepared by		Checked by		Approved by	
Vers 1	1.5.08	name	Natascha Arens	name	Erwin Budde	name	Nick Graham -Higgs
			N. Arens.				
Vers 2	26.5.08		Natascha Arens	name		name	Nick Graham -Higgs
			N. Arens.				
Final	1.9.08						
			N. Arens.				

ngh environmental

planning • assessment • ems • auditing

nghenvironmental prints all documents on sugar cane paper made from 100% bagasse (a by-product of sugar production).

206/410 elizabeth street surry hills **sydney**
nsw 2010 australia
t 61 2 8202 8333 **f** 61 2 9211 1374
web: www.nghenvironmental.com.au email: ngh@nghenvironmental.com.au

1/216 carp street (po box 470) **bega**
nsw 2550 australia
t 61 2 6492 8333 **f** 61 2 6494 7773

102/ 63-65 johnston st (po box 5464)
wagga wagga nsw 2650 australia
t 61 2 6971 9696 f 61 2 6971 9693

Suite 4/4, 234 naturaliste terrace
dunsborough wa 6281 australia
t 61 8 9759 1985 **f** 61 2 6494 7773

Contents

1 Introduction 1

1.1 Description of the Proposal 1

1.2 Background to the Proposal 2

1.3 Director General Requirements 3

2 Overview of the study area 5

3 Methodology 12

3.1 Assessment methodology 12

4 Results 18

4.1 Flora 18

4.2 Fauna 24

5 Potential impacts 33

5.1 Construction impacts 33

5.2 Potential impacts – operation 34

5.3 Summary of Impacts by map sheet 34

5.4 Cumulative Impact Assessment 70

6 Summary of Mitigation Measures 73

6.1 General Mitigation Measures 73

6.2 Specific Mitigation Measures 73

7 References 87

Figures

Figure 1-1 Location of the Gas Pipeline 4

Figure 2-1 Location of each of the Bioregions in relation to the proposal 11

Figure 3-1 Assessment methodology. 17

Figure 5-1 Biodiversity Constraints 35

Figure 5-2 - Biodiversity Constraints 38

Figure 5-3 Biodiversity Constraints 40

Figure 5-4 - Biodiversity Constraints 42

Figure 5-5 - Biodiversity Constraints 44

Figure 5-6 - Biodiversity Constraints 46

Figure 5-7 - Biodiversity Constraints 48

Figure 5-8 - Biodiversity Constraints 50

Figure 5-9 - Biodiversity Constraints 52

Figure 5-10 - Biodiversity Constraints 54

Figure 5-11 - Biodiversity Constraints 56

Figure 5-12 - Figure 5-12 Biodiversity Constraints 58

Figure 5-13 - Biodiversity Constraints 60

Figure 5-14 - Biodiversity Constraints 62
Figure 5-15 –Biodiversity Constraints 64
Figure 5-16 - Biodiversity Constraints 66
Figure 5-17 - Biodiversity Constraints 68

Table 1-1 – Design Specifications for the Gas Pipeline 1
Table 1-2 – General Construction Process for the QHGP 2
Table 3-1 Biodiversity impact significance criteria 14
Table 4-1 Threatened plant species with the potential to be impacted by the proposal 18
Table 4-2: Threatened fauna and lifecycle groups that require further investigation 25
Table 4-3 Water courses identified in the surface and ground water assessment as requiring further assessment 32
Table 6-1 – Summary of Constraints and areas for further investigation (AFI) 76
Table 6-2– Summary of additional site specific management measures - flora 85

1 Introduction

1.1 Description of the Proposal

Hunter Gas Pipeline Pty Ltd is proposing to construct an approximately 827km long high pressure gas transmission pipeline to supply gas from Wallumbilla in the Surat Basin of south central Queensland to the Newcastle area in New South Wales (NSW). The entire gas transmission line is referred to as the Queensland Hunter Gas Pipeline (QHGP). The pipeline is split into approximately 222km in Queensland and 603km in NSW. A lateral of about 10km extends from the main pipeline to the Maitland area. This concept biodiversity assessment refers to the 603km section of the QHGP from the NSW/Queensland border near Boomi to the Newcastle area (the proposal). Figure 1.1 shows the location of the pipeline.

The objectives of the proposal are to:

- Provide an alternative and secure gas supply to NSW, and in particular the Newcastle area.
- Provide NSW direct access to the rapidly expanding Queensland gas fields.
- Encourage exploration and development of gas fields in northern NSW.
- Provide for increased competition within the NSW gas market.
- Facilitate the development of clean burning natural gas power plant(s) for base and/or peak load power generation, along the route of the gas pipeline.
- Support regional NSW economic development through the provision of a new gas supply and regional power generation opportunities.
- Select a pipeline route, cognisant of social, heritage, environmental, geotechnical, and topographical constraints that provides for the most efficient and economically feasible construction methodologies.
- Design and construct a pipeline that has the minimum practicable impact on both the natural and built environment.
- Utilise regional skilled labour in the construction and operational phases of the proposal to the fullest extent possible.
- Construct and commission the pipeline on a schedule that makes this gas available to customers as quickly as possible.

Design specifications for the pipeline are provided in Table 1-1. Further detail on the pipeline can be found in Chapter 5 of Volume A of the Environmental Assessment for the proposal.

Table 1-1 – Design Specifications for the Gas Pipeline

Pipeline component	Design specification
Length:	Approximately:
NSW	
Mainline	603km
Lateral (Maitland area)	10.5km
QLD	222km

Pipeline component	Design specification	
Total	825km	
Diameter	Main line – 508mm Maitland area lateral – 304mm	
Wall thickness:	12.7mm minimum	
Material	API5L – X65 or X70 = carbon steel, X70 means that the pipe has a yield strength of 70,000 psi	
Coating	Fusion bonded epoxy or other recognised system such as High Density Polyethylene	
Depth cover	In rock	May be reduced to 600mm in urban areas, and 450mm in rural areas providing rock occurs over a continuous 50 metres.
	Generally	750mm
	Deep cultivated areas	1200mm
	Road/rail crossings	120mm
	Watercourse crossings	1200-2000mm
Nominal Capacity	65 Petajoules/annum	
Maximum Operating Pressure	15.3Mpa	

The general details of the construction process are provided in Table 1-2, further detail on construction methodology for specific areas of the pipeline is provided Chapter 3 of the Environmental Assessment.

Table 1-2 – General Construction Process for the QHGP

Construction element	Details
Width of vegetation clearing 30m	30m
Construction workforce	Approx 600
Construction spreads	3 main spreads plus a smaller crew for special crossings and difficult areas.
Standard construction hours	06:00 – 18:00 hours 7 days / week
Standard work cycle	28 days on, 9 days off
Construction duration (approximate)	8 months
Refueling	Mobile fuel truck and construction depot
Normal time between clear and grade and reinstatement	Up to 4 months

1.2 Background to the Proposal

The history of the proposal in relation to its planning and approval is as follows:

- Proposal commenced under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act).
- Planning focus meeting on 20 February 2006.

- Department of Planning Director-General requirements under Part 5 issued 30 March 2006.
- Applied for project approval under Part 3A of the EP&A Act on 17 October 2006.
- Director-General environmental assessment requirements under Part 3A issued 14 November 2006.
- Draft version of the environmental assessment issued to the Department of Planning on 8 December 2006 for a review of adequacy.
- Comment from the Department of Planning, the then Departments of Environment and Conservation, Natural Resources and Primary Industries received around January/February 2007.
- Comments received from NSW departments and agencies on the draft version of the environmental assessment highlighted concerns relating to the route alignment and selection, lack of conceptual design of the pipeline including a framework for detailed design and the need for a systematic approach to the environmental assessment. The environmental assessment for the Queensland portion of the QHGP has been approved and a pipeline licence granted effective 1 May 2007.

A Preliminary Environmental Assessment Report was prepared by Manidis Roberts in November 2007 and submitted to the Minister for Planning (Section 75M of the EP&A Act) to authorise a concept plan. **ngh**environmental have been engaged to prepare the Preliminary Biodiversity Assessment which will accompany Environmental Assessment for the Proposal.

1.3 Director General Requirements

The Department of Planning Director General (DG) issued the requirements for the Environmental Assessment on 3rd March 2008. Requirements relating to Ecological Impacts are provided below.

Ecological Impacts – the environmental assessment must include a justified and tiered approach for impacts of the proposal on native vegetation, threatened species, populations, ecological communities and their habitats for each bioregion (including both terrestrial and aquatic ecology). The Environmental Assessment must:

- include a review of the length of the project to identify bioregions that will or may be impacted by the project
- for each identified bioregion, include a screening of species, populations, ecological communities and habitats based on ecological significance and the potential for impact as a consequence of the project
- for species, populations, ecological communities and habitats with high ecological significance and significant potential for significant impact, include sufficient information to demonstrate the likely impacts, consistent with the guidelines for threatened species assessment (DECC 2005)
- for other species, populations, ecological communities and habitats, a general bioregion- based assessment of ecological values associated with the project
- consider region based ecological outcomes, including habitat connectivity and distribution of species and how these might be impacted by the proposal
- demonstrate a design philosophy of impact avoidance on ecological values, and in particular ecological values of high significance

- include an outline of any proposed compensatory habitat or off set strategy, including scale scope and timing of implementation
- include a framework for further consideration of ecological impacts at the project approval stage, and during detailed design of the project, and mitigation of impacts during construction and operation.

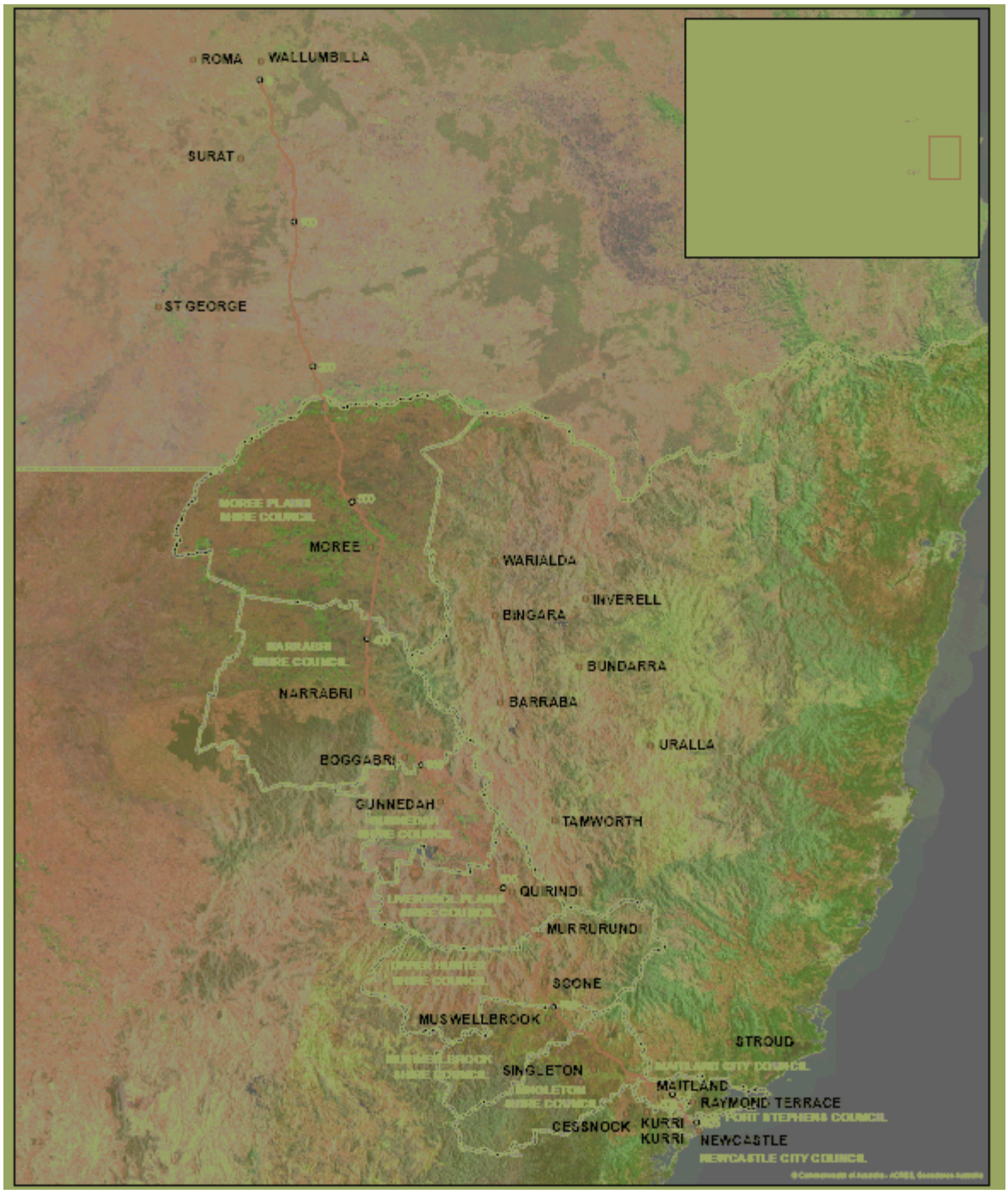


Figure 1-1 Location of the Gas Pipeline

2 Overview of the study area

The Proposal would traverse a wide variety of environments, from south central Queensland semi-arid lands to coastal hinterland environments near Newcastle on the NSW coast. The proposal would be located within the Darling Riverine Plains, Brigalow Belt South, Nandewar, Sydney Basin and NSW North Coast bioregions (HSO, 2006; Thackway and Creswell, 1995).

Darling Riverine Plains Bioregion

Approximately 105km of the proposal would be located within this bioregion. This bioregion is located within a semi-arid climatic zone and is generally hot and dry. Most of the bioregion contains gently sloping floodplains at an altitude of less than 200m above sea level. The major river systems of the bioregion include the MacIntyre, Barwon, Mehi, Gwydir and Boomi Rivers. The geology is composed of quaternary riverine deposits, predominantly clays, sands and gravels (HSO, 2006).

The Darling Riverine Plains Bioregion in the area of the proposal includes the EEC native vegetation on the cracking clay soils of the Liverpool Plains (TSC Act Listed) and Brigalow (*Acacia harpophylla dominant* or co-dominant) (EPBC Act Listed). Nineteen species listed as threatened on the TSC Act are known to occur within the Darling Riverine Plains Bioregion. Nine of these species are endangered and 10 are considered vulnerable (NSW NPWS 2001). Further impacts on threatened species in this bioregion are provided in Section 4.

The area is home to a number of endemic or very re stricted species of reptiles (Kearle et al. 2002). These include *Emydura macquarii, Delma plebia* (leaden delma), *Ctenotus allotropis, Ctenotus brachyonyx, Egernia modesta, Hemiaspis damelii* (grey snake), *Pseudechis guttatus, Simoselaps australis* (coral snake), *Anomalopus leuckartii* (two-clawed worm-skink) and *Anomalopus mackayi* (listed under the TSC Act as endangered).

The five-clawed worm-skink *Anomalopus mackayi* is largely restricted to the Darling Riverine Plains (Cogger 1992). Its range has decreased because suitable habitat has been cleared for cropping or degraded by grazing (Cogger et al. 1993; Sadlier and Pressey 1994, cited in Morton et al. 1995). This species is expected to occur along the route of the proposal.

Only the hardiest trees can survive the heavy clays that occur on plains, including myall, poplar box and belah. Many plains are treeless, supporting only shrubs and grasses such as oldman saltbush (*Atriplex nummularia*), bladder saltbush (*Atriplex vesicaria*) and Mitchell grass (*Astrebla* sp.). Closer to the hills support grey box (*Eucalyptus microcarpa*), Blakely's red gum (*Eucalyptus blakelyi*), silver-leaf ironbark (*Eucalyptus melanophloia*), poplar box, wilga (*Geijera parviflora*), rosewood (*Heterodendrum oleifolium*), belah, kurrajong (Brach*ychiton populneum*), white cypress pine (*Callitris glaucophylla*), yarran (*Acacia homalophylla*), some brigalow (*Acacia harpophylla*) and several other species of Acacia (NPWS 2003).

Sandy soils on levees of old channels and dunes often have stands of white cypress pine. Lake beds may be bare or covered by clumped lignum (*Muehlenbeckia cunninghamii)* with a fringe of black box.

Swamp vegetation varies with duration and depth of flooding. Marshes supplied with more permanent water support associations of common reed (*Phragmites australis),* cumbungi (*Typha* sp.), water couch (*Pseudoraphis spinescens*) and aquatic species such as water milfoil (*Myriophyllum propinquum*) and duckweed (*Lemna minor*). Less frequently flooded swamps support lignum and grasslands, especially water couch, and nardoo (*Marsilea hirsuta*) is also common (NPWS 2003).

Castlereagh-Barwon sub region

The proposal in this bioregion passes through only one sub region, the Castlereagh-Barwon sub region. This is characterised by sediment derived from Jurassic sandstones on the Castlereagh fan and from basalts on the Namoi fan. River red gums occur on the larger streams. Coolabah with occasional myall, river cooba, whitewood belah and clumps of river paperbark also occur. Mitchell grass with few trees are predominant on clay plains. Poplar box with wilga, whitewood, belah, white cypress pine, silver-leaf ironbark and occasional brigalow occur on areas with higher red soils.

Brigalow Belt South Bioregion

A total of approximately 310km of the proposal would be located within this bioregion. This bioregion has a sub-humid climate, with no dry seasons and a hot summer. To the far-west of the bioregion, the climate becomes hot and semiarid. The geology of the region is characterised by both basaltic lava flows and quartz sandstones.

The Brigalow Belt South Bioregion has a total of 155,353 hectares or 2.91 per cent of its area held under a relatively limited range of the available conservation mechanisms. Two Endangered Ecological Communities have the potential to be affected by the proposal (box gum woodland & brigalow). Benson (1999) notes brigalow, box woodlands and plains grasses as the most threatened plant communities in the bioregion.

Four endangered and 12 vulnerable plant species listed on the schedules of the TSC Act occur in this region. Species with the potential to occur along the pipeline are further discussed in Section 4. Vertebrate fauna recorded from surveys in the bioregion consist of 18 amphibian species, 68 reptiles, 281 birds and 82 mammal species (NPWS 2003).

Many of these species of fauna are considered threatened, including the endangered malleefowl (*Leipoa ocellata),* for which the bioregion contains important habitat, and the vulnerable koala (*Phascolarctos cinereus*) which has important populations in the Warrumbungles, the Pilliga and the area around Gunnedah (NSW NPWS 2000a).

The birds of the bioregion are highly diverse, mainly consisting of tropical woodland species and comprising the largest number of Australian resident species of any bioregion. There are no major populations of rare or threatened birds in the bioregion and although many birds within the bioregion have restricted ranges, none is endemic. Exotic species are low in numbers and those present are located mainly around towns.

The Brigalow Belt South Bioregion has experienced major declines in ground-nesting, ground-feeding insectivorous and grassland birds, a trend common to many parts of Australia. Reduction of bird diversity in habitat fragments and the continued loss of woodland and freshwater birds is expected for the future.

Conservation of habitat is crucial to the survival of small grassland and woodland birds. Maintaining and increasing the connectivity between seasonally variable food sources is a vital management measure for

the long term survival of these species. Fragmentation of habitats is a major concern and as such areas dedicated to serve connectivity should be in blocks large enough to discourage invasion by exotic species or fragment specialists such as noisy miners (NPWS 2003).

The bioregion is made up of 10 sub regions of which the proposal would pass through six:

Northern Basalts

The northern basalts sub region occurs on undulating low stony hills, long slopes with sandy wash and heavy clays in the valley floors. Brigalow, belah, whitewood, wilga, budda and poplar box are predominant on basalt hills. Silver-leaved ironbark, spotted gum and smooth-barked apple on stony hills and River red gum, belah myall and poplar box on basalt flats. Dominant species on lower sandstone slopes include Silver-leaved ironbark and white cypress pine in sandstone rocks, smooth-barked apple, white cypress, Blakely's red gum, Moreton Bay ash, poplar box, wilga, rough-barked apple. White box, with silver-leaved ironbark, white wood, bull oak and brigalow are predominant on alluvial clays (NPWS 2003).

Northern Outwash

The northern outwash sub region occurs on sloping plains with alluvial fans that are coarser and steeper than the Gwydir Fans that occur downstream. Soils are mostly red loams and heavy brown clays. Dominant vegetation includes poplar box with white cypress pine, wilga and budda on red soils with belah and brigalow on brown clays (NPWS 2003).

Pilliga Outwash

This sub region is characterised by long slopes broken by sandy abandoned stream channels, patches of heavy grey clay and incised stream channels. Soils are deep texture contrast soils with harsh clay subsoils, grey clay with gilgai. Vegetation is dominated by Poplar box, pilliga box, Blakely's red gum, white cypress pine and mugga on coarser soils. While, Belah, brigalow, yarran, budda, wilga whitewood, rosewood dominate on heavier soils. River red gums dominate creek lines with occasional silver-leaved ironbark, white box and fuzzy box in run-on sites (NPWS 2003).

Pilliga

This region is distinguished by stepped sandstone ridges with low cliff faces and high proportion of rock outcrop. Long gentle outwash slopes are intersected by sandy stream beds and prior stream channels. The soils include a few patches of heavy clay, shallow black earths and red loams on basalts. White box with white cypress pine and kurrajong is the predominant vegetation on the basalt hills. Blue-leaved ironbark, white gum, black cypress pine, whitewood, and rough-barked apple are more common on stony sandstone plateau and streams. The gentler sandstone slopes support Narrow-leaved ironbark, white cypress pine, red stringy bark, patches of mallee and broom heath. Pilliga box with grey box, poplar box, fuzzy box, bull oak, rosewood, wilga and budda occur on heavier soils in the west and north. River red gum lines all streams (NPWS 2003).

Liverpool Plains

Liverpool plains sub region occurs on undulating hills and sloping plains with alluvial channels and floodplains. It consists of extensive black earths on low angle slopes, with brown clays, alluvial soils and red or brown texture contrast soils on slopes below sandstone. Plains grass, finger panic grass, windmill grass and blue grass occur on black earths with occasional white box, yellow box, poplar box and wilga. White box and white cypress pine with rough-barked apple, hill red gum, occasional belah and mulga are found on texture contrast hillslope soils (NPWS 2003).

Liverpool Range

The Liverpool range is an undulating plateau top with steep margins grading to long footslopes. It contains stony red brown loams on ridges, shallow stony clay soils on steep slopes grading to deep black earths on lower slopes. On the plateau vegetation is dominated by open forest of silvertop stringybark, manna gum and mountain gum. Snow gums are found in cold air drainage hollows. Tallow wood, blackbutt and blue gum are predominantly on eastern slopes with small areas of vine forest. The slopes of the Liverpool range are dominated by White box with rough-barked apple, belah in the creeks on northern aspects and yellow box and blakely's red gum on southern aspects (NPWS 2003).

Nandewar Bioregion

The pipeline only passes through this bioregion for a relatively short section and then only just on the boundary of the southern section of the Brigalow belt and Nandewar Border. It is characterised by clay or loam soils with some siliceous soils derived from acid volcanic rocks. On the sedimentary rocks, shallow stony soils occur on ridges passing to texture contrast soils on almost all slopes. These change in colour from red brown subsoils on upper slopes to yellow subsoils on lower slopes.

Soils support diverse vegetation communities that are also affected by altitude. Granites develop gritty shallow profiles between outcrops and tors on the crests, grading to harsh texture contrast soils with yellow clay subsoils that are prone to gully development on the lower slopes. Basalt areas on Kaputar have frequent rock outcrops interspersed with shallow, stony, brown loams. Black earths are found on lower slopes and in valleys (NPWS 2003).

Vegetation of the region includes box woodlands found on clay or loam soils, typically at low to mid elevation in agriculturally productive areas. As soil fertility decreases and topographic relief increases, box woodlands are replaced by ironbark/cypress pine communities which characterise much of the less agriculturally productive parts of Nandewar. These communities are common at mid elevations, particularly on sedimentary hills and ranges, and form woodlands and open forests typically consisting of silver-leaved ironbark (*Eucalyptus melanophloia*), white cypress pine (*Callitris glaucophylla*) and tumbledown red gum (*Eucalyptus dealbata*).

18 species of plants listed under the NSW TSC Act, 9 of which are considered as endangered and 9 vulnerable, have been recorded in the region. A further 24 plants listed as rare or threatened (ROTAP) at a national scale (Briggs and Leigh 1995).

The area has high fauna species diversity with over 400 species recorded, 51 of these are listed as extinct, endangered or vulnerable in the TSC Act. Protection of the remnant vegetation of the Nandewar Bioregion is critical to the survival of these species. Vegetation clearance, fragmentation and disturbance are the major threats to biodiversity in this region (NPWS 2003).

Sydney Basin Bioregion

The southern leg of the Proposal skirts along the edge of this bioregion. The bioregion extends almost to Batemans Bay in the south to Nelson Bay on the central coast, just to the east of Mudgee.

Much of the Basin landscape is elevated sandstone plateau, with the exceptions being the Hunter Valley and the low-lying Cumberland Plain. In the south and west the Basin ends in cliff lines formed on sandstones and conglomerates of the basal Permian sediments. The considerable range of rock types, topography and climates in the Sydney Basin has resulted in a large variety of soils and vegetation communities. The Sydney Basin Bioregion is one of the most species diverse in Australia. Limited areas of

rainforest can be found in the lower Hunter, Illawarra escarpment and on Robertson basalts, as well as in the protected gorges and on richer soil in most subregions.

Species composition and structural form are similar on sandy soils of the sandstone plateaus and the sandy soils of the dunes. Better quality shale soils form caps on sandstone and on the coastal ramps.

Dune vegetation communities are dominated by old man banksia (*Banksia serrata*), smooth-barked apple (*Angophora costata),* red bloodwood (Corymbia gummifera) and blackbutt (*Eucalyptus pilularis*) with a diverse shrub layer. Estuaries are characterised by a swamp oak (*Casuarina glauca*), common reed (*Phragmites australis*), saltmarsh (Juncus kraussii, Sporobulus virginicus, and Sarcocornia quinqueflora) and mangrove (*Aegiceras corniculatum* and *Avicennia marina*) sequence. The boundaries of these communities are dynamic due to present day geomorphic processes. Rainforest communities are characterised by coachwood (Ceratopetalum apetalum), native tamarind (*Diploglottus australis*), white cherry (*Schizomeria ovata*), cheese tree (*Glochidion ferdinandi*), lilly pilly (*Acmena smithii*), blackwood (*Acacia melanoxylon*) and Port Jackson fig (*Ficus rubiginosa*), with soft tree fern (*Dicksonia antarctica*) and rough tree fern (*Cyathea australis*) common in the understorey.

Moving further inland the adjacent tall forests are dominated by Sydney peppermint (*Eucalyptus piperita*), narrow-leaved peppermint (*Eucalyptus radiata*), messmate (*Eucalyptus obliqua*), brown barrel (*Eucalyptus fastigata*), yellow stringybark (*Eucalyptus muellerana*), coastal white box (*Eucalyptus quadrangulata*), blackbutt, turpentine (*Syncarpia glomulifera*), Deane's gum (Eucalyptus deanei), bangalow palm (Archontophoenix cunninghamiana), cabbage tree palm (*Livistonia australis*), forest oak (*Allocasuarina torulosa*) and the creekline species, water gum (*Tristania laurina*).

The bioregion also has many stunning sandstone plateaus and the vegetation in these areas vary with altitude and rainfall. Common trees include red bloodwood, yellow bloodwood (Corymbia eximia), rough-barked apple (*Angophora floribunda*), smooth-barked apple, hard-leaved scribbly gum (*Eucalyptus sclerophylla*), grey gum (*Eucalyptus punctata*), black ash (*Eucalyptus sieberi*), Sydney peppermint, blue-leaved stringybark (*Eucalyptus agglomerata*), turpentine, brown stringybark (*Eucalyptus capitellata*) and northern grey ironbark (*Eucalyptus siderophloia*).

Drier, lowland environments, such as the upper Hunter, Cerrabee and Cumberland Plain support forests and woodlands dominated by forest red gum (*Eucalyptus tereticornis*), grey gum, spotted gum (E*ucalyptus maculata*), scribbly gum (*Eucalyptus haemastoma*), grey box (Eucalyptus moluccana), white box, yellow box (*Eucalyptus melliodora*), fuzzy box (*Eucalyptus conica*), narrow-leaved ironbark (*Eucalyptus crebra*), broad-leaved ironbark (*Eucalyptus fibrosa*), rough-barked apple, yellow bloodwood and extensive stands of swamp oak.

Swamp vegetation ranges from monocultures of common reed to complex prickly-leaved tea-tree (*Melaleuca stypheloides*) and paperbark (*Melaleuca quinquenervia*) associations, with swamp mahogany (Eucalyptus robusta), swamp oak, sedges, tall spike rush (*Elaeocharis sphacelata*) and juncus (*Juncus* sp.).

The area is rich in diversity and as a consequence also supports a large number of endangered species and communities. Important vegetation communities include yellow box - ironbark woodlands in the northern escarpments of the bioregion. These woodlands are thought to provide important habitat for species such as the regent honeyeater (*Xanthomyza phrygia*), but are not well represented in conservation reserves in

the bioregion (NSW NPWS 2002). In total there are 92 vulnerable and 60 endangered plant species in the bioregion (Australian Terrestrial Biodiversity Assessment 2002).

The Sydney Basin Bioregion supports 2 endangered and 4 vulnerable frog species, 54 vulnerable and 14 endangered bird species, 25 vulnerable, 3 endangered and one extinct mammal species, and 11 vulnerable and 2 endangered reptile species. Threatened species recorded in the bioregion include the brush-tailed rock wallaby (*Petrogale penicillata*), koala (*Phascolarctos cinereus*), yellow-bellied glider (*Petaurus australis*), brush-tailed phascogale (*Phascogale tapoatafa*), tiger quoll (*Dasyurus maculatus*), broadheaded snake (*Hoplocephalus bungaroides*), glossy black cockatoo (*Calyptorhyncus lathami*), turquoise parrot (*Neophema pulchella*) and powerful owl (*Ninox strenua*) (NSW NPWS 2002).

Hunter Sub Region

This is the only sub region that the pipeline passes through. It is a complex of Permian shales, sandstones, conglomerates, volcanics and coal measures. Features include rolling hills, wide valleys, with a meandering river system on a wide flood plain. Streams can be brackish or saline at low flow. The upper catchment supports numerous small swamps and extensive estuarine swamps behind the coastal barrier of beach and dunes.

A variety of harsh texture contrast soils occur on slopes and deep sandy loam alluvium on the valley floors. Soil salinity is common on some bedrocks in the upper catchment. There are patches of rainforest brush in the lower valley. Forest and open woodland of white box, forest red gum, narrow-leaved ironbark, grey box, grey gum spotted gum, rough-barked apple and extensive stands of swamp oak occur in the upper reaches and foothills. River oak and river red gum occurs along the streams. Coastal dune vegetation of blackbutt, smooth-barked apple, coast banksias and swamp mahogany. Mangroves, salt marsh and freshwater reed swamps occur in the estuary.

North Coast Bioregion

Again the proposal just catches the boundary of this bioregion at it southern limit. In terms of geology and geomorphology this bioregion is one of the most diverse in NSW. It has Devonian and Permian bedrocks that are part of the New England Fold Belt and have been closely faulted as they were thrust over the northern margin of the Sydney Basin. Small bodies of granite and granodiorite have intruded the sedimentary rocks and there are three centres of Tertiary basalt eruption.

On the basalts the soils are typically red, friable loams or clay loams with high fertility, good structure and excellent water-holding capacity. On granites and most of the quartz rich sedimentary rocks, shallow yellow earths are found on hillcrests, yellow and brown texture contrast profiles are found on the slopes, and organic loams or sandy loams are found on the alluvial plains. In the coastal dunes, deep siliceous sands and very well developed podsols can be found.

The proposal passes through only the south of the bioregion where, cool temperate species are more common, including Antarctic beech (*Nothofagus moorei*), which occurs as a monoculture with a fern understorey. In addition to the fertile areas derived from basalts, rainforests are sometimes found inhabiting protected pockets where plant nutrients have accumulated through organic cycling in litter.

Forests occurring on soils derived from granites are mainly eucalypt vegetation communities. The dominant species include blackbutt (*Eucalyptus pilularis*), Sydney blue gum, spotted gum (*Eucalyptus maculata*), grey gum (*Eucalyptus punctata*), forest red gum (*Eucalyptus tereticornis*), red bloodwood (*Corymbia gummifera*), brush box (Tristania conferta) and white mahogany.

The north coast bioregion supports 108 endangered and 89 vulnerable flora species (NSW NPWS 2001). Several of these species are endemic to the bioregion. Threatened fauna species include 36 listed as endangered and 121 listed as vulnerable. Numbers of grassland species and ground-feeding insectivorous birds, as well as temperate woodland and forest birds, appear to have declined in the bioregion. The continued loss of woodland birds, particularly those sensitive to fragmentation, in the bioregion is likely.

Figure 2-1 shows the location of each of the bioregions with respect to the pipeline.

Figure 2-1 Location of each of the Bioregions in relation to the proposal

3 Methodology

3.1 Assessment methodology

This stage of the biodiversity assessment includes two distinct phases, (1) desktop review and field validation and (2) analysis of data and impact screening assessment. The flow chart (**Figure 3.1**) and text below describes the assessment methodology.

Phase 1 – Desktop review and field validation

- A desktop review was undertaken targeting a corridor, 200m wide (100m either side of the proposed centreline) for the length of the proposal.
- The desktop review included a review of relevant literature, previous studies, interpretation of aerial photos, DECC Wildlife Atlas data, predicted species lists from CMA sub-regions and EPBC Act Matters of National Environmental Significance and validation of existing vegetation maps. The desktop review looked at a minimum area 10km either side of the study area. In some areas, owing to the poor quality of data, the lack of previous impact assessment documentation, and where the homogeneity of the landscape permitted, searches extended beyond 10km to provide a greater regional snapshot of the biodiversity conditions of the existing environment. This desktop review identified areas that potentially pose biodiversity constraints for the proposal. Species list from search results are provided in Appendix 1.
- Following the desktop review, two aerial reconnaissances were undertaken. The first identified significant constraints along the route and as such the route was modified and a second aerial reconnaissance was undertaken. This included a validation component employing a flyover of the route with fixed wing aircraft. The objective of the work was to validate the field maps, with a particular focus on the extent and potential condition of areas within the corridor containing native vegetation. This risk based approach allowed the validation of sections of the corridor that do not contain native vegetation and give confidence that these areas are low risk and as such do not require detailed field assessment.

Data Sources

GIS data sources for the desktop review have been supplied mostly through the Department of Environment and Climate Change (DECC) Gunnedah office from a variety of custodians. The following data sets have been used to generate field maps for use in the rapid assessment and flyover described below.

- Low resolution colour digital orthophotos (Supplied by Manidis Roberts)
- Google Earth Satellite Images (2008) with gas pipeline route overlay
- Roads, drainage and 50 metre contours based on 1:25,000 mapping – Geoscience Australia
- National Parks Estate - Department of Environment and Climate Change website download
- Wetlands of NSW - Department of Environment and Climate Change website download
- Wilderness areas in NSW - Department of Environment and Climate Change website download
- NSW State Forests – NSW Department of Lands

- Atlas of NSW Wildlife – Department of Environment and Climate Change
- Eastern Bushlands vegetation database – NPWS 1997
- Northern Comprehensive Regional Assessment (CRA) – Lower North East Forest Ecosystems mapping - Department of Environment and Climate Change website download
- Brigalow Belt South modelled vegetation mapping - Department of Environment and Climate Change (NPWS) - NSW Western Regional Assessments (WRA) - Resource and Conservation Council (2002)
- Nandewar modelled vegetation mapping – Western Regional Assessment - Department of Environment and Climate Change
- North West Vegetation Mapping - Moree Shire - land use and vegetation mapping – NSW Department of Land and Water Conservation (2001)
- Native Vegetation Mapping Project (NVMP) Boggabri and Bellata map sheets – NSW Department of Land and Water Conservation (2002)
- Land Capability for Eastern and Central NSW - NSW Department of Land and Water Conservation
- Land Use mapping for Eastern NSW by 1:250,000 map sheets – NSW Department of Land and Water Conservation
- QHGP mainline, corridor and kilometre points (KPs) – Rev D and tile factory lateral – Rev C – Manidis Roberts Pty Ltd (2008).

Where required data sets were converted to the new datum (GDA 1994) using geographic coordinates (latitude – longitude, represented on maps in degrees, minutes and seconds).

Limitations of Data and Methodology

- The Northern CRA vegetation mapping is derived from computer grid-modelling techniques used to assign forest ecosystem types according to a range of environmental parameters, with some guidance from field botanical records and air photo interpretation mapping. The CRA mapping was designed for a regional-scale overview of vegetation which could be used for purposes such as the assessment of the adequacy of conservation reserves in protecting the range of ecosystem types. As such the spatial accuracy can be inadequate for detailed study of vegetation at a local level. It has been found generally from work in southern NSW, that modelled forest ecosystems mapping is broadly accurate in terms of the vegetation types present in an area, but not very accurate as to their placement in the landscape. CRA mapping therefore has limitations for detailed work and has been used only as a general guide in the present project. Field survey has been recommended to validate areas of constraints along the pipeline route, and if necessary, amendment of the vegetation maps or more substantial re-mapping where it is found to be inaccurate.
- The Brigalow Belt South vegetation mapping was undertaken at a later time than the Southern and Northern CRAs, using updated and improved data sources and more rigorous methodology. The work was undertaken by DECC for regional scale analysis.
- The Moree Shire land use and vegetation mapping was based on air photo interpretation by the Department of Land and Water Resources in 2002 and ostensibly appears more consistent and accurate than the DECC modelled vegetation maps. Preliminary experience with this data set suggests it is reasonably accurate and it has been the most helpful in the rapid assessment.

- No validation or re-mapping of vegetation has been possible during the rapid biodiversity assessment, which has been essentially a desktop rather than a field assessment.
- Threatened fauna and flora records included in the Atlas of NSW Wildlife, compiled by DECC, are either concentrated in parks and reserves where surveys have taken place or, in non-park areas, where records are largely opportunistic sightings which are biased to areas along public roads and around towns. Since the corridor lies entirely outside the National Parks Estate, the latter applies and therefore does not give a true picture of the distribution and abundance of threatened species. The records are of use primarily as a means to predict where threatened species could potentially be found in the corridor on the basis of suitable habitat being present.
- Endangered ecological communities (EECs) information was not available for this project and presumably mapping has not been attempted for any areas along the pipeline route. At this stage the potential presence of EECs can only be inferred on the basis of mapped vegetation types which correspond to EECs.

Phase 2 - Analysis of data and impact screening assessment.

Following completion of the desktop review and field validation, a biodiversity assessment has been prepared and includes the following:

- Identification of potentially significant and minor risk areas (to guide the assessment and continual adaptive management approach).
- Determination of the level of impact on biodiversity likely to be associated with the proposal route.
- An identification of areas where, owing to identified potential significant impacts, detailed field assessment is required to refine the proposal route and acceptably manage potential adverse impacts. Note, detailed field assessment has not been undertaken as part of this constraints analysis. The desktop assessment undertaken here is considered adequate to inform likely impacts at this stage. Detailed field investigations, where necessary would be included in the Statements of Commitments and would inform detailed design and management measures at the design, construction and operational phases. The results of the field assessment will be included in the Preferred Project Report.

The significance of impacts on the biodiversity has been undertaken through a screened assessment approach, using the significance criteria as outlined in Table 3-1 below. The screening assessment is based on the principles of both the 7-Part Test (Section 5A of the NSW EP&A Act), as well as the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines. Undertaking a 7 part test was not considered appropriate at this stage as a defined route and impact area has not been determined.

Table 3-1 Biodiversity impact significance criteria

Significance criteria	
Significant	**Minor/ not significant**
Threatened Flora and fauna	
• Have an adverse effect on the life cycle of a viable local population and place it at risk of extinction. • Fragmentation or isolation of habitat from other areas of habitat to a level that would impact on	• Unlikely to impact on the life cycle of a viable population • Unlikely to fragment or isolate habitat from other areas of habitat.

Significance criteria	
Significant	**Minor/ not significant**
a viable population. • Remove a significant area of habitat.	
Endangered populations	
Have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.	Unlikely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.
Endangered Ecological Communities or critically endangered ecological communities	
Work that is likely to place a local community at risk of extinction. Work that is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	Work that is unlikely to place a local community at risk of extinction.
ROTAP species Biogeographical Forest Ecosystems and protected species	
Work likely to place a local forest ecosystem, ROTAP species or protected species at a risk of extinction.	Works would have only a minimal impact on attribute.

Note: For the purposes of this criteria, "local" would be determined during the assessment based on the habitat, lifecycle, and / or distribution for each relevant species, community or population.

An initial screening process was undertaken to look for areas along the route that comprise the following groups:

- scattered trees
- grazing
- cropping/ploughed

Initially, areas along the proposal that comprised grazing land, cropping or ploughed land, or scattered trees with no records or potential for threatened species, populations or communities were identified low risk areas where given the implementation of mitigation measures and an overarching adaptive management approach, impacts are not likely to be significant.

For each section of the pipeline the above significance criteria has been applied to life cycle groups[1] below:

[1] A lifecycle group is defined as a group of organisms with similar life cycle attributes and ecological requirements.

- Woodland & forest birds, hollow dependent birds and ground dwelling birds
- Burrowing amphibians
- Non-burrowing amphibians
- Saxicolous (rock dwelling) reptiles
- Fossorial (burrowing) reptiles
- Arboreal mammals
- Hollow dependent fauna
- Terrestrial mammals
- Wetland birds
- Aquatic fauna
- Endangered ecological communities and threatened flora species

The potential for significant impact for each of these groups across the whole pipeline has been assessed. For example where a section of the pipeline does not contain exposed rock, then saxicolous (rock dwelling) reptiles would be excluded from further assessment. If the answer is yes there is 'potential for significant impact', then the assembly (all species potentially utilising this habitat) of threatened flora or fauna within that group would be tested against the significance criteria based on the habitat requirements for each threatened species or EEC.

The outcome of this assessment is provided in the matrix at Appendix 2, displayed on the constraints maps in Section 5.3 and summarised in Table 6-1.

Due to the specific habitat requirements for fish a slightly different approach has been taken as described below.

Aquatic ecology

A background search was undertaken in order to determine the threatened aquatic species and the aquatic ecological communities occurring or potentially occurring within the NSW catchments that the proposal would cross. Three catchments were identified as:

- Hunter/Central Catchment
- Namoi Catchment
- Border Rivers/Gwindir Catchment.

Background searches included NSW Bionet search tool and the EPBC Act Protected Matters search tool. A search for threatened fish species potentially occurring within 50km of the proposed pipeline route was undertaken. A 50km search radius was undertaken to account for fish migrations and compensate for limitations in data.

The significance criteria (Table 3-1) was applied to determine if there was a potential for significant impact to each of these species and EECs. If the impact was determined to be minor then no further assessment is required and the project at that crossing can proceed with standard mitigation measures. This assessment was based on a worst case scenario where the crossing technique used for the pipeline would temporarily/permanently block fish passage at a site (ie use of coffer dams). The assessment table is provided in Appendix 3.

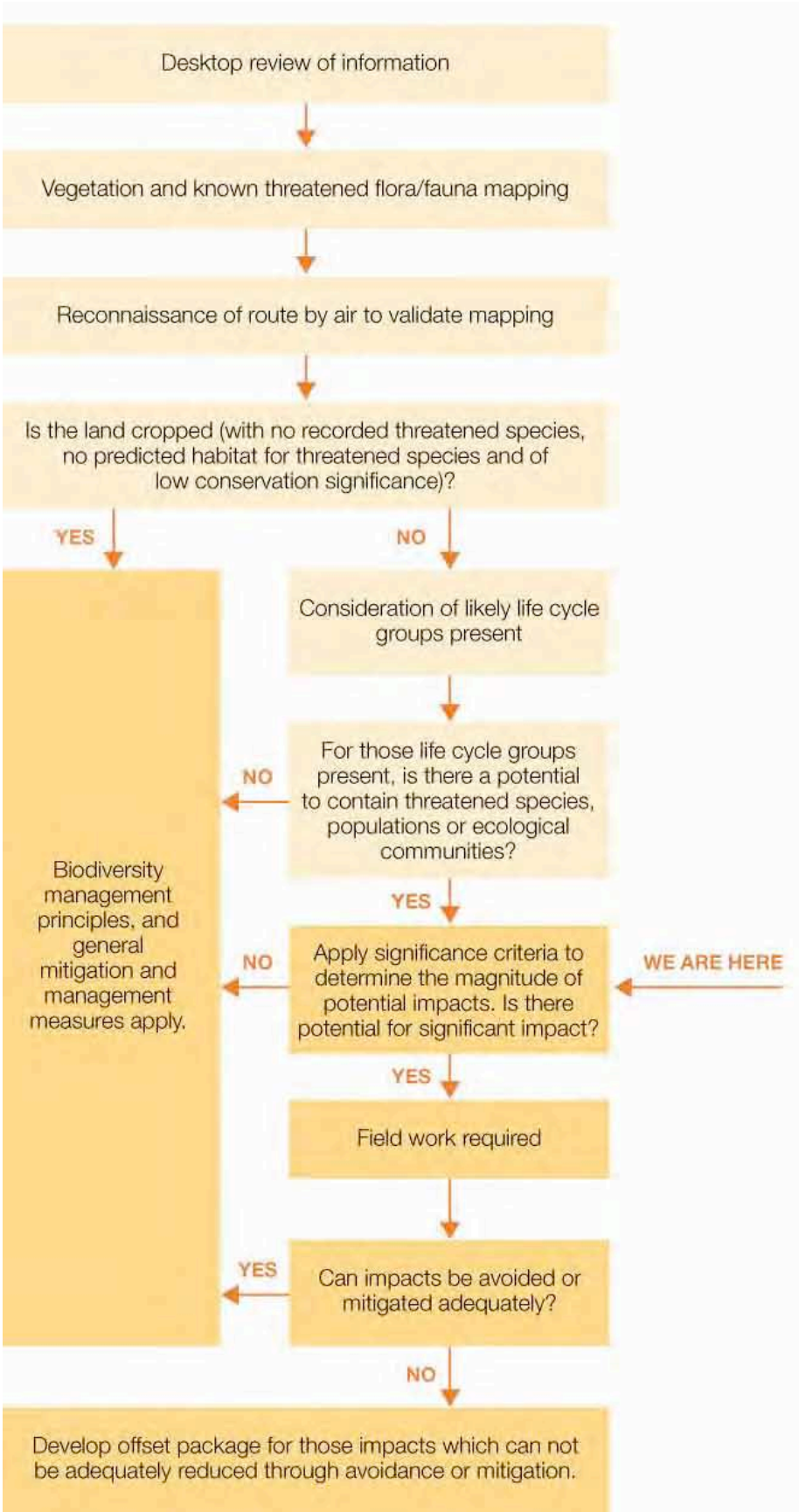


Figure 3-1 Assessment methodology.

4 Results

4.1 Flora

Vegetation types

The pipeline passes through a diverse range of vegetation types as described in Section 2 above. Where the proposal passes through native vegetation, a vegetation map was produced. A total of 23 vegetation maps have been prepared and are attached at Appendix 4.

Threatened species

A threatened flora species list generated from DECC records within 10-25 km of the proposal (the search area was dependent on the location, where there was a paucity of records the search area was expanded), CMA sub region an EPBC predicted species lists, in addition to an assessment of species whose habitat may be provided along or adjacent to the proposal route was undertaken. The list, along with species descriptions and an assessment of likely occurrence and impact is provided at Appendix 1 and Appendix 3. **Table 4-1** lists threatened species that may be present along the pipeline and have the potential to be affected by the proposal. Section 5.3 shows those species which after the screening process, described in Section 3, (Table 3-1) have the potential to be significantly impacted.

Table 4-1 Threatened plant species with the potential to be impacted by the proposal

Species	Listing	Species	Listing
Sida rohlenae	TSC-E	*Dichanthium setosum*	TSC-V EPBC-V
Digitaria porrecta	TSC-E EPBC - E	*Diuris tricolor*	TSC-V EPBC-V
Zannichellia palustris	TSC-E	*Swainsona murrayana*	TSC-V EPBC-V
Bothriochloa biloba	EPBC - V	*Eucalyptus parramattensis subsp. Decadens*	TSC-V EPBC –V
Tylophora linearis	TSC-E EPBC –E	*Homopholis belsonii*	EPBC - V
Tetratheca juncea	TSC-V EPBC V	*Thesium austral*	TSC-V EPBC-V
Rhizanthella slateri	TSC-V	*Goodenia macbarronii*	TSC-V

Species	Listing	Species	Listing
	EPBC –E		
Philotheca ericifolia	TSC-V EPBC-V	*Prostanthera cineolifera*	TSC-V EPBC-V
Lepidium monoplocoides	TSC-E	*Cyperus conicus*	TSC-E
Desmodium campylocaulon	TSC-E	*Monotaxis macrophylla*	TSC-E
Pomaderris queenslandica	TSC – E		

Endangered Populations

A number of endangered populations are recorded within a 10 km of the centreline of the proposal. These include:

- *Diuris tricolor*, the Pine Donkey orchid population in the Muswellbrook LGA
- *Acacia pendula* population in the Hunter Catchment
- *Cymbidium canaliculatum* R. Br. Population in the Hunter Catchment
- *Eucalyptus camaldulensis* population in the Hunter Catchment
- *Leionema lamprophyllum* subsp. *obovatum* population in the Hunter Catchment

Diuris tricolor, the Pine Donkey orchid population in the Muswellbrook LGA, *Cymbidium canaliculatum* (commonly known as the black tiger orchid or black orchid) R. Br. Population in the Hunter Catchment and *Eucalyptus camaldulensis* population in the Hunter Catchment are expected to occur within the corridor of the pipeline route.

Endangered Ecological Communities

Twenty three Endangered Ecological Communities (EEC) were identified with the potential to occur along the length of the proposal. As a result of the screening process those that are expected to occur and have the potential to be affected have been described below. Appendix 3 provides a full list of all EEC with a description of each and likelihood of occurrence and impact. Appendix 2 includes a matrix that shows the presence of EEC for each KP.

Native Vegetation on Cracking Clay Soils of the Liverpool Plains (TSC Act)

Native Vegetation on Cracking Clay Soils of the Liverpool Plains is mainly a native grassland community which includes a range of small forb and herb species. The main grass species include Plains Grass (*Austrostipa aristiglumis*), Queensland Bluegrass (*Dichanthium sericeum*) and Coolibah Grass (*Panicum queenslandicum*). It also contains scattered and patchy shrubs and trees, including Boree (*Acacia pendula*), Rough-barked Apple (*Angophora floribunda*), Fuzzy Box (*Eucalyptus conica*), Bimble Box (*E. populnea*) and Yellow Box (*E. melliodora*). In wetter locations rushes and sedges are common. This community is located around Coonabarabran, Gunnedah, Murrurundi, Narrabri, Tamworth and Quirindi, on the North West Slopes and Plains of NSW. The vast majority of this vegetation community has been converted through agriculture and no examples are within conservation reserves. Most surviving remnants of the community are on Travelling Stock Routes, that occur on the highly fertile cracking clay soils of the Liverpool Plains. Native Vegetation on Cracking Clay Soils of the Liverpool Plains is not known to be conserved in any area managed by the National Parks and Wildlife Service.

This community is likely to occur around KP 446-450, 465-468 and in scattered patches further south.

Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (TSC Act)

Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees. This community has a dense to sparse tree layer in which Casuarina glauca (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermagui. The understorey is characterised by frequent occurrences of vines, *Parsonsia straminea, Geitonoplesium cymosum* and *Stephania japonica var. discolor*, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter. The extent of the Swamp Oak Floodplain Forest prior to European settlement has not been mapped across its entire range. However, the remaining area of Swamp Oak Floodplain Forest is likely to represent much less than 30% of its original range.

This community is present within or adjacent to the corridor, especially from the Hunter estuary to Hunter River crossing (KP 801-825)

Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (TSC Act)

Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. The structure of the community is typically open forest, although partial clearing may have reduced the canopy to scattered trees. The most widespread and abundant dominant trees include *Eucalyptus robusta* (swamp mahogany), *Melaleuca quinquenervia* (paperbark) and, south from Sydney, *Eucalyptus botryoides* (bangalay) and *Eucalyptus longifolia* (woollybutt). Other trees may be scattered throughout at low abundance or may be locally common at few sites, including *Callistemon salignus* (sweet willow bottlebrush), *Casuarina glauca* (swamp oak) and *Eucalyptus resinifera subsp. hemilampra* (red mahogany), *Livistona australis* (cabbage palm) and *Lophostemon suaveolens* (swamp turpentine). A layer of small trees may be present, including *Acacia irrorata* (green wattle), *Acmena smithii* (lilly pilly), *Elaeocarpus reticulatus* (blueberry ash), *Glochidion ferdinandi* (cheese tree), *Melaleuca linariifolia* and *M. styphelioides* (paperbarks). Shrubs include A*cacia longifolia, Dodonaea triquetra, Ficus coronata, Leptospermum polygalifolium subsp. polygalifolium* and *Melaleuca* spp.. Occasional vines include *Parsonsia straminea, Morinda jasminoides* and *Stephania japonica var. discolor*. The groundcover is composed of abundant sedges, ferns, forbs, and grasses including *Gahnia clarkei*, *Pteridium esculentum, Hypolepis muelleri, Calochlaena dubia, Dianella caerulea, Viola hederacea, Lomandra longifolia, Entolasia marginata* and *Imperata cylindrica*. The exact amount of its original extent is unknown but it is much less than 30%.

This community occurs near the Pacific Highway at around KP 813.

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (TSC Act)

Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime. In the 1990s the extent remaining were: 3% in the NSW North Coast bioregion, 66% in the Lower Hunter – Central coast region, 40% on the Cumberland Plain, 70% in the Sydney – South Coast region, and 30% in the Eden region.

This community is present mostly in association with the Hunter River estuary at the southern end of the proposal (KP 801-825).

Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion (TSC Act)

Lower Hunter Spotted Gum - Ironbark Forest occurs principally on Permian geology in the central to lower Hunter Valley. It is dominated by *Corymbia maculata*, (Spotted Gum) and *Eucalyptus fibrosa* (*Broad-leaved Ironbark*), while *E. punctata* (Grey Gum) and *E. crebra* (Grey Ironbark) occur occasionally. The understorey is marked by the tall shrub, *Acacia parvipinnula*, and by the prickly shrubs, *Daviesia ulicifolia, Bursaria spinosa, Melaleuca nodosa* and *Lissanthe strigosa*. The ground layer is diverse; frequent species include C*heilanthes sieberi, Cymbopogon refractus, Dianella revoluta, Entolasia stricta, Glycine clandestina, Lepidosperma laterale, Lomandra multiflora, Microlaena stipoides, Pomax umbellata, Pratia purpurascens, Themeda australis* and *Phyllanthus hirtellus*. In an undisturbed condition the structure of the community is typically open forest. Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion is restricted to a range of approximately 65 km by 35 km centred on the Cessnock - Beresfield area in the Central and Lower Hunter Valley (NPWS 2000). Within this range, the community was once widespread. A fragmented core of the community still occurs between Cessnock and Beresfield. Remnants occur within the Local Government Areas of Cessnock, Maitland, Singleton, Lake Macquarie, Newcastle, Port Stephens and Dungog but may also occur elsewhere within the bioregion. Outliers are also present on the eastern escarpment of Pokolbin and Corrabare State Forests on Narrabeen Sandstone. The community is currently mapped as occurring in more than 4 800 fragments, of which more than 4 500 are less than 10 ha in area (House 2003). The four largest patches now cover about 7 000 ha, representing less than one-quarter of the current distribution, or about 10% of the estimated pre-European distribution (House 2003).

This community could occur in areas mapped as “Grey Box-Red Gum-Ironbark” and “Ironbark”, as well as “Hunter Spotted Gum-Ironbark” to the east of KP 653-656 and around KP 698 -700 and KP 754-759.

Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions Brigalow (Acacia harpophylla dominant and co-dominant) (TSC and EPBC Act)

The Brigalow community is a low woodland or forest community dominated by Brigalow *Acacia harpophylla*, with pockets of Belah *Casuarina cristata* and Poplar Box *Eucalyptus populnea subsp. bimbil*. The canopy tends to be quite dense and the understorey and ground cover are only sparse. Scattered remnants occur on the North West Slopes and Plains and Darling River Plains in NSW and also in Queensland. Usually occurs on heavy clay soils. This community has been extensively cleared for agriculture, with most surviving remnants along roadsides and paddock edges. It provides important habitat for rare native wildlife such as the Black-striped Wallaby. Brigalow ecological community is poorly

represented in the existing reserve system with only one reserve, "Brigalow Park Nature Reserve", of 202 hectares containing this community.

This community is present along the proposal with known stands at KP 490, 466, 460 and 453.

Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South bioregions (TSC Act)

The *Cadellia pentastylis* community is a forest community with the canopy dominated or co-dominated by the tree *Cadellia pentastylis* (Ooline). Other canopy species include *Eucalyptus albens, Eucalyptus beyeriana, Eucalyptus chloroclada, Eucalyptus melanophloia, Eucalyptus pilligaensis, Eucalyptus viridi*s and *Callitris glaucophylla*. Understorey species include *Alstonia constricta, Beyeria viscosa, Carissa ovata, Einadia hastata, Geijera parviflora, Notelaea microcarpa* and *Aristida* and *Stipa* species. Stands of *Cadellia pentastylis* occur in northern NSW on undulating terrain on a variety of soil types, usually between 300-450 m elevation. The distribution of the community falls within the Nandewar and Brigalow Belt South bioregions. The Cadellia community also occurs in Queensland, where it has been extensively cleared. Stands of the community occur under a variety of tenures. Some areas are conserved in the Scrub Myrtle Flora Reserve, Gamilaraay Nature Reserve and under a voluntary conservation agreement.

It is possible that this community occurs along the proposal especially around KP 476-477.

Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions (TSC Act)

This woodland community is found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The structure of the community may vary from tall riparian woodlands to very open 'savanna like' grassy woodlands with a sparse midstorey of shrubs and saplings. Typically these woodlands form mosaics with grasslands and wetlands, and are characterised by Coolibah (*Eucalyptus coolabah*) and, in some areas, Black Box (*E. largiflorens*). Other tree species may be present including River Cooba (*Acacia stenophylla*), Cooba (*A. salicina*), Belah (*Casuarina cristata*) and Eurah (*Eremophila bignoniiflora*). The community is currently known from parts of the Local Government Areas of Brewarrina, Central Darling, Cobar, Coonamble, Moree Plains, Narrabri, and Walgett but may occur elsewhere in these bioregions.

This community is present along the corridor in fragmented stands in the area south of Garah to the Queensland Border.

Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes bioregions (TSC Act)

This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub stratum may have been reduced or eliminated by clearing or heavy grazing. This EEC is known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderee, Lachlan, Leeton,

Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narranderra, Narromine, Parkes, Urana, Wagga Wagga and Warren, and but may occur elsewhere in these bioregions.

The EEC is present along the edges of some stands of fragmented vegetation at KP 275 and 296.

Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions (TSC Act)

This was previously an open forest community of flora and fauna that may now exist as woodland or as remnant trees. Characteristic tree species are Carbeen (*Corymbia tessellaris*) and White Cypress-pine (*Callitris glaucophylla*). Associated trees include *Corymbia dolichocarpa, Eucalyptus populnea, E. camaldulensis, Casuarina cristata* and *Allocasuarina leuhmannii*. Found on riverine plains of the Meehi, Gwydir, MacIntyre and Barwon Rivers and in small remnants farther south. Occurs on siliceous sands, earthy sands and clayey sands. Less than 500 ha of the Carbeen Open Forest Community is found within Boomi, Boomi West and Boronga Nature Reserves.

This community is present at KP 251 on the edge of the TSR.

Bluegrass (Dichanthium spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) (EPBC Act)

Grasslands dominated by Bluegrass (*Dichanthium* spp.) occur over a broad geographic range in Queensland including the Brigalow Belt (North and South), the Desert Uplands and the Gulf Plains. However, species composition of these grasslands is strongly influenced by soil type and accordingly displays a high degree of variation across their national distribution. The species, *Dichanthium sericeum*, also occurs in New South Wales, but current information indicates that it does not dominate any grassland communities there. The ecological community Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Bioregions (North and South) includes: *Dichanthium sericeum* grassland + emergent trees open woodland on Cainzoic igneous rocks, in particular fresh basalt; Grassland of *Dichanthium* spp., +/- *Astrebla* spp. on Cainozoic clay plains including weathered Tertiary basalt. Patches of low *Acacia harpophylla* in places; Grassland of *Dichanthium sericeum* and or *Astrebla* species on Cainzoic alluvial clay plains; and *Dichanthium sericeum* grassland with clumps of *Acacia harpophylla* on Cainozoic fine-grained sedimentary rocks.

This EEC may occur within vegetation stands mapped as “native & naturalised grasslands/chenopods”, “Moree Grassland” and “Northern Clay Plain Grassland” around KP 230-231, 236, 238, 233-235, 379-380, 399 401 and 404.

White Box Yellow Box Blakely’s Red Gum Grassy Woodland and Derived Grassland (TSC Act and EPBC Act)

White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box *Eucalyptus albens,* Yellow Box *E. melliodora* and Blakely's Red Gum *E. blakelyi.* Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs. Intact stands that contain diverse upper and mid-storeys and groundlayers are rare. Modified sites include the following:

- Areas where the main tree species are present ranging from an open woodland formation to a forest structure, and the groundlayer is predominantly composed of exotic species; and
- Sites where the trees have been removed and only the grassy groundlayer and some herbs remain.

Along the pipeline route stands may occur in vegetation mapped as

- New England Stringybark
- Yellow Box-Blakely's Red Gum
- Yellow Box-Broad-leaved Stringybark
- Yellow Box-Grey Box-Red Gum
- New-England Stringy Bark-Blakely's Red Gum
- Yellow Box/Blakely's Red Gum/Rough-barked Apple
- Yellow Box/Blakely's Red Gum/Grey Box

The aerial reconnaissance in conjunction with the vegetation mapping indicates that these vegetation communities could occur within the pipeline route at KP 641, 660, 662, 668-669. The alignment also passes adjacent to potential box-gum woodland at KP 703-705, 764, 756 and 759. It should be noted that the air reconnaissance confirmed that some of these stands had been cleared despite being mapped stands.

4.2 Fauna

Vegetation maps in Appendix 4 show the vegetation types for the route. DECC threatened fauna maps were also produced but are not published in this report. The pipeline passes through habitats for the following lifecycle groups:

- **Woodland & Forest Birds, Hollow dependent birds Ground dwelling birds** – Riparian vegetation and floodplain woodland along major watercourses such as the Namoi and Mehi Rivers. Smaller riparian areas along creeklines such as Gil Gil, Mooki, Marshalls Ponds and Tycannah Creeks. Woodland areas adjacent to the Boomi River comprising coolibah. Other woodland areas including conservation reserves and TSRs around the Namoi Valley, Liverpool Plains and ranges.
- **Non-Burrowing Amphibians** – known records are predominantly in wetland areas around the Hunter River - Hexham area and Kooragang Nature Reserve. Habitat would also occur on watercourse and wetlands across the route, in particular around the Boomi, Gnoura Goura, Gil Gil, Gwydir, Mooki and Mehi drainage systems.
- **Saxicolous reptiles -** rocky outcrop areas adjacent to the Namoi River near Baan Baa and the New England Highway south of Murrurundi. Potential movement corridors between rocky outcrop areas/ridges around the Wingen and Elderslie areas.
- **Fossorial Reptiles -** rocky outcrop areas described above in addition to Coolibah/Blackbox Woodland, riparian vegetation, native and naturalised grassland areas and native vegetation on cracking clay soils. Within these areas fossorial reptiles could be present within cracks in the soil as well as beneath dead timber and leaf litter.
- **Arboreal mammals -** Woodland areas and corridors, particularly riparian vegetation along major watercourses such as the Namoi, Mehi and Hunter Rivers as well as smaller creeks throughout the proposed pipeline length. TSRs and conservation reserves within the Namoi Valley and Liverpool Ranges.
- **Terrestrial Mammals -** Woodland areas and corridors particularly where wooded fragments are located close to a water source and where native grasses are present. TSRs and conservation reserves within the Namoi Valley and Liverpool Ranges.
- **Wetland Birds -** wetland or low lying areas around the Hunter River area including the Hexham Swamp Nature Reserve and Kooragang Nature Reserve.

- **Fish -** all watercourses including permanent and ephemeral waterways particularly where snags and riparian vegetation are present.

Threatened fauna

Threatened species and lifecycle groups with the potential to occur along the pipeline route are provided in Appendix 3, the matrix provided in Appendix 2 shows the screening process undertaken for each lifecycle group along the length of the corridor for each kilometre point (KP). Following the screening assessment as described in Section 3.1, the following species will require further investigation once a pipeline route and easement has been determined. Although the screening assessment has identified these species as requiring particular attention, the field surveys proposed to be undertaken prior to submission of the preferred project report, will undertake habitat assessment for all lifecycle groups. Survey methods will be diverse and will aim to record as many species as possible.

Table 4-2: Threatened fauna and lifecycle groups that require further investigation

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
REPTILES			
Border thick-tailed gecko *Underwoodisaurus sphyrurus*			
Present where rock outcropping exists.	Possible	EPBC – V TSC - V	Little is known on the ecology of this species, other than it is found amongst rocky outcrops within eucalypt forest or woodland where it can be found amongst rock fragments on the ground and fallen timber often within a short burrow. They are known to shelter by day under these features. It can also be found in highly disturbed areas, with some populations known from roadside reserves. As populations are likely to be highly localised, and the species has a low dispersal capability and low-fecundity, construction through rock outcrops could significantly impact on a population of this species should one be present. If avoidance of suitable habitat is not possible, further investigation would be required by site surveys and habitat assessment.
Five-clawed Worm-Skink (also referred to as Five-clawed worm skink) *Anomalopus mackayi*			
Present, north of KP450	Possible	EPBC – V TSC - E	The species is found in open woodland areas with low grass cover (usually between 5 and 10 cm) and scattered eucalypts. This type of woodland is generally supported by red black to black clay-loam soils (Shea et al. 1987). Individuals also occur in open grassy paddocks with scattered eucalypts and moist black soil (Swan 1990). It uses fallen logs and timber as sheltering sites and digs in loose soil to create permanent tunnellike burrows (Ayers et al. 1996; Sadlier & Pressey 1994). It shows adaptations to a semi-fossorial way of life where it digs

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
			and lives permanently in burrows under well-embedded timber. Activities which destroy or compact soil structure adversely effects this species by isolating populations in unaffected areas (Sadlier & Pressey 1994). Construction activities are likely to directly impact on habitat for this species. Soil compaction, disturbance, weed invasion, fragmentation and removal of fallen timber are also known threats. The species is likely to use only a very small home range, and this trait, along with potential threats by construction, may impact on local populations if present. Surveying of potential habitat should be undertaken to determine their status. The species is considered difficult to survey. The use of artificial habitat as a sampling method has been used with success on Delma and other cryptic genera, and may be useful for this species. Hand searches and funnel traps are also suggested. Surveys must be lead by personnel experienced in herpetological surveying and species identification. This species is likely to occur in low-densities, so where one individual is recorded, a population should be considered present. As little is known of their ecology, wherever this species is recorded during target surveys, these locations must be avoided. Other areas of habitat which are deemed suitable based on species presence elsewhere but where no individuals are recorded during the surveys, should be avoided where possible. Where avoidance is not possible, pre-clearance surveys should be conducted during the construction period and vehicular movements minimised to a very narrow buffer to avoid widespread soil compaction and site disturbance. In any case, clearance surveys of open trenches for this species should be conducted daily north of KP450.
Pink-tailed Worm-lizard *Aprasia parapulchella*			
Present where rock outcropping exists.	Possible	EPBC – V TSC- V	The Pink-tailed Worm Lizard inhabits sloping, open woodland areas within predominantly native grassy areas. Regardless, the species is found at sites that are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. It can be found sheltered underneath small, partially-embedded rocks and is known to spend much of its time beneath these rocks in burrows constructed by termites or black ants, from which it feeds upon their eggs and larvae.

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
			As populations are likely to be highly localised, and the species has a low dispersal capability and low-fecundity, construction through rock outcrops could significantly impact on a population of this species should one be present. If avoidance of suitable habitat is not possible, further investigation are required by site surveys and habitat assessment.
FROGS			
Green and Golden Bell Frog *Litoria aurea*			
Present, Key populations around Kooragang Island and Hexham Swamp	Present, based on information within recovery plan	EPBC – V TSC - V	Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). Populations are also known from Hexam Swamp and Kooragang Island. It inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. Mortality from construction equipment, introduction of Chytridiomycosis (*Chytrid Fungus*) and disturbance and removal of habitat are key threats. Avoidance of impact to habitat and habitat retention is recommended. Significant impact possible through areas of key populations. Unavoidable impacts may be able to be offset by compensatory measures. Additional information must be sought to determine if a key population is present, the status of the population from surveys by experienced frog personnel. Chytrid management of vehicles, machinery and staff.
ARBOREAL MAMMALS AND HOLLOW DEPENDENT FAUNA			

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
Koala *Phascolarctos cinereus*			
Present, based on Atlas records	Present, based on Atlas records	TSC –V	In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the north coast and ranges. It inhabits eucalypt woodlands and forests. Koala feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Vegetation surveys for koala-feed tree species at sites where koalas have been recorded. Where a potential dispersal/movement corridor has been identified, habitat and matrix assessment[2] should be undertaken to determine the quality of this area of habitat. The objectives of additional field work would be to make a site-specific analysis of the importance of these habitats in a fragmented landscape.
Eastern Pygmy Possum *Cercartetus nanus*			
Present	Atlas recods	TSC V	The eastern pygmy possum is found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, It shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (eg. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. They appear to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. This species could occur in areas with hollow bearing trees particularly along creeklines. Known records occur near Gunnedah.
Squirrel Glider *Petaurus norfolcensis*			
Present at lateral	Present at	TSC - V	This species is found in dry sclerophyll woodland, preferring

[2] The dominant and most extensive (and often most modified) patch type in the landscape is often referred to as a matrix (Lindenmayer & Fischer 2006)

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
based on atlas	lateral based on atlas records		dense, white-barked eucalyptus country (Klippel 1992) and is generally absent from closed forest (Menkhorst et al., 1988). A mix of eucalypts, banksias and acacias including some winter flowering species and abundant hollows are required by this species. Fragmentation, predation by foxes and cats and inappropriate fire regimes are listed as threats to this species.
Micro bats			
Present	Present	various	Likely to be present in areas where there are hollw-bearing trees and/or rock overhangs and caves for roost and breeding sites. High likelihood of feeding sites along waterways.
Pale headed snake *Hoplocephalus bitorquatus*			
Possible	Possible north of gunnedah	TSC-V	The pale-headed snake has a patchy distribution from north-east Queensland to north-east NSW. In NSW it occurs from the coast to the western side of the Great Divide as far south as Tuggerah. It is found mainly in dry eucalypt forests and woodlands, cypress woodland and occasionally in rainforest or moist eucalypt forest. It also favours streamside areas, particularly in drier habitats. Known records occur near Gunnedah.
GROUND DWELLING MAMMALS			
Stripe-faced Dunnart Sminthopsis macroura			
Possible	Possible, north of approx. KP 636	TSC -V	This species is most commonly encountered along inland watercourses and other drainage features amongst native grasslands and low chenopod shrublands on clay, sandy or stony soils. They are known to shelter in cracks in the soil, beneath rocks and logs and within grass tussocks. As the species is likely to have a small home range (~0.34ha to 1ha) and has a low-fecundity, it would be highly susceptible to local extinctions by stochastic events. If present, disturbance by construction could result in disruption to normal ecological activities including breeding. Habitat assessment and trapping required at potential sites.
Pilliga Mouse *Pseudomys pilligaensis*			
Possible	Possible north of KP 636	TSC V EPBC V	The Pilliga Mouse is restricted to an isolated area of low-nutrient deep sand which has long been recognised as supporting a distinctive vegetation type (Pilliga Scrub). Recent studies indicate that the Pilliga Mouse were found in greatest abundance in

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
			recently burnt moist gullies, areas dominated by broombush and areas containing an understorey of kurricabah (*Acacia burrowii*) with a bloodwood (*Corymbia trachyphloia*) overstorey. Consistent features of the latter two habitats were: a relatively high plant species richness; a moderate to high low shrub cover; and a moist groundcover of plants, litter and fungi. The gully where high rates of capture were encountered had an extensive cover by low grasses and sedges, with little shrub cover and large areas of ash-covered ground. As the species is likely to have a small home range and has a low-fecundity, it would be highly susceptible to local extinctions by stochastic events. If present, disturbance by construction could result in disruption to normal ecological activities including breeding. Habitat assessment and trapping required at potential sites.
BIRDS			
Woodland & Forest Bird, Hollow-dependant Birds, Ground-dwelling Birds Bush Stone Curlew TSC E Swift Parrot TSC E EPBC E Regent Honeyeater TSC E EPBC E Superb Parrot TSC V EPBC V Australian Bustard TSC E Mallee Fowl TSC E EPBC V Brown Treecreeper (eastern subspecies) TSC V Turquoise Parrot TSC V Grey-crowned Babbler (eastern subspecies) TSC V Speckled Warbler TSC V Diamond Firetail TSC V Squatter pigeon TSC V EPBC V Australian Brush Turkey population in the brigalow belt south (Endangered Population)			
Present along vegetated areas, and in landscapes dominated by agricultural	Present		Numerous locations have been identified as potential movement corridors for avifauna. Construction activity has the potential to disrupt dispersal movements along such corridors which are often the only means of dispersal across these fragmented landscapes. Dispersal between natal territory and other areas of habitat is made by juveniles or sub-adults in an attempt to establish new

Presence of habitat	Likelihood of occurrence	Conservation Status	Potential impact
activities			territories. This could also significant effects on the occupancy of suitable habitat elsewhere, such as nature reserves. Habitat and Matrix Assessment should be undertaken to determine if such a movement corridor is present. Bird surveys will provide additional information to undertake a site-specific analysis. Possible outcomes of these works could include recommendations on the timing of the surveys, and analysis of the quality of habitat present compared with other potential corridors.
Wetland Birds Terek Sandpiper – TSC V EPBC V Lesser Sand Plover– TSC V EPBC V Black Tailed Godwit– TSC V EPBC V Broad Billed Sandpiper– TSC V EPBC V Little Tern TSC E Black necked Stork TSC E Painted Snipe TSC E EPBC V			
Present in wetland areas and in particular at Kooragang Island	Present		Wetland areas, particularly at the southern end of the pipeline provide important breeding sites for wetland birds and the Hunter River complex is a Ramsar listed site. Construction activity has the potential to disrupt breeding in wetlands if undertaken during the breeding period. Habitat and Matrix Assessment should be undertaken to determine if such a movement corridor is present. Bird surveys will provide additional information to undertake a site-specific analysis. Possible outcomes of these works could include recommendations on the timing of the surveys, and analysis of the quality of habitat present compared with other potential wetlands.

Aquatic ecology

Watercourses listed in Table 4-3 have been identified in the Surface and Groundwater Assessment as requiring further investigation. These water courses also provide important habitat for EEC and endangered aquatic species including:

- Lowland Darling River aquatic ecological community
- *Notopala sublineata* (River snail)
- *Bidyanus bidyanus* (Silver perch)

- *Ambassis agassizii* (Olive perchlet) western population
- *Mogurnda adspersa* (Purple spotted gudgeon) western population
- *Maccullochella peelii peelii* (Murray Cod)

Appendix 2 provides information as to where these species may occur along the pipeline route and Appendix 3 provides an assessment of impact and likelihood of occurrence of aquatic species and communities. General management measures have been recommended for watercourse crossings where these species may occur (refer to Section 6).

Table 4-3 Water courses identified in the surface and ground water assessment as requiring further assessment

Water feature	KP	Catchment
Barwon River	222	Border Rivers/Gwindir
Gnoura Creek	231.5	Border Rivers/Gwindir
Boomi River	235	Border Rivers/Gwindir
Whalan Creek	252	Border Rivers/Gwindir
Gil Gil Creek	287	Border Rivers/Gwindir
Marshalls Ponds Creek.	316.5	Border Rivers/Gwindir
Gwydir River	332	Border Rivers/Gwindir
Mehi River	339	Border Rivers/Gwindir
Tycannah Creek	357	Border Rivers/Gwindir
Gurley Creek	366	Border Rivers/Gwindir
Ten Mile Creek	404	Border Rivers/Gwindir
Namoi River	445.5, 479.5, 501, 504, 527.5	Namoi
Mooki Ck	556.5, 559,566	Namoi
Quipolly Ck	591.5	Namoi
Petwyn Valley Creek	658.5	Hunter/Central
Kingdon Ponds	688	Hunter/Central
Hunter River	694, 780.5, 783, 800.5	Hunter/Central
Fal Brook	740	Hunter/Central
Glendon Brook	756.5	Hunter/Central

5 Potential impacts

5.1 Construction impacts

The construction of the pipeline would involve working in a corridor of an average of 30 metres in width, which would contain the trench and other earthworks. Actual trench widths may vary depending on substrate and the need for boulder removal and excavation through rock. Other activities would include camps for construction teams and the construction of permanent buildings for the operational phase of the pipeline. The potential impacts on biodiversity that may result from the proposal during construction include:

- Clearing of native vegetation and other habitat through the preparation of the easement, resulting in reduced habitat areas for native flora and fauna species for the duration of the construction period and until the area has sufficiently regenerated.
- Removal of vegetation over the area of the pipeline trench and peripheral impacts to vegetation from vehicle and machinery access, spoil deposition and retrieval and materials and equipment laydown.
- The trenching, boring and vehicle traffic may impact on trees by damaging roots and soils.
- Potential for the introduction and spread of weeds, directly by importing weed propagules on machinery and materials and indirectly by removing competing native vegetation and altering site conditions in favour of weed species.
- Disturbance to soils and vegetation resulting from the pipeline trenching may provide opportunities for a suite of herbaceous weeds to establish. Many of these species would however likely decline over time as perennial vegetation becomes re-established. Invasion of native plant communities by exotic perennial grasses is listed as a key threatening process in the Threatened Species Conservation Act 1995, and these species have the potential of transforming the understorey of grassy forest communities.
- Damage to or removal of endangered ecological communities, threatened flora species and/or populations or habitat for threatened fauna species and/or populations during the construction period.
- Increased vehicle/fauna interactions due to increased traffic, primarily during the construction periods.
- Disturbance to native fauna, particularly nocturnal species, due to increased lighting around construction compounds and for certain night-time construction activities.
- Disturbance to fish and fish passage, particularly if the waterway is used by migratory fish.
- Disturbance to fauna dispersal and breeding.
- Entrapment of small mammals, reptiles and frogs may pose a risk to fauna during construction.
- During construction it is desirable to only leave the trench open for the minimum period possible in the interests of general trench stability, the objective being days, not weeks. However given that the trench may be open at any time and the timing from clearing to rehabilitation could be up to

four months, without appropriate environmental management this could represent an environmental risk to fauna.

- The cleared easement and trench may act as a barrier to some ground dwelling species of fauna.
- Fragmentation of habitat may result in some level of impact especially if the home range of a ground dwelling species is fragmented.
- Damage to habitat resulting from accidental spills, clearing, emergency or maintenance works or other occurrences.
- Blasting, welding and use of machinery introduces a risk of fire, which may impact on vegetation.

5.2 Potential impacts – operation

The potential impacts on biodiversity that may result from the proposal during operation include:

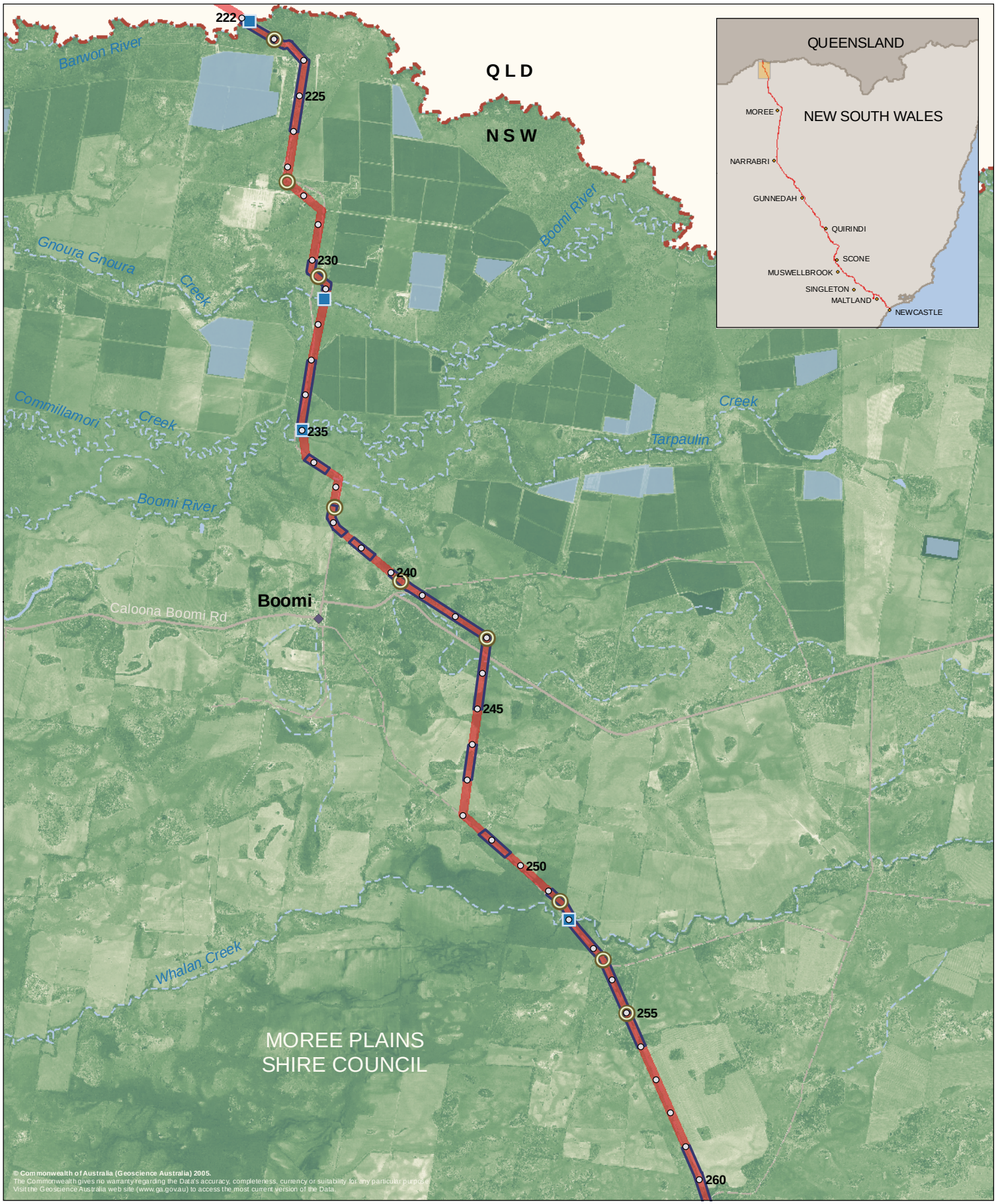
- Fragmentation or isolation of existing habitat areas. This would be magnified where closed or dense native vegetation is removed and requires maintenance of the clear easement.
- Increased incidence of weeds along the disturbed easement.
- Edge effects resulting from clearing, this may include weed invasion of intact native vegetation and wind-throw of trees adjacent to the gas pipeline. An 'ecotone' where woodland and forest meet the cleared easement may also be created. This could potentially result in changed species composition, especially in relation to woodland and forest dependent birds, where the route requires clearing of these vegetation types.

5.3 Summary of Impacts by map sheet

In this section for each of the 17 map sheets (Figures 5.1-5.17) the key features of the existing environment are described. This information is a result of the screening process, the air reconnaissance, examination of habitat types, existing flora and fauna records, vegetation maps and the matrix assessment provided at Appendix 2. Potential major impacts are described as a linear length of corridor. The exact location and easement width is not known at this stage and as such the linear length presented in kilometres is a worst case scenario. Management measures are presented in a hierarchy, for example, if the first measure of avoid the native vegetation is implemented, then the need to undertake further survey work may be reduced.

Figures according to Bioregion are as follows.

Figure 5-1	Darling Riverine Plains Bioregion	**Figure 5-10**	Brigalow Belt South
Figure 5-2	Darling Riverine Plains Bioregion	**Figure 5-11**	Brigalow Belt South/ Nandewar
Figure 5-3	Darling Riverine Plains Bioregion	**Figure 5-12**	Brigalow Belt South/North Coast
Figure 5-4	Darling Riverine Plains Bioregion/ Brigalow Belt South	**Figure 5-13**	Sydney Basin
Figure 5-5	Brigalow Belt South	**Figure 5-14**	Sydney Basin
Figure 5-6	Brigalow Belt South	**Figure 5-15**	Sydney Basin
Figure 5-7	Brigalow Belt South	**Figure 5-16**	Sydney Basin/North Coast
Figure 5-8	Brigalow Belt South	**Figure 5-17**	Sydney Basin
Figure 5-9	Brigalow Belt South		



Drawing no. 07002g_nghBio_01r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint
- State border

ngh environmental
planning • assessment • ems • auditing

Figure 5.1 Biodiversity constraints - Boomi region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment – Figure 5-1

- Gnoura Gnoura Creek
- Barwon River
- Boomi River
- Whalan Creek
- Travelling Stock Route
- Boomi Nature Reserve
- Glossy black-cockatoo and koala records
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-1

There is potential for impact to

- 22km of habitat for stripe-faced dunnart , pilliga mouse and five-clawed worm skink
- 5km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 1km of potential habitat for arboreal fauna
- 15km of potential Coolibah –Black box woodland EEC
- 6km of potential Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) EEC
- 1km Carbeen Open Forest EEC
- 11km potential habitat for *Swainsona murrayana* and *Sida rohlenae*
- Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species). Silver Perch, Olive perchlet, Purple spotted gudgeon, Murray Cod at permanent water crossings Barwon River, Boomi River and Whalan Creek

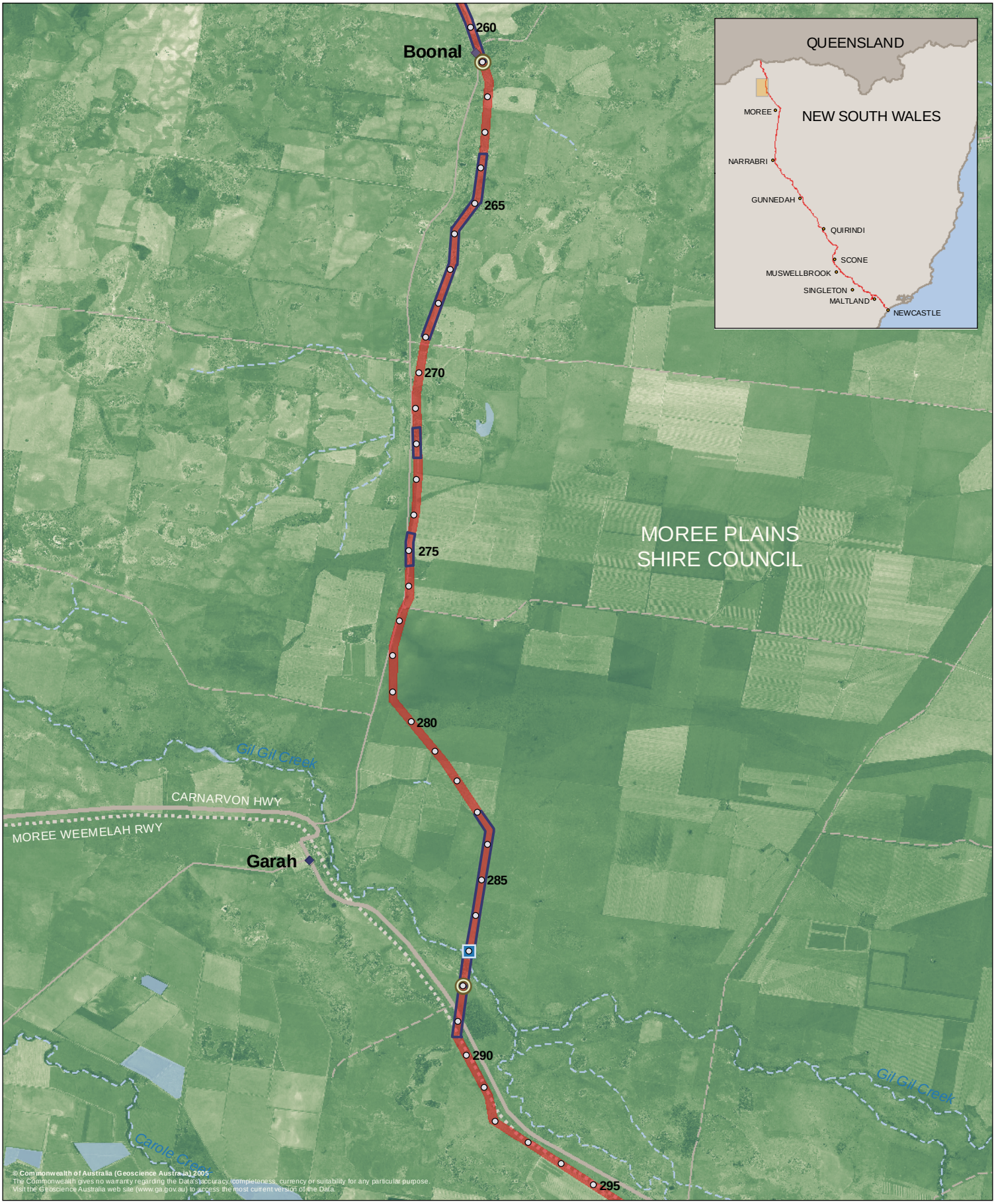
In addition the proposal could result in

- Further fragmentation of already fragmented landscape
- Potential disruption to fauna corridor on Gnoura Gnoura Creek and Boomi River

Management measures - Figure 5-1

- Avoid TSR
- Avoid crossings where high value aquatic habitat occurs
- Minimize impact to riparian zone
- Survey for native grass species and *Swainsona murrayana, Sida rohlenae*, stripe-faced dunnart and river snail
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species.

- Avoid mature trees and rehabilitate grass sward
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Consider minimising corridor width in biodiversity constraint areas following further survey work
- Offset residual impacts if required



Drawing no. 07002g_nghBio_02r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.2 Biodiversity constraints - Garah region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment – Figure 5-2

- Travelling Stock Route
- Gil Gil Creek
- Glossy black-cockatoo, grey-crowned babbler, little pied bat, yellow-bellied sheath-tail bat records
- Fragmented habitat for a number of threatened species and EEC

Potential impacts – Figure 5-2

There is potential for impact to

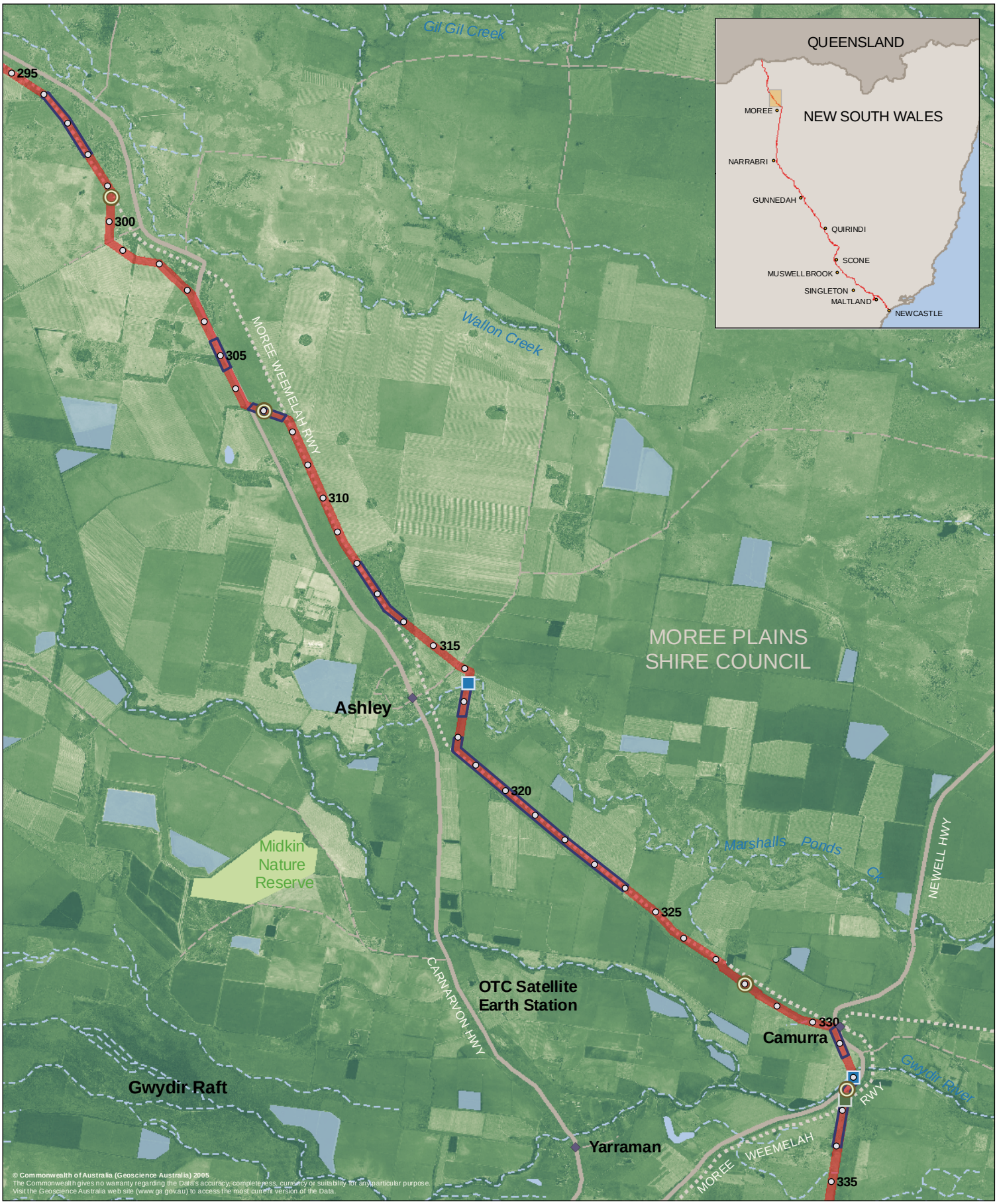
- 11km of potential stripe- faced dunnart, pilliga mouse and five-clawed worm skink habitat
- 4km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 2km potential Coolibah –Black box woodland EEC
- 7km potential *Swainsona murrayana* and *Sida rohlenae* habitat
- Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species) Silver Perch (M), Olive perchlet, Purple spotted gudgeon, Murray Cod (M) at Gil Gil Creek

In addition the proposal could result in

- Further fragmentation of already fragmented landscape
- Potential disruption to fauna corridor on Gil Gil Creek

Management measures – Figure 5-2

- Avoid TSR
- Avoid crossings where high value aquatic habitat occurs
- Minimise impact to riparian zone
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage
- Survey for native grass species and *Swainsona murrayana* and *Sida rohlenae* and stripe-faced dunnart and river snail
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species
- Avoid mature trees and rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work
- Offset for residual impacts if required



Drawing no. 07002g_nghBio_03r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Potential infrastructure constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.3 Biodiversity constraints - Ashley region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment – Figure 5-3

- Travelling Stock Route
- Carole Creek, Marhsall Ponds, Gwydir River
- No existing threatened fauna or flora records
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-3

There is potential for impact to

- 4km of potential habitat for stripe-faced dunnart and pilliga mouse
- 18km of potential five-clawed worm skink habitat
- 3km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 14km *Swainsona murrayana* and *Sida rohlenae* habitat
- 1km potential Myall Woodland EEC
- Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M), Olive perchlet, Purple spotted gudgeon, Murray Cod (M) at Marshalls Pond Creek and Gwydir River

In addition the proposal could result in

- Further fragmentation of already fragmented landscape
- Potential disruption to fauna corridor on Marshall Pond and Gwydir River

Management measures - Figure 5-3

- Avoid TSR
- Avoid crossings where high value aquatic habitat occurs
- Minimize impact to riparian zone
- Survey for native grass species and Swainsona murrayana and Sida rohlenae and stripe-faced dunnart and river snail
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species
- Avoid mature trees and rehabilitate grass sward
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage
- Consider minimising corridor width in biodiversity constraint areas following further survey work
- Offset for residual impacts if required

Drawing no. 07002g_nghBio_04r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.4 Biodiversity constraints - Moree region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-4

- Travelling Stock Route
- Mehi River, Tycannah Creek, Gurley Creek
- Koala record on Mehi river
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-4

There is potential for impact to

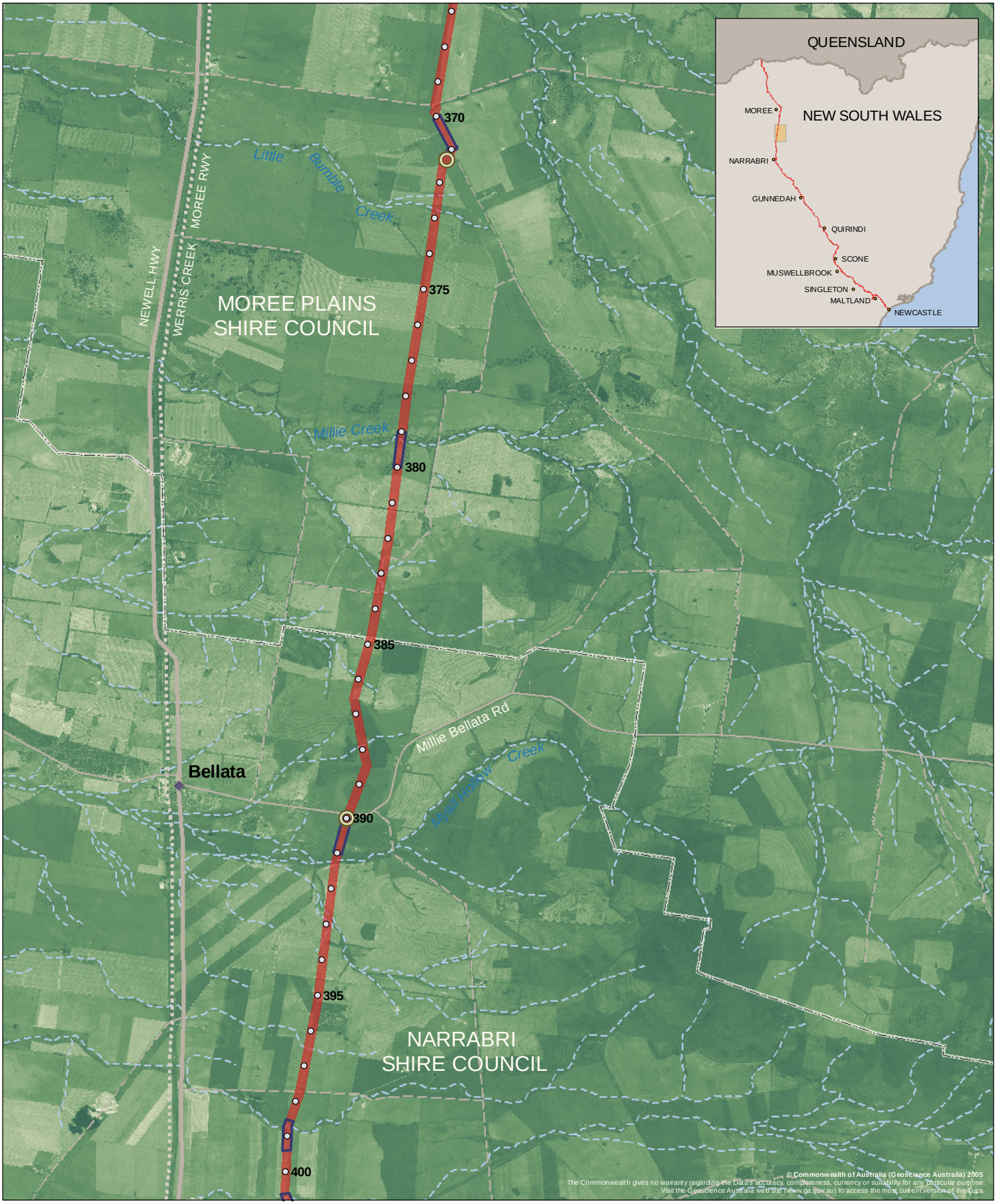
- 6km of potential habitat for stripe-faced dunnart and pilliga mouse
- 9km of potential five-clawed worm skink habitat
- 3km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 3km of potential arboreal fauna
- 1km potential Coolibah –Black box woodland EEC
- 4km of potential *Swainsona murrayana* and *Sida rohlenae* habitat
- Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M), Olive perchlet, Purple spotted gudgeon, Murray Cod (M) at Mehi River, Tycannah Creek and Gurley Creek

In addition the proposal could result in

- Further fragmentation of already fragmented landscape
- Potential disruption to fauna corridor on the Mehi River

Management measures - Figure 5-4

- Avoid TSR
- Avoid crossings where high value aquatic habitat occurs
- Minimize impact to riparian zone
- Survey for native grass species and *Swainsona murrayana* and *Sida rohlenae* and stripe-faced dunnart, and river snail
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage
- Avoid mature trees and rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work
- Offset for residual impacts if required



Drawing no. 07002g_nghBio_05r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.5 Biodiversity constraints - Bellata region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-5

- Travelling Stock Route (370-371)
- Gurley Creek, Millie Creek, Myall Hollow Creek
- Glossy black cockatoo record (Gurley) koala record and five-clawed worm skink record (Bellata)
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-5

There is potential for impact to

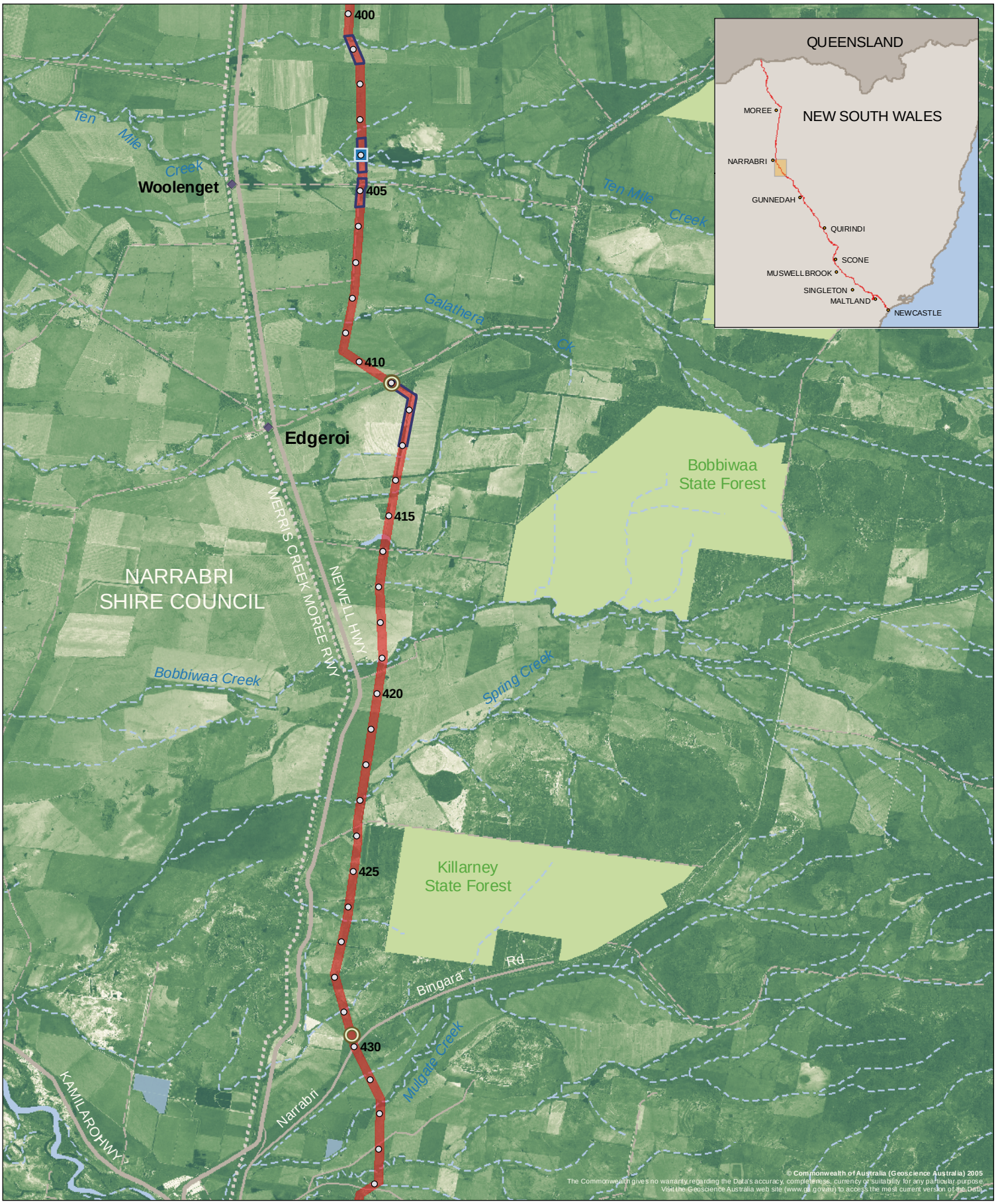
- 3km of potential habitat for stripe-faced dunnart and pilliga mouse
- 5.5km of potential five-clawed worm skink habitat
- 1km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 1km of potential Arboreal fauna habitat
- 2km of potential Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) EEC

In addition the proposal could result in

- Further fragmentation of already fragmented landscape

Management measures - Figure 5-5

- Avoid TSR
- Survey for native grass species, stripe-faced dunnart.
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species
- Minimise impact to riparian zone
- Avoid mature trees and rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work
- Offset for residual impacts if required



Drawing no. 07002g_nghBio_06r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.6 Biodiversity constraints - Narrabri north region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-6

- Ten Mile Creek, Galathera Creek, Spring Creek
- Bobbiwaa State Conservation Area
- Killarney State Forest
- Threatened fauna records all associated with Killarney State forest and Bobbiwaa State Conservation Area, including koala, hooded robin, brown treecreeper, painted honeyeater, speckled warbler, turquoise parrot, yellow-bellied sheathtail-bat and masked owl
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-6

There is potential for impact to

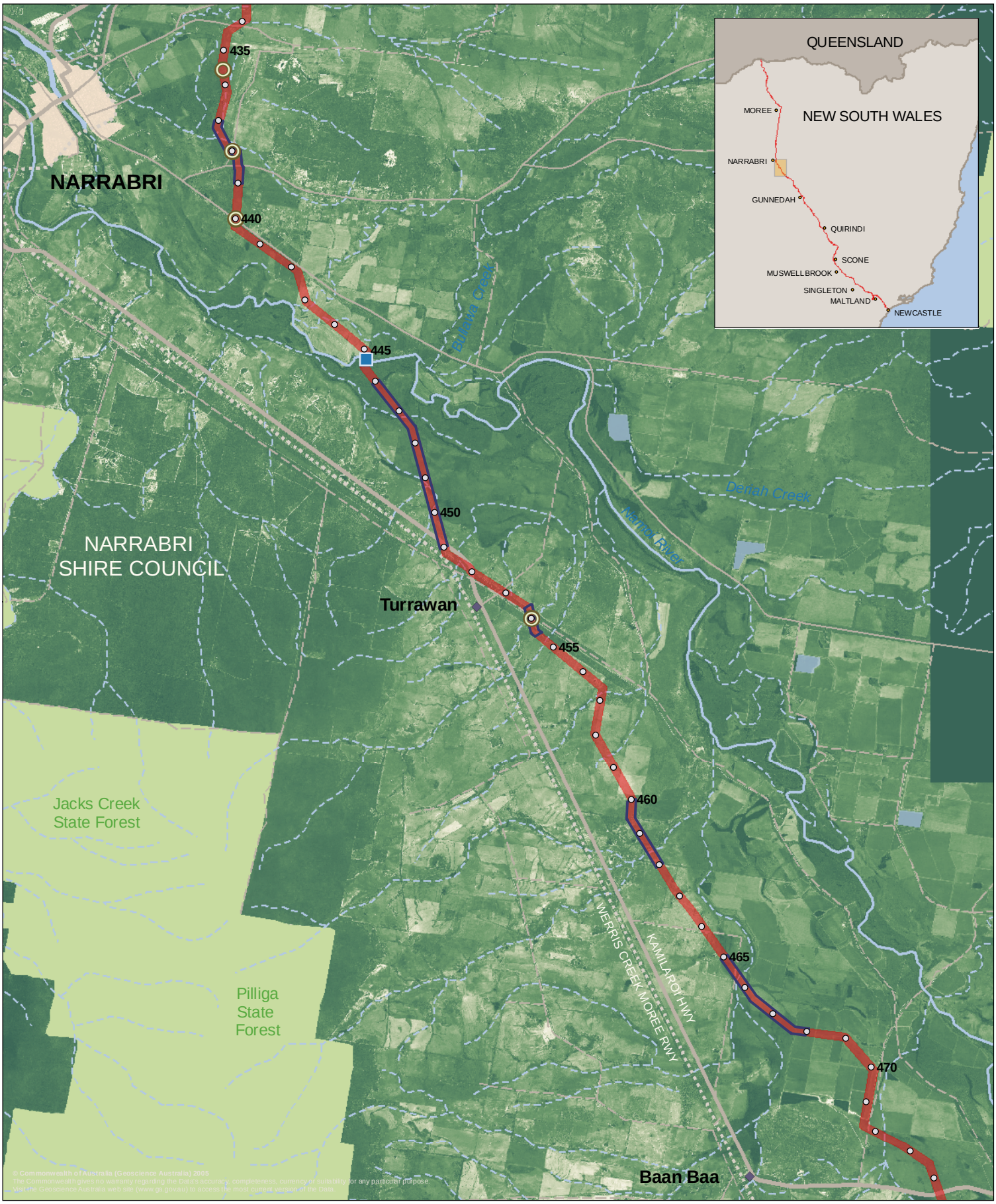
- 3km of potential habitat for stripe-faced dunnart and pilliga mouse
- 7km of potential five-clawed worm skink habitat
- 2km potential Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) EEC

In addition the proposal could result in

- Further fragmentation of already fragmented landscape

Management measures - Figure 5-6

- Avoid biodiversity constraint areas
- Minimise impact to riparian zone
- Survey for Stripe-faced dunnart,
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species
- Rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work



Drawing no. 07002g_nghBio_07r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.7 Biodiversity constraints - Narrabri region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-7

- Namoi River
- Jacks Creek and Pilliga State Forest
- Barking owl, black-necked Stork, koala records associated with Namoi River and riparian vegetation
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-7

There is potential for impact to

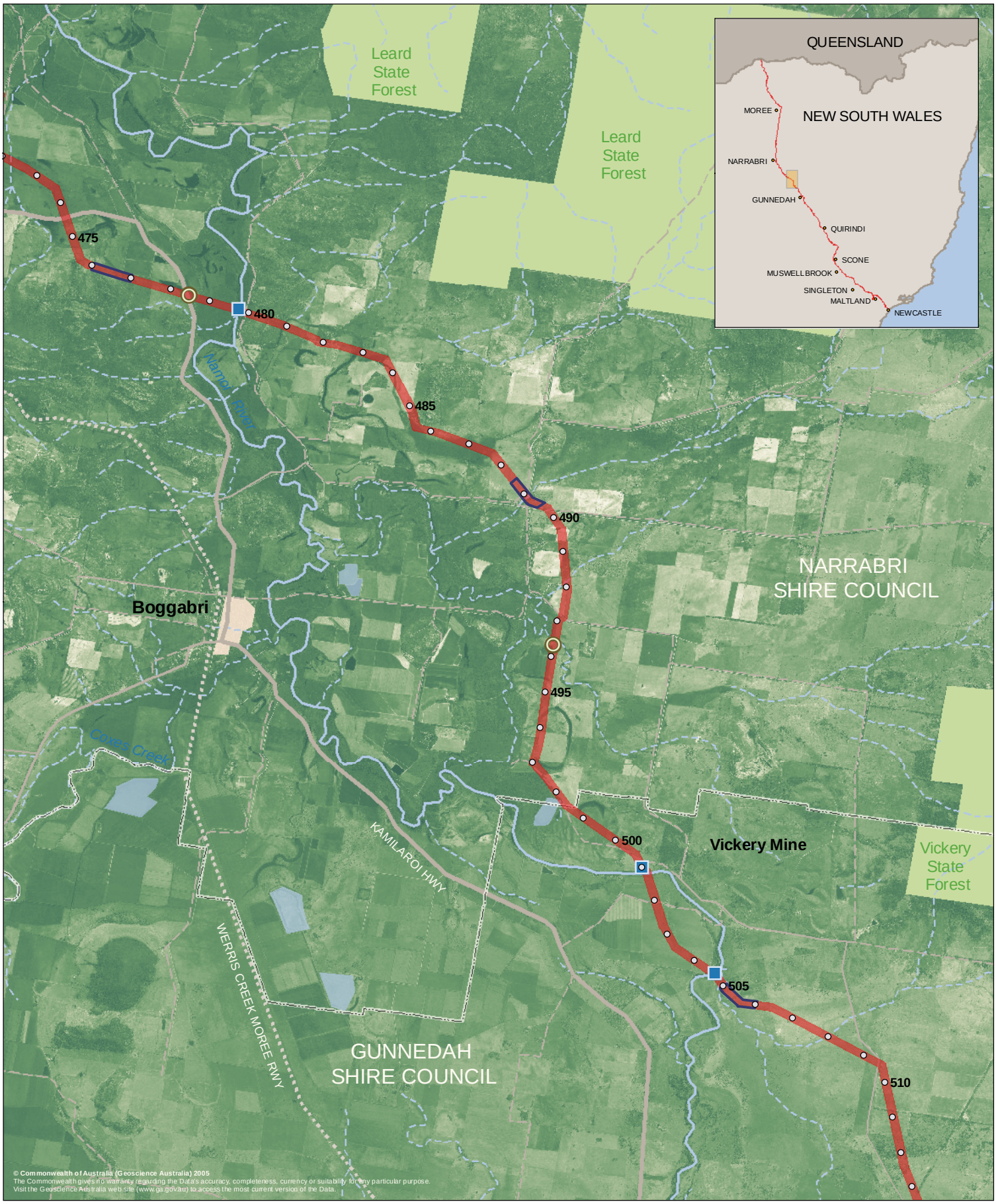
- 1km of potential habitat for stripe-faced dunnart and pilliga mouse
- 5km of potential five-clawed worm skink habitat
- 2km of potential habitat for pale headed snake
- 1km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 3km of potential arboreal and hollow dependent fauna
- 2km of potential Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions Brigalow EEC
- 9km Native vegetation on Cracking clay soils' EEC and *Dichanthium setosum* and *Digitaria porrecta* habitat

In addition the proposal could result in

- Disturbance to important movement corridor (Namoi River)
- Further fragmentation of already fragmented landscape

Management measures - Figure 5-7

- Avoid native vegetation
- Survey for Stripe-faced dunnart
- Survey for five-clawed worm skink and pale headed snake habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of these species
- Undertake survey for *Dichanthium setosum; Digitaria porrecta*
- Avoid mature trees
- Rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work



Drawing no. 07002g_nghBio_08r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.8 Biodiversity constraints - Boggabri region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-8

- Namoi River
- Leard State Forest, Vickery State Forest
- Turquoise parrot, grey crowned babbler and koala records
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-8

There is potential for impact to

- 1km of potential habitat for five-clawed worm skink
- 2km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 2km of potential habitat for arboreal and hollow dependent fauna
- 2km Ooline (*Cadellia pentastylis*) EEC
- 3km of potential Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions Brigalow EEC
- Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M), Murray Cod (M) at Namoi River

In addition the proposal could result in

- Further fragmentation of already fragmented landscape

Management measures - Figure 5-8

- Avoid riparian habitat and edge of TSR
- Avoid crossings where high value aquatic habitat occurs
- Minimise impact to riparian zone
- Survey for five-clawed worm skink habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of this species
- Survey Riparian corridor (Namoi 501-504)
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage
- Avoid mature trees
- Rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work

Drawing no. 07002g_nghBio_09r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.9 Biodiversity constraints - Gunnedah region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-9

- Namoi River
- Mooki River
- Quoll and koala records
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-9

There is potential for impact to

- 2km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 2km of potential habitat for arboreal and hollow dependent fauna
- 1km of potential Native vegetation on Cracking clay soils' EEC and *Dichanthium setosum* and *Digitaria porrecta* habitat
- Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M), Murray Cod (M) at Namoi River

In addition the proposal could result in

- Further fragmentation of already fragmented landscape

Management measures - Figure 5-9

- Avoid riparian vegetation
- Avoid crossings where high value aquatic habitat occurs
- Minimise impact to riparian zone
- Survey Riparian corridor (Namoi 532-533)
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Avoid mature trees
- Rehabilitate grass sward
- Consider minimising corridor width in biodiversity constraint areas following further survey work

Drawing no. 07002g_nghBio_10r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Infrastructure constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.10 Biodiversity constraints - Breeza region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-10

- Mooki River
- Koala records
- Fragmented Habitat for threatened species and EEC

Potential impacts - Figure 5-10

There is potential for impact to

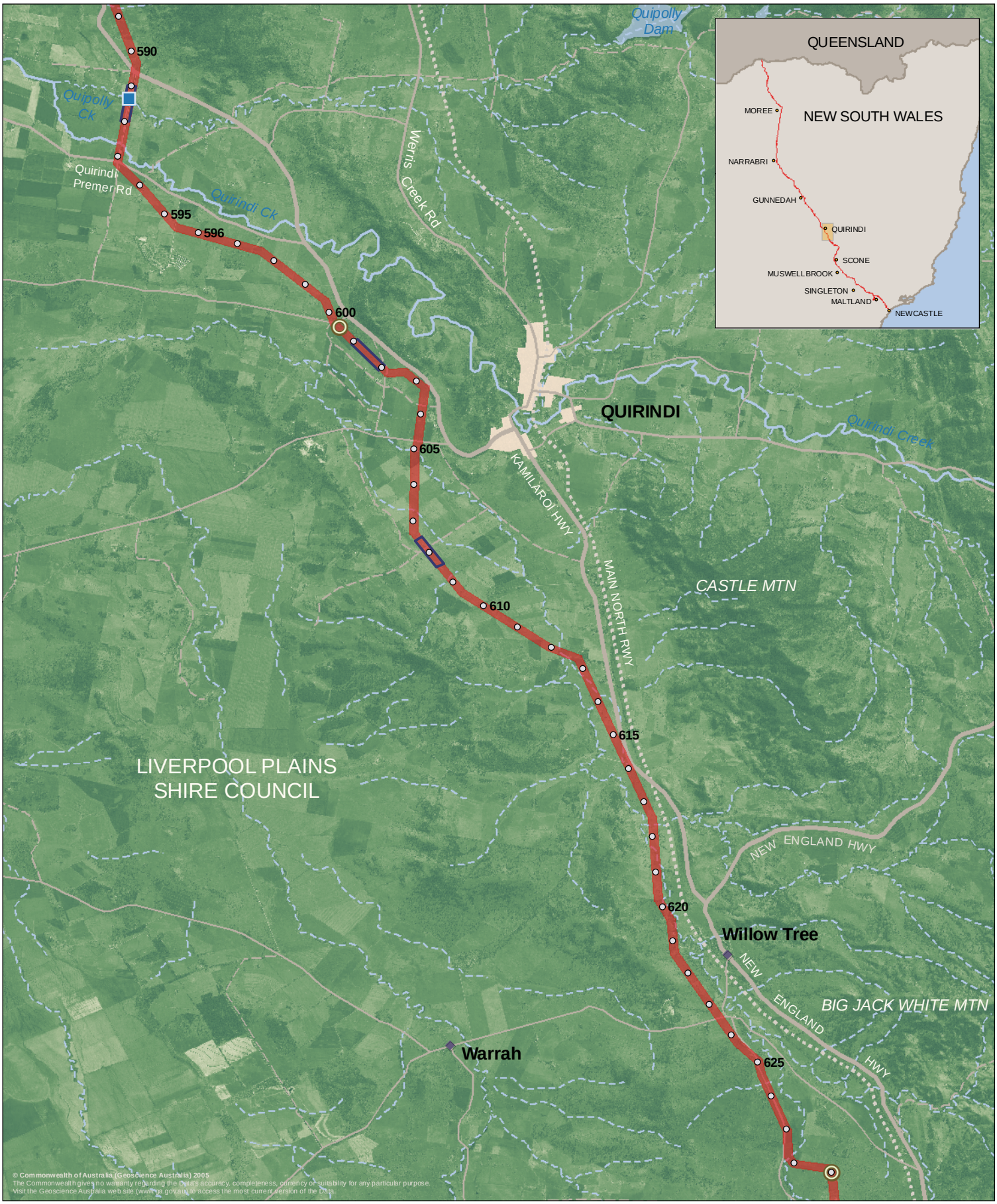
- 3km of potential habitat for woodland & forest, hollow dependent and ground dwelling birds
- 3km of potential habitat for arboreal and hollow dependent fauna
- Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M), Murray Cod (M) at Mooki River

In addition the proposal could result in

- Further fragmentation of already fragmented landscape along the riparian corridor on the Mooki River

Management measures - Figure 5-10

- Avoid riparian vegetation on the Mooki River
- Avoid crossings where high value aquatic habitat occurs
- Survey Riparian corridor (Mooki 556-559)
- Minimise impact to riparian zone
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage
- Consider minimising corridor width in biodiversity constraint areas following further survey work



Drawing no. 07002g_nghBio_11r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd AHMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.11 Biodiversity constraints - Quirindi region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-11

- Quirrindi Creek, Quippolly Creek
- Koala and speckled warbler records
- Fragmented habitat for threatened species and EEC

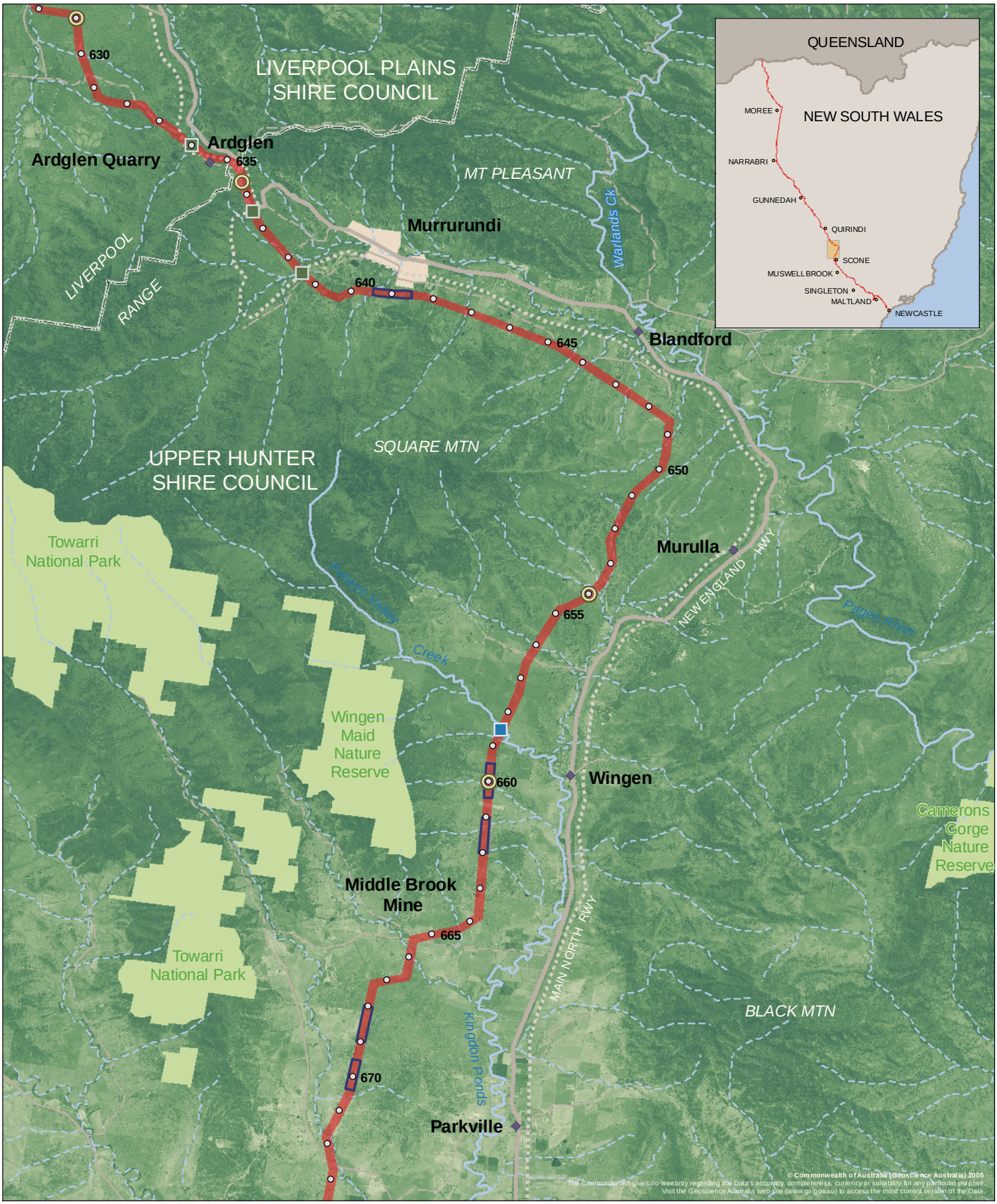
Potential impacts - Figure 5-11

There is potential for impact to

- 5km of potential Native vegetation on Cracking clay soils' EEC
- 5km of *Dichanthium setosum* and *Digitaria porrecta* habitat
- Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M), Murray Cod (M) at Quipolly Creek

Management measures - Figure 5-11

- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Rehabilitate grass sward



Drawing no. 07002g_nghBio_12r1

Date 01 September 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Infrastructure constraint
- TSR crossing
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.12 Biodiversity constraints - Murrurundi region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-12

- Towarri & Murrundi National Park Wingen Maid & Camerons Gorge Nature Reserve
- Pages River, Warlands Creek, Petwyn Valley Creek
- Yellow-bellied sheathtail-bat, glossy black cockatoo and *Cymbidium canaliculatum* records
- Fragmented habitat for threatened species and endangered populations

Potential impacts - Figure 5-12

There is potential for impact to

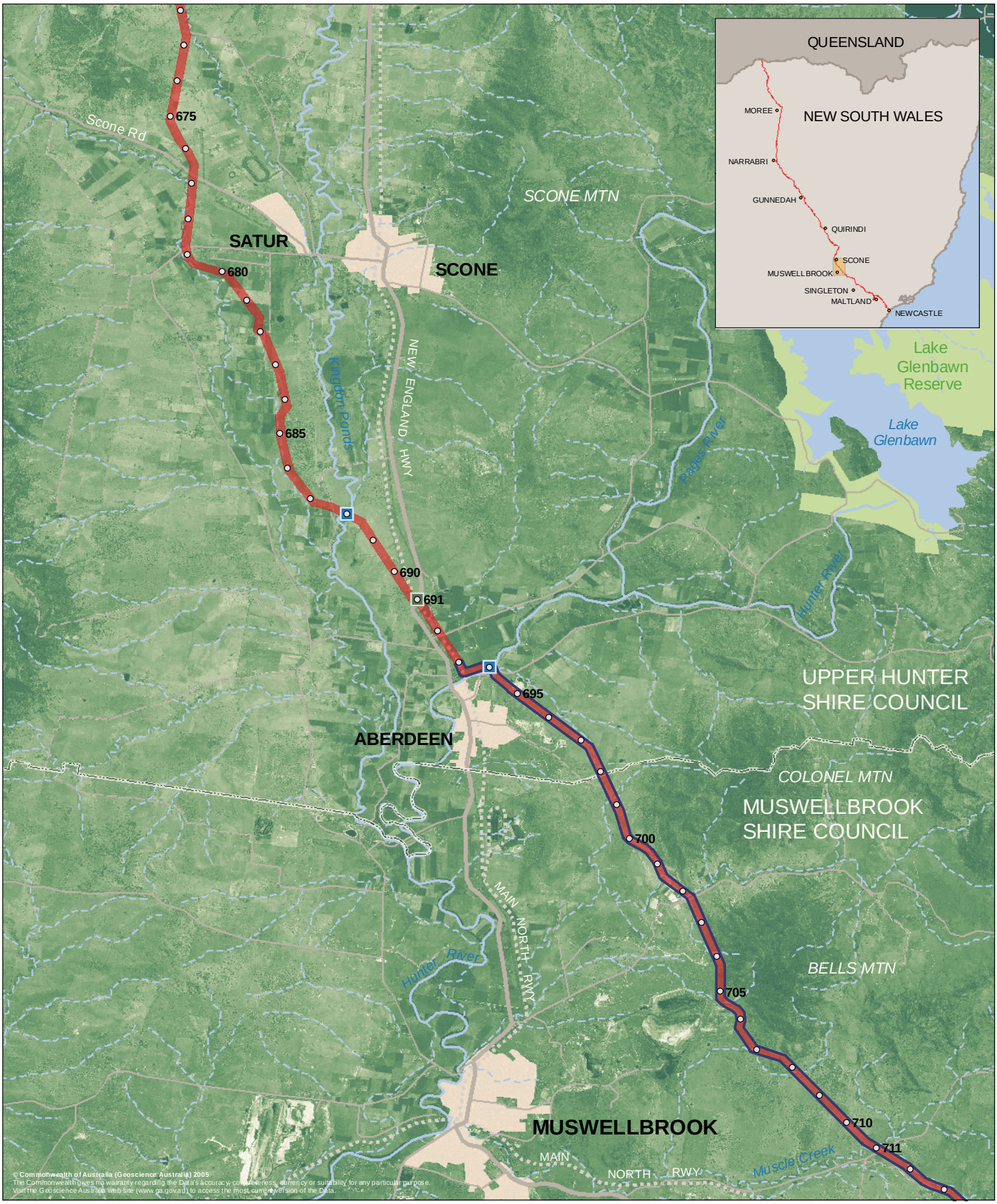
- 5km of potential Box-gum woodland EEC.
- 6km of potential habitat for Border thick-tailed gecko Pink-tailed worm lizard
- 4km of potential habitat for woodland & forest and ground dwelling birds
- 4km of potential habitat for arboreal animals
- 2km of potential habitat for the Endangered population *Cymbidium canaliculatum*
- Threatened fish species (including migratory species).Silver perch (M) at Petwyn Valley Creek.

In addition the proposal could result in

- Disruption to movement corridor between Burning Maid and Wingen Nature Reserve

Management measures - Figure 5-12

- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Survey for Border thick-tailed gecko Pink-tailed worm lizard habitat prior to commencement of construction. Develop construction timing in consideration of avoiding relevant sensitivities in the lifecycles of these species
- Search for *Cymbidium canaliculatum* and/or avoid host trees (661-662, 670)
- Consider minimising corridor width in biodiversity constraint areas following further survey work



Drawing no. 07002g_nghBio_13r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Infrastructure constraint
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.13 Biodiversity constraints - Muswellbrook region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-13

- Lake Glenbawn Reserve, Scone Mountain National Park
- Hunter River, Kingdon Ponds, Sandy Creek, Muscle Creek
- Swift parrot, regent honeyeater, glossy black cockatoo and yellow bellied glider, quoll, little bent winged bat, eastern false pipistrelle, sooty owl, koala and *Eucalyptus camaldulensis* records
- Fragmented habitat for a number of threatened species and endangered populations

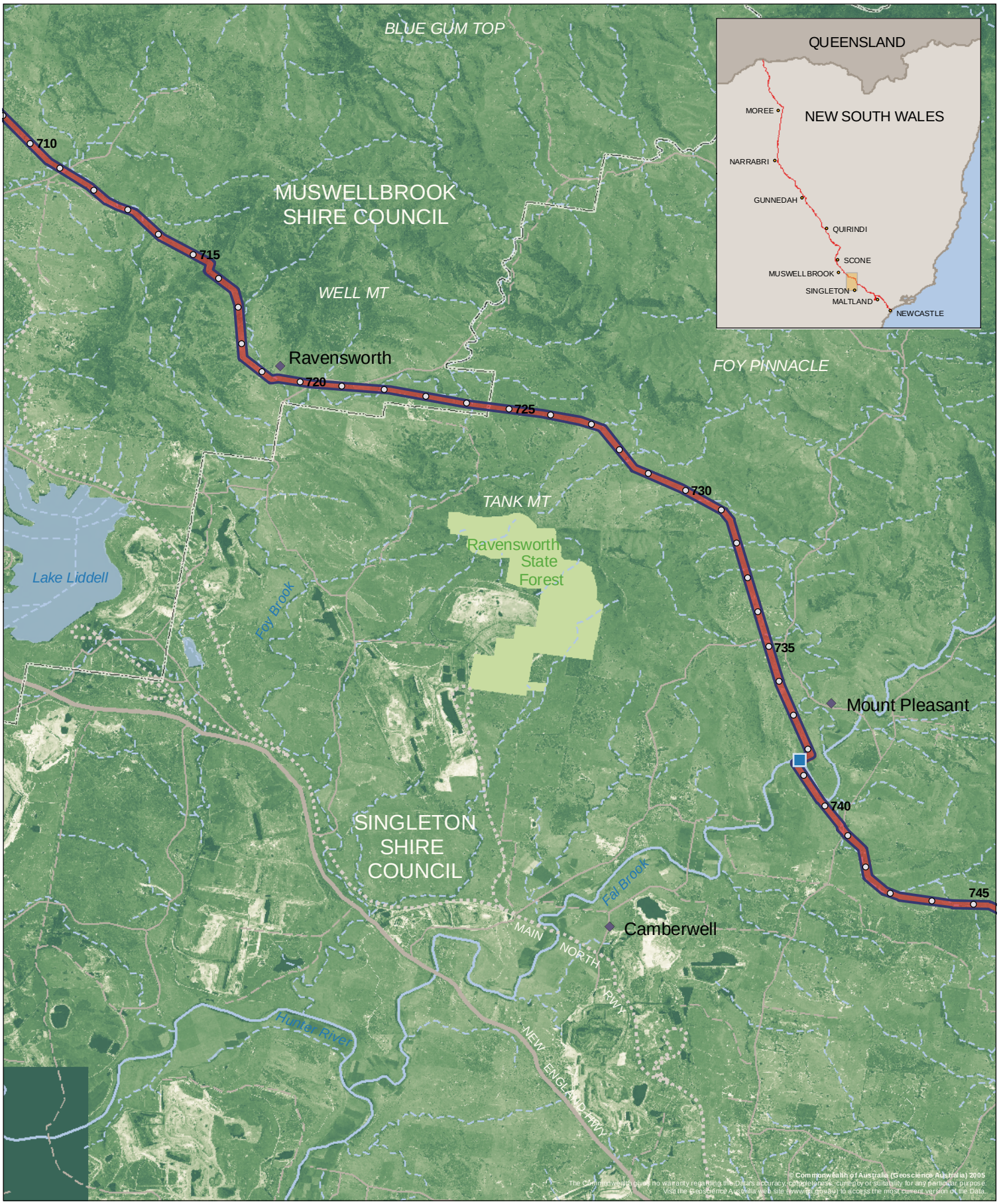
Potential impacts - Figure 5-13

There is potential for impact to

- 16km of potential *Diuris tricolor* habitat
- 2km of potential *Bothriochloa biloba* habitat
- 3km of possible habitat for the *Eucalyptus camaldulensis* population in the Hunter Catchment endangered population
- Threatened fish species (including migratory species).Silver perch (M) at Kingdon Ponds and Hunter River

Management measures - Figure 5-13

- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Avoid all individuals of *Eucalyptus camaldulensis*
- Onsite ecologist during construction and careful translocation of *Diuris tricolor* and *Bothriochloa biloba* if found (Species are most evident in Spring)



Drawing no. 07002g_nghBio_14r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.14 Biodiversity constraints - Singleton north region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-14

- Ravenswood State Forest
- Hunter River, Fal Brook
- Red-backed Button-quail, quoll, barking owl, masked owl, red goshawk, squirrel glider, diamond firetail, brown treecreeper and grey crowned babbler records

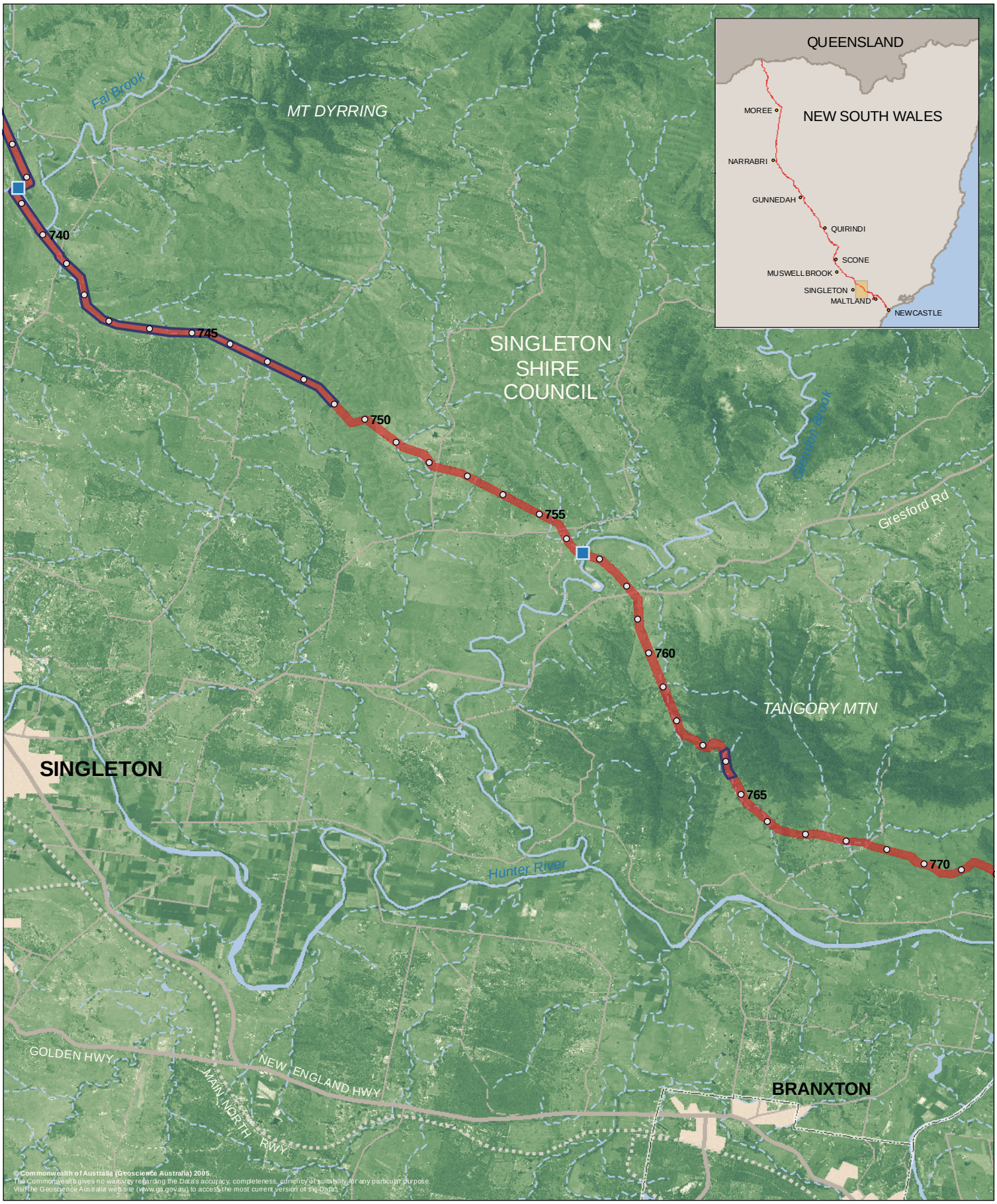
Potential impacts - Figure 5-14

There is potential for impact to

- 3km of potential disruption to movement corridor across vegetated ridge (woodland birds, mammals and reptiles)
- 27km of potential *Bothriochloa biloba* habitat
- 3km of potential habitat for *Eucalyptus camaldulensis* population in the Hunter Catchment endangered population
- Threatened fish species (including migratory species).Silver perch (M) unnamed creek and Fal Brook

Management measures - Figure 5-14

- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Avoid movement corridor
- Undertake site specific habitat assessment – including field survey to determine extent of movement corridor
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Avoid all individuals of *Eucalyptus camaldulensis*
- Onsite ecologist during construction and careful translocation of *Diuris tricolor* and *Bothriochloa biloba* if found (Species are most evident in Spring)



Drawing no. 07002g_nghBio_15r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.15 Biodiversity constraints - Singleton east region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-15

- Hunter River, Fal Brook
- Quoll and koala records
- Fragmented habitat for a number of threatened species and EEC

Potential impacts - Figure 5-15 (from KP 745)

There is potential for impact to

- 2km of potential habitat for woodland & forest and ground dwelling birds
- 2km of potential movement corridor across vegetated ridge (Woodland Birds, Mammals and reptiles)
- 4km of potential *Bothriochloa biloba* habitat
- 1km of potential Lower Hunter potential Gum-Ironbark Forest
- Threatened fish species (including migratory species).Silver perch (M) Glendon Brook

Management measures - Figure 5-15

- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Undertake site specific habitat assessment – including field survey to determine extent of movement corridor (762-764). Survey will inform further management measures
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage
- Onsite ecologist during construction and careful translocation of *Bothriochloa biloba* if found (Species most evident in Spring)
- Retain and rehabilitate grass sward

Drawing no. 07002g_nghBio_16r1

Date 21 August 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Infrastructure constraint
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.16 Biodiversity constraints - Maitland region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-16

- Ravenswood State Forest
- Hunter River, Fal Brook
- Grey crowned babbler, grey headed flying fox, phascogale, squirrel glider, quoll, black-necked Stork and koala records
- Fragmented habitat for a number of threatened species and EECs

Potential impacts - Figure 5-16 (from KP 771)

There is potential for impact to

- 3km potential Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion EEC
- Threatened fish species (including migratory species).Silver perch (M) at Hunter River and unnamed creek

Lateral

- Potential to disrupt squirrel glider and bird in industrial area

Management measures - Figure 5-16

- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Minimize disturbance corridor
- Undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage

Drawing no. 07002g_nghBio_17r1

Date 01 September 2008

Source Geoscience Australia
RLMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Proposed pipeline corridor
- Potential surface water constraint
- Potential biodiversity constraint

ngh environmental
planning • assessment • ems • auditing

Figure 5.17 Biodiversity constraints - Newcastle region

1:140,000 (at A4)

0 1 2 3 4km

Key features of the existing environment - Figure 5-17

- Kooragang and Hexham Swamp Nature Reserve
- Hunter River
- Grey crowned babbler and grey headed flying fox, phascogale, quoll, black-necked stork, speckled duck, square tailed kite, magpie goose, gould's petrel, masked owl, glossy black cockatoo, squirrel glider, greater broad nosed bat, turquoise parrot, little bent winged bat, eastern bent winged bat, Australasian bittern, black tailed godwit, great knot, terek sandpiper, diamond firetail, albatross, lesser sandplover, greater sandplover, comb-crested Jacana, osprey, wandering albatross, broad billed sandpiper, swift parrot, green and golden bell frog, koala and *Zannichellia palustris* records
- Fragmented habitat for a number of threatened species and EECs

Potential impacts - Figure 5-17

There is potential for impact to

- 25km of potential Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion EEC
- 25km of potential habitat for *Zannichellia palustris* and *Eucalyptus parramattensis subsp*. *Decadens*
- 20km of potential habitat for green and golden bell frog. Likely to disrupt a movement corridor and dispersal routes between Kooragang and Hexham Swamp Nature Reserve. These areas are identified as two of the 4 listed important populations of this species in the Hunter region.
- 20km of potential habitat for wetland birds
- 3km of potential habitat for arboreal mammals (likely to be a Koala corridor)
- Threatened fish species (including migratory species).Silver perch (M) at Hunter River and unnamed creek
- Hunter River Estuary system is a listed Ramsar site

Management measures - Figure 5-17

- Directional drilling through all wetland areas
- Avoid mature trees especially in riparian areas
- Avoid crossings where high value aquatic habitat occurs
- Undertake works when water way is dry or undertake works outside of migratory period for fish or avoid blocking fish passage
- Survey all areas for movement corridors and locations of species/ populations
- Minimize disturbance corridor following results of survey work
- Create wet refuges for frogs
- Avoid mature trees

5.4 Cumulative Impact Assessment

The assessment of cumulative impact from the proposal has two aspects:

1. The cumulative impact from the proposal itself, along its entire length; and
2. The cumulative impact from other developments in the region

As discussed above, in broad terms, impacts from the proposal include:

- Removal of vegetation and habitat
- Fragmentation of habitats
- Severing potential movement corridors for biota, including genetic material
- Isolation of patches of suitable habitat
- Edge effects associated with linear infrastructure corridors

Fragmented landscapes

Each of the bioregions has experienced high levels of native vegetation clearing, with significant loss across most landscapes. In stark contrast, many bioregions have only a small proportion of the total area reserved for conservation and natural resource management. Agricultural activities such as broad-scale cropping, or grazing have resulted in high levels of clearing of native vegetation across each bioregion. Preliminary assessment of orthophotos and vegetation mapping of the locality of the proposal confirms the presence of large areas of cleared land, separated by areas of native vegetation. In most cases, cleared land dominates the landscape, with only smaller fragments of native vegetation, often lineal, and on roadsides, remaining.

Fragmentation is often defined as the process where "a large expanse of continuous habitat is divided into a number of smaller patches, isolated from one another by an assembly of habitats which is different from the original" (Fahrig 2003). Similarly, "fragmentation of the landscape produces a series of remnant vegetation patches surrounded by an assembly of different vegetation and/or land uses" (Saunders et al. 1991). Implicit in both definitions is the fact that fragmented habitats were originally more widespread. Fragments can then be defined by a change in the surrounding habitat with many aspects of the habitat within the fragment remaining unchanged (Watson 2002).

While it is generally considered that habitat fragmentation has a negative effect on biodiversity (Fahrig 2003), the remaining fragments of native vegetation provide varying levels of habitat to the biodiversity of the landscape. Many studies suggest these remaining fragments are likely to host a subset of this representation (Patterson 1987). However, in such landscapes, fragments of native vegetation often provide the only remaining habitat for biodiversity, becoming key elements to maintain regional biodiversity.

Fragments also provide valuable contributions to landscape connectivity and can act as 'stepping stones' and contribute to the 'softness' of surrounding habitat. More importantly, their presence is also likely to contribute to fauna movement at varying levels.

Biodiversity across natural landscapes, and even more so, in fragmented landscapes is not distributed evenly. Landscape variables such as soil type and geology play an important role in vegetation communities and faunal distribution. In a fragmented landscape, the position of remaining fragments is likely to be influenced by agricultural productivity, whereby, the vegetation of the more fertile soils was targeted for

large scale clearing, resulting in an over-representation of fragments on marginal or unproductive soils. The landscape position of remaining fragments will significantly impact on biodiversity distribution. For example, species that show a preference for riparian areas are likely to be adversely affected, as remaining fragments are likely to be largely biased away from these areas, as they can provide productive agricultural environments.

All bioregions that the proposal passes through have experienced high levels of native vegetation clearing. Therefore any remaining fragments are likely to provide varying levels of habitat for biodiversity regardless of their condition. Some fragments can host a particular suite of flora and fauna and not others even though they share similar habitat features. In this case, fragments could have been affected by a stochastic event or anthropogenic disturbance which is known to cause major changes in species composition (Lunt & Spooner 2005; Mac Nally & Horrocks 2002).

Considering the potential for fragments to provide connectivity, habitat for breeding and refuge, 'stepping stones' and localised movement corridors, fragments in fragmented landscapes are important in maintaining regional level biodiversity for a variety of taxa, especially for those with small home ranges and low-dispersal potential. The proposal as it stands passes through approximately 150kms of potential EEC and threatened species habitat, 73kms of this has been identified as potential habitat for EECs.

Habitat Connectivity

The connectivity of fragments in fragmented landscapes has often been considered vital to regional level conservation. Movement corridors are one aspect of this connectivity, where the fauna can move through hostile land into other areas of suitable habitat. This function is important in terms of breeding success and a 'maintain and improve' function to regional biodiversity, whereby dispersal between the natal territory and other areas of habitat is made by juveniles or sub-adults in their attempt to establish new territories. If fragments are spatially close, these features may also act as 'stepping stones' for fauna that has the ability to disperse or move across a surrounding, potentially hostile land.

However, the surrounding land may not necessarily be hostile. Traditionally researchers always treated the land surrounding fragments as a hostile environment for faunal diversity based on the island biogeography theory (MacArthur & Wilson 1967). Indeed, some species have never been known to use the surrounding land (Haddad 1999). However, we also know that some species use these features (Fischer et al. 2004a; Ricketts et al. 2001). Some researchers consider this response by fauna as compensation for declining habitat when a landscape becomes more fragmented (Norton et al. 2000). A 'soft' approach to this surrounding land is characterised by high levels of heterogeneity such as the presence of scattered trees, native grasses, fallen timber and rocky outcrops (Fischer et al. 2004a) and can greatly increase the genetic exchange of individuals and populations between fragments (Lindenmayer et al. 2001). This exchange is likely to inhibit levels of local extinctions and therefore, offset possible negative effects of fragmentation.

Preliminary analysis during desktop assessment suggests that the fragments within the landscape provide varying levels of connectivity. Potential corridors have been identified, in particular, along riparian areas which do not appear to have been previously cleared. Travelling Stock Reserves and roadside vegetation are also known to be important contributors to regional level conservation due to their remnant native vegetation and few grazing activities (Davidson et al 2005).

Fragmentation has occurred in the landscape, a result of a number of landuses and associated management practices, along with the development of infrastructure. The following land management practices and development that has fragmented the landscape within and adjacent to the proposed development easement include;

- The proposal is located within a predominantly agricultural landscape along almost its entire length, with the exception of small areas where it would pass through urban or semi-rural areas. Pressures on biodiversity in these landscapes are typically from loss of biodiversity from clearing for agricultural purposes and to some extent, particularly towards the southern end of the route, mining.
- Degradation of ecosystems from agricultural activities such as weed control, crop escapes, pasture improvement, grazing of native and exotic pastures and cultivation
- Loss of biodiversity from clearing of vegetation from infrastructure works such as road and railway construction and maintenance and water and sewerage construction and maintenance
- Ongoing impacts from existing fragmented landscapes such as loss of genetic diversity, increased exposure to stochastic events for isolated populations and increased mortality from predation or accidents (eg road kill)

The impacts from the proposal are similar to the existing impacts in the landscape, and therefore the proposal would add cumulatively to these existing impacts and pressures. The extent to which this is the case is difficult to measure, and whilst at a landscape level the additional impacts are unlikely to significantly add to the existing impacts, at a local or possibly regional scale, the accumulation of the existing impacts and the additional impacts from the proposal could be substantial.

6 Summary of Mitigation Measures

6.1 General Mitigation Measures

The following general mitigation measures are assumed to be part of the Proposal and will be implemented across the whole of the pipeline route

- Directional drilling is the preferred crossing method for all Class 1 and 2 Waterways. Where this is not possible Class 1 and 2 waterway crossing methods will be developed in consultation with DPI and DECC.
- Soil and Water management measures will be developed and included in the Construction Environmental Management Plan (CEMP) and/or Environmental Work Method Statements etc. It will include implementation of appropriate erosion and sediment control measures such as minimising the area of exposed surfaces, protection of drainage lines, covering exposed surfaces progressively etc.
- Following the biodiversity survey of constraint areas, residual sensitive areas that cannot be avoided would have minimum ROW clearing measures applied.
- Minimising clearing of native vegetation. Native vegetation management measures will be formulated and included in the Construction Environmental Management Plan (CEMP) and/or Environmental Work Method Statements etc.
- Minimising the length of time the trench is open.
- Create wet/damp refuge areas in the trench to provide shelter for trapped fauna.
- Earth ramps located every 500 metres along the trench would be included in the construction methodology to allow larger animals such as macropods and snakes to escape.
- Regular patrols of the pipeline to remove any fauna trapped in the open trench
- Where coarse woody debris is present along the area to be trenched it would be placed to one side of the trench and replaced following trenching and revegetation.
- Procedures for equipment cleaning to reduce the risk of the spread of pathogens

6.2 Specific Mitigation Measures

Terrestrial ecology

Despite the level of care taken to reduce impacts by implementing generic management measures across the whole project a number of site specific impacts will be experienced. The site or species specific impacts may be managed by employing site specific safe guards. Detailed studies undertaken will inform these studies following further field surveys, however measures could include:

- In areas of know *Diuris tricolor* habitat the ANPC (1997) *Guidelines for the Translocation of Threatened Plants in Australia,* and Cropper, S. (1993) *Management of Endangered Plants* will be referenced for appropriate guidelines for minimum depth of topsoil to be removed, storage techniques and time-frames to ensure survival of *Diuris tricolor* and its associated mycorrhizae.
- Where the pipeline passes through habitat for *Anomalopus mackayi* all rocks and large woody debris that provide refuge habitat for this species would be stockpiled to the side of the trench during construction and reinstated upon completion of revegetation works. Maintenance staff will be informed of the importance of this habitat to ensure that it is not removed as part of track maintenance during the operation of the pipeline.
- In areas of known Endangered Ecological Community (EEC) the following mitigation hierarchy will be employed:
    - Avoid the area of EEC by either realignment of the pipeline
    - Where realignment is not possible narrowing the corridor to a minimum width (it is understood this can be as little as 8m)
    - Where residual impacts remain offset strategies will be prepared. Any offset strategies would be prepared in consultation with the proponents environmental staff and the DECC.

Weeds

A number of Key Threatening Processes relate to the spread of weeds into areas of native vegetation, including:

- Invasion and establishment of exotic vines and scramblers
- Invasion of native plant communities by bitou bush & boneseed
- Invasion of native plant communities by exotic perennial grasses
- Invasion, establishment and spread of *Lantana camara*

Weed management will be an important component of onsite management throughout the construction phase of the pipeline. A weed management plan will be prepared as part of the Construction Environmental Management Plan (CEMP) for the Project. Information on weeds will be collected during the field work proposed to be undertaken prior to the preparation of the preferred project report and throughout the preparation of the CEMP and weed management sub plan. Identification of weeds in the area will be from a combination of sources, including literature and database review in addition to consultation with property owners regarding known weeds and existing onsite management. The weed management plan will include identification of areas of noxious weeds and management measure to ensure weeds are not spread; measures to minimise weed risks, weed control (including prior to commencement of works), weed hygiene and rehabilitation. These measures would also reduce risks to vegetation from soil-borne pathogens.

Phytophthora cinnamomi

P.cinnamomi spreads via its microscopic spores moving in surface and sub-surface water flows. It spreads more slowly up slope and on flat ground (approximately 1 metre/year) because it is restricted to movement in plant roots. *P.cinnamomi* can continue to grow within plants when their moisture content is greater than 80% (Shearer and Tippet, 1989).

Human activity causes the most significant, rapid and widespread distribution of the pathogen. Road construction, earthmoving, driving dirty vehicles and stock movement all contribute to the increased spread of *P.cinnamomi.* Bush restoration activities may also inadvertently spread the pathogen, particularly when plants have been purchased from non-accredited nurseries, or when dirty tools are used (Dieback Working Group 2000).

Clear criteria for what constitutes an areas' vulnerability to the threat of *P. cinnamomi* in NSW and ACT are not available for two major reasons:

1. there is insufficient knowledge of the susceptible species in NSW & ACT
2. there is variable susceptibility of plant species depending on climatic conditions, i.e. some species only appear susceptible during sustained periods of unusually high rainfall.

The pathogen occurs widely across Australia but the severity of its impact is most evident within ecological communities of the south-west and south-east of the country, however options for the control of the disease are limited (Cahill et al, 2008). The disease is recognised at a Commonwealth level as a threat to Australia's biodiversity. Management of the disease is reliant on hygiene, the use of chemicals and restriction of access, and has had only limited effectiveness and not provided complete control (Cahill et al, 2008). Anecdotal evidence suggests that sites that receive less than 600 mm average annual rainfall are not vulnerable to the threat of *P. cinnamomi.* Beyond that, and because of the apparently cryptic nature of the disease in NSW & ACT, a precautionary approach should be adopted and the pathogen assumed to be absent unless it can be proven to be present (McDougall and Summerell, 2003).

A risk assessment will be undertaken prior to any disturbance as a result of pipeline activities to determine the likelihood of occurrence along the route. The results of the risk assessment will be included in the Construction Environmental Management Plan (CEMP). Should a risk be identified then appropriate measures will be developed and included in the CEMP. This would include measures such as liaison and seeking advice from agencies and restriction of vehicle movement and hygiene controls as necessary.

Aquatic ecology

The following measures are required to be implemented for all water crossings listed in Table 4-3

Border Rivers/Gwindir Catchment

- Survey for river snail
- Minimise impact to riparian zone
- The construction methodology for high sensitivity crossings would be prepared in consultation with DPI and DECC
- Avoid crossings where high value aquatic habitat occurs; undertake works when water way is dry or undertake works outside of fish migratory period or avoid blocking fish passage

Namoi catchment and Hunter Central Catchment

- Minimise impact to riparian zone
- The construction methodology would be prepared in consultation with DPI and DECC
- Avoid crossings where high value aquatic habitat occurs; undertake works when water way is dry or undertake works outside of migratory period or avoid blocking fish passage

Summary assessment of potential impacts and management measures

Table 6-1 and Table 6-2 provide summaries of areas for further investigation. Where it is thought that there is the possibility that the pipeline can be realigned, the first management option is to avoid the biodiversity constraint, while this may not avoid the impact entirely it is likely to reduce the impact. Where it cannot be avoided, management measures and/or survey work has been recommended. Survey is recommended where the air reconnaissance, aerial photography and vegetation mapping was not sufficient to adequately determine the impact to the subject biota and/or there is a general paucity of information on that species or community. Following survey work, further recommendations for the constrained area of the proposed pipeline route and/or species or EEC would be made. Table 6-1 indicates the areas that require further investigation and Table 6-2 shows those areas that have constraints but can be managed with site specific measures.

This table has been prepared following an assessment of REV H which includes route optimisation within the corridor to avoid and minimise impacts to biodiversity.

Table 6-1 – Summary of Constraints and areas for further investigation (AFI)

This table has been prepared following an assessment of REV H which includes route optimisation within the corridor to avoid and minimise impacts to biodiversity. For more detail on mitigation measures please refer to figures 5-1 – 5-17 and associated text in Chapter 5.

AFI/ constraint	Subject species/EEC	Rationale/management measures
222-226	Lowland Darling River aquatic ecological community (EEC) Coolibah - Black Box Woodland Five-clawed worm-skink Ground mammals River Snail	• Survey for grasses (222-223) and subject fauna species/habitat • Avoid mature trees • Minimise corridor width and impact to riparian zone • Already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape
230-231 & 236, 238	Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) *Swainsona murrayana* *Sida rohlenae* Five-clawed worm-skink Ground mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Avoid mature trees • Minimise corridor width • Already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape -survey for fauna species/habitat • Potential fauna corridor especially on Gnoura Gnoura Creek, undertaken onsite habitat assessment and bird surveys
233-235	Coolibah - Black Box Woodland Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) Five-clawed worm-skink Ground mammals River Snail	• Survey for grasses and subject fauna species/habitat • Avoid mature trees • Minimise corridor width • Already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape. • Construction could disrupt fauna movement corridor • Important feeding and movement corridor for Avifauna – undertake onsite habitat assessment and bird surveys

AFI/ constraint	Subject species/EEC	Rationale/management measures
239	Coolibah - Black Box Woodland Arboreal Fauna	• Avoid mature trees • Minimize disturbance corridor
240-243	Coolibah - Black Box Woodland Five-clawed worm-skink Ground Mammals Avifauna	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape/Avifauna, this section could be an important movement corridor in an already highly fragmented landscape, especially out of Boomi NR
244-245	Coolibah - Black Box Woodland	• Avoid mature trees • Minimize disturbance corridor
246-247	*Sida rohlenae* *Swainsona murrayana*	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward
246	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
249	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
251	Coolibah - Black Box Woodland Carbeen Open Forest EEC Five-clawed worm-skink Ground Mammals	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
252	Lowland Darling River aquatic ecological community (EEC) Coolibah - Black Box Woodland Five-clawed worm-skink Ground Mammals River Snail	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
253	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
254-256	Coolibah - Black Box Woodland Five-clawed worm-skink Ground Mammals Avifauna	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be

AFI/ constraint	Subject species/EEC	Rationale/management measures
		confined to small patches in the landscape • Avifauna, this section could be an important east-west corridor in an already highly fragmented landscape
259	Five-clawed worm-skink Stripe-faced Dunnart Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
260	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
261	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
264	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
265	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
266	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
267	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
268	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals Woodland Birds	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Close records of threatened woodland birds, highly fragmented landscape, maybe only movement corridor, construction impacts
269	Five-clawed worm-skink	• Search for subject fauna species/habitat. Potential

AFI/ constraint	Subject species/EEC	Rationale/management measures
	Ground Mammals Woodland Birds	construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Close records of threatened woodland birds, highly fragmented landscape, maybe only movement corridor, construction impacts
272	Coolibah - Black Box Woodland Five-clawed worm-skink Ground Mammals	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
275	Five-clawed worm-skink S Ground Mammals Myall Woodland EEC	• Search for representative EEC species • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
283-286	*Sida rohlenae* *Swainsona murrayana*	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward
287-288	Lowland Darling River aquatic ecological community (EEC) *Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals River Snail Avifauna	• Minimise disturbance corridor • Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna, this section could be an important movement corridor along Wallon and Gil Gil creeks in an already highly fragmented landscape
289	Coolibah - Black Box Woodland Five-clawed worm-skink Ground Mammals Avifauna	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna, this section could be an important movement corridor along Wallon and Gil Gil creeks in an already highly fragmented landscape
296	*Sida rohlenae* *Swainsona murrayana* Myall Woodland EEC Five-clawed worm-skink	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward. • Search for representative EEC species • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
297-298	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential

AFI/ constraint	Subject species/EEC	Rationale/management measures
	Avifauna	construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna, this section could be an important movement corridor along Wallon and Gil Gil creeks in an already highly fragmented landscape
305	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
307	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
312-314	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
317	Five-clawed worm-skink Ground Mammals Avifauna	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna, this section could be an important movement corridor along Marshalls Pond Creek in an already highly fragmented landscape
318-324	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
327-329	Five-clawed worm-skink	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
331	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
332	Lowland Darling River aquatic ecological community (EEC). *Sida rohlenae*	• Minimise disturbance to riparian vegetation • Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate

AFI/ constraint	Subject species/EEC	Rationale/management measures
	Swainsona murrayana Five-clawed worm-skink River Snail	grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
333-334	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
337	Lowland Darling River aquatic ecological community (EEC). *Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals River Snail Avifauna Arboreal fauna	• Minimise disturbance to riparian vegetation • Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna and Aboreal Mammals, this section along Meehi River could be an important movement corridor in an already highly fragmented landscape
338	Coolibah - Black Box Woodland Five-clawed worm-skink Stripe-faced Dunnart Avifauna Arboreal fauna	• Avoid mature trees • Minimize disturbance corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna and Aboreal Mammals, this section along Meehi River could be an important movement corridor in an already highly fragmented landscape
339	Lowland Darling River aquatic ecological community (EEC). *Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink Ground Mammals River Snail Avifauna Arboreal fauna	• Minimise disturbance to riparian vegetation • Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna and Aboreal Mammals, this section along Meehi River could be an important movement corridor in an already highly fragmented landscape
341	*Sida rohlenae* *Swainsona murrayana* Five-clawed worm-skink	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
348	*Sida rohlenae* *Swainsona murrayana*	• Rapid search for native grass species, *Swainsona murrayana* and *Sida rohlenae* or protect and rehabilitate

AFI/ constraint	Subject species/EEC	Rationale/management measures
	Five-clawed worm-skink	grass sward • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape and dependent on the condition of the EEC
355-356	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
357	Lowland Darling River aquatic ecological community (EEC) Five-clawed worm-skink Ground Mammals River Snail	• Minimise disturbance to riparian corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna and Arboreal Mammals, this riparian area could be an important movement corridor in an already highly fragmented landscape
364-366	Lowland Darling River aquatic ecological community (EEC) Five-clawed worm-skink Ground Mammals River Snail	• Minimise disturbance to riparian corridor • Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape • Avifauna, riparian area could be an important movement corridor in an already highly fragmented landscape
370-371	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat. Potential construction disturbance, already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape
379-380	Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Belt Bioregions (North and South) Five-clawed worm-skink Ground Mammals Arboreal fauna Avifauna	• Protect grass sward or • Survey for native grass species • Search for subject fauna species/habitat. Likely habitat for and, potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape. Avifauna and koala, in this section along riparian area could be an important movement corridor in an already highly fragmented landscape
390-391	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat and undertake habitat assessment • Already fragmented landscape, any populations in locality likely to be confined to small patches in the landscape, along Myall Hollow Creek
395.5	Five-clawed worm-skink	• Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape, likely dependant on presence/condition of patch
398 & 400	Five-clawed worm-skink	• Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented

AFI/ constraint	Subject species/EEC	Rationale/management measures
		landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape, likely dependant on presence/condition of drainage line
399 & 401, 404	Bluegrass (*Dichanthium* spp.) dominant grasslands pf the Brigalow Belt Bioregions (North and South)	• Protect and rehabilitate grass sward; or • Search for native grass species
405 & 411-413	Five-clawed worm-skink Ground Mammals	• Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape
422-423 431.5, 433	Five-clawed worm-skink	• Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape, likely dependant on presence/condition of drainage line
437-439	Five-clawed worm-skink Pale-headed snake Arboreal fauna	• Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape.
454	Five-clawed worm skink Ground Mammals Arboreal fauna Avifauna	• Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape • Important movement corridor adjacent
460-462	Five-clawed worm skink	• Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape
476-477	*Cadellia pentastylis* Five-clawed worm skink	• Search for *Cadellia pentastylis* individuals • Avoid mature trees • Search for subject fauna species/habitat and undertake site-specific habitat assessment • Potential construction disturbance, already fragmented landscape, any populations in locality likely to be unevenly distributed and confined to small patches in the landscape

AFI/ constraint	Subject species/EEC	Rationale/management measures
501&504.5	Lowland Darling River aquatic ecological community (EEC). Avifauna Mammals Reptiles	• Undertake survey of Riparian Corridor • Riparian flank of the Namoi likely to be an important corridor
527.5	Movement corridor Avifauna Mammals Reptiles *Koala*	• Undertake survey of Riparian Corridor • Riparian flank of the Namoi likely to be an important corridor
532	Arboreal Fauna	• Undertake survey of Riparian Corridor • Riparian flank of likely to be an important corridor
556-557 559	Arboreal Fauna Avifauna	• Undertake survey of Riparian Corridor • The riparian flank along Mooki Creek is likely to be an important corridor for avifauna considering the highly fragmented landscape in the locality • Koala records might suggest that this is important habitat considering surrounding cleared landscape
635-636	Avifauna Border thick-tailed gecko Pink-tailed worm lizard Mammals	• Undertake survey • Potential to disrupt movement corridor between Liverpool Range and Murrundi Pass
641, 662, 668-669.	Box-gum woodland EEC	• Undertake survey for representative EEC species
643-645	Border thick-tailed gecko Pink-tailed worm lizard	• Undertake survey for subject species and undertake site-specific habitat assessment • Potential for occurrence of and, low dispersal, isolated population
659-662	Woodland Birds Mammals Border thick-tailed gecko Pink-tailed worm lizard	• Survey and undertake site-specific habitat assessment • Potential movement corridor between Burning Maid and Wingen Mountain NR due to surrounding fragmented landscape, potential to disrupt if it is one
660, 661-662,	*Cymbidium canaliculatum* Box-gum woodland EEC	• Search for /avoid mature host trees • Search for representative EEC species
668-669	Box-gum woodland EEC	• Search for representative EEC species
670	*Cymbidium canaliculatum*	• Search for /avoid mature host trees
715-718	Woodland Birds Mammals Border thick-tailed gecko Pink-tailed worm lizard	• Survey and undertake site-specific habitat assessment • potential movement corridor across vegetated ridge, due to surrounding fragmented landscape, potential to disrupt if it is one
762-764	Woodland Birds Mammals Border thick-tailed gecko Pink-tailed worm lizard	• Survey and undertake site-specific habitat assessment • Potential movement corridor across vegetated ridge, due to surrounding fragmented landscape, potential to disrupt if it is one
801-825	Swamp Oak Forest/Freshwater wetlands *Zannichellia palustris* *Eucalyptus parramattensis subsp. Decadens*	• Avoid (Directional Drill) • If directional drilling is not possible survey for EEC and threatened species and develop management measures following detailed assessment

AFI/ constraint	Subject species/EEC	Rationale/management measures
803-808	Green and Golden Bell Frog	• Potential to disrupt refuge habitat if located Green and Golden Bell Frog in wetland. Undertake survey to inform further management measures.
813-815-	Arboreal Fauna	• Koala movement corridor (815-813). Undertake survey to inform further management measures.
812-825	Green and Golden Bell Frog	• Potential to disrupt habitat Green and Golden Bell Frog or dispersal routes between Hexham Swamp and Kooragang Is NR. Undertake survey to inform further management measures.

Table 6-2– Summary of additional site specific management measures - flora

KP	Species/EEC	Mitigation measure3
446-451	Native vegetation on Cracking clay soils' *Dichanthium setosum* *Digitaria porrecta*	Avoid mature trees and rehabilitate protect sward, topsoil and grasses
460-462	possibly Brigalow	Avoid mature trees, rehabilitate sward, topsoil and grasses
465-468	possibly Native vegetation on Cracking clay soils' possible habitat for *Dichanthium setosum; Digitaria porrecta*	Avoid mature trees, rehabilitate sward, topsoil and grasses
489	Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions Brigalow (*Acacia harpophylla* dominant and co-dominant)	Avoid all mature trees
505-506	Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions Brigalow (*Acacia harpophylla* dominant and co-dominant)	Avoid all mature trees
533 591-592 601-602 608	Native vegetation on Cracking clay soils' *Dichanthium setosum* *Digitaria porrecta*	Avoid mature trees, rehabilitate sward, topsoil and grasses
693-696	*Eucalyptus camaldulensis* *Diuris tricolor*	Avoid all individuals; Onsite ecologist - Careful translocation required if disturbed *This species most evident in Spring
697-710	*Diuris tricolor*	Onsite ecologist Careful translocation required if disturbed *This species most evident in Spring
711-721	*Bothriochloa biloba*	Retain and rehabilitate top layer of soil and grass
722, 739-740	*Eucalyptus camaldulensis*	Avoid all individuals
723-738	*Bothriochloa biloba*	Retain and rehabilitate top layer of soil and

[3] If it can be demonstrated that these measure can be effectively implemented then on the ground survey not required

KP	Species/EEC	Mitigation measure3
741-749		grass
764, 785, 790 791	*Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion*	Avoid mature trees; minimise corridor width

7 References

Australian Terrestrial Biodiversity Assessment 2002. *National Land and Water Resources* Audit, Canberra.

Benson, J. 1999. Setting the Scene: the native vegetation of New South Wales, Native Vegetation Advisory Council of NSW, Sydney.

Briggs, J. and Leigh, J. 1995. *Rare or threatened Australian plants*, CSIRO, Canberra.

Cogger H.G. (1992) *Reptiles and Amphibians of Australia*, Reed International Books, Chatswood

Cogger, H.G., E.E. Cameron, R.A. Sadlier & P. Eggler (1993). *The Action Plan for Australian Reptiles*. [Online]. Australian Nature Conservation Agency. ANCA, Canberra.

Davidson, I, Scammell. S, O'Shannassy, P., Mullins, M., Learmonth, S. 2005, 'Travelling stock reserves: refuges for stock and biodiversity?' *Ecological Management & Restoration* Vol. 6 (1), 5–15.

Fahrig I (2003) Effects of habitat fragmentation on biodiversity. *Annual review of ecology evolution and systematics* **34** 487-515.

Haddad, N.M. 1999. Corridor and distance effects on interpatch movements: a landscape experiment with butterflies. *Ecological Applications* 9:612-622.

Harper Summers O'Sullivan (2006) *Queensland Hunter Gas Pipeline Environmental Assessment*

Lindemayer & Fischer (2001) H*abitat Fragmentation and Landscape Change: An Ecological and Conservation Systhesis* Island Press.

Lunt ID & Spooner PG (2005) Using an historical ecology approach to understand patterns of biodiversity in fragmented agricultural landscapes. *Journal of Biogeography* ***32*** *,* 1859-1873 (published as 'Special paper')

McDougall, KL, Summerell BA (2003) The impact of *Phytophthora cinnamomi* on the flora and vegetation of New South Wales – a re-appraisal. In *Phytophthora* in Forests and Natural Ecosystems. 2nd International IUFRO Working Party 7.02.09 Meeting, Albany, Western Australia, October 2001. Eds. JA McComb, GEStJ Hardy and IC Tommerup; pages 49-56. (Murdoch University Print: Murdoch, Western Australia).

Mac Nally, R. & Horrocks, G. (2002c) Relative influences of site, landscape and historical factors on birds in a fragmented landscape. *Journal of Biogeography*, 29

Menkhorst P.W., Weavers B.W. and Alexander J.S.A. 1988. Distribution, Habitat and Conservation Status of the Squirrel Glider Petaurus australis (Petauridae: Marsupialia) in Victoria. *Australian Wildlife Research* 15: 59-71.

MenkhorstP.W. and Collier M. 1987. Diet of the Squirrel GlidePr,e taurus norfolcensis (Marsupialia: Petauridae), in Victoria. Australian Mammalogy 11: 110-115.

Morton, S. R., Short, J. & Barker, R. D. with an Appendix by Griffin, G. F. & Pearce, G. 1995, *Refugia for Biological Diversity in Arid and Semi-arid Australia*, Department of the Environment, Sport and Territories, Canberra, ACT.

NSW NPWS 2000a. *Preliminary Overview of the Brigalow Belt South Bioregion* (Stage 1). NSW Western Regional Assessments. Resource and Conservation Assessment Council (RACAC), Planning NSW, Sydney.

NSW NPWS 2001. Atlas of New South Wales wildlife. NPWS, Hurstville.

NSW NPWS 2002. *Wollemi National Park Plan of Management.* NPWS, Hurstville.

Robert H. MacArthur & Edward O. Wilson (1967) *The Theory of Island Biogeography*. Princeton University Press

Sadlier R. A., Pressey R. L. & Whish G. L. 1996. *Reptiles and amphibians of particular conservation concern in the Western Division of New South Wales: Distributions, Habitats and Conservation Status*. NSW NPWS Occasional Paper 21.

Sadlier R.A. and Pressey R.L. 1994. Reptiles and amphibians of particular conservation concern in the western division of New South Wales: a preliminary review. *Biological Conservation* 69: 41-54.

Shea G. Millgate M. and Peck S. 1987. A range extension for the rare skink *Anomalopus mackayi*. *Herpetofauna* 17(2): 16-19.

Shearer BL, Tippett JT. 1989. Jarrah Dieback: The Dynamics and Management of *Phytophthora cinnamomi* in the Jarrah (*Eucalyptus marginata*) Forest of South-western Australia. Perth , Western Australia : Department of Conservation and Laud Management: Research Bulletin No 3.

Swan G. 1990. A field guide to the Snakes and Lizards of New South Wales. Three Sisters Productions, NSW.

Thackway R, Creswell ID (eds) 1995 *An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves* System Cooperative Program. Version 4.0. Australian Nature Conservation Agency, Canberra.

Watson DM. 2002. A conceptual framework for the study of species composition in islands, fragments and other patchy habitats. *Journal of Biogeography* 29: 823–34

Appendix 1 – Database search results

Search criteria: External Report of all Valid Records of threatened Florafrom Selected Area - 55,735888,6569116,56,235024,6895193
Report generated on 17/01/2008 - 01:04 PM

CLASS_NAME	FAMILY_NAME	SCIENTIFIC_EXOTIC	COMMON_NAME	LEGAL_STATUS
Amphibia	Hylidae	Litoria booroolongensis	Booroolong Frog	E1
Reptilia	Gekkonidae	Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	V
Reptilia	Scincidae	Anomalopus mackayi	Five-clawed Worm-skink	E1
Reptilia	Elapidae	Hoplocephalus bitorquatus	Pale-headed Snake	V
Aves	Megapodiidae	Alectura lathami	Australian Brush-turkey Alectura lathami Gray, 1831 in the	E2
Aves	Megapodiidae	Leipoa ocellata	Malleefowl	E1
Aves	Anseranatidae	Anseranas semipalmata	Magpie Goose	V
Aves	Anseranatidae	Anseranas semipalmata	Magpie Goose	V
Aves	Anatidae	Oxyura australis	Blue-billed Duck	V
Aves	Anatidae	Stictonetta naevosa	Freckled Duck	V
Aves	Ardeidae	Botaurus poiciloptilus	Australasian Bittern	V
Aves	Ciconiidae	Ephippiorhynchus asiaticus	Black-necked Stork	E1
Aves	Accipitridae	Hamirostra melanosternon	Black-breasted Buzzard	V
Aves	Accipitridae	Lophoictinia isura	Square-tailed Kite	V
Aves	Gruidae	Grus rubicunda	Brolga	V
Aves	Otididae	Ardeotis australis	Australian Bustard	E1
Aves	Rostratulidae	Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	E1
Aves	Burhinidae	Burhinus grallarius	Bush Stone-curlew	E1
Aves	Cacatuidae	Calyptorhynchus banksii	Red-tailed Black-Cockatoo	V
Aves	Psittacidae	Neophema pulchella	Turquoise Parrot	V
Aves	Psittacidae	Polytelis swainsonii	Superb Parrot	V
Aves	Strigidae	Ninox connivens	Barking Owl	V
Aves	Tytonidae	Tyto capensis	Grass Owl	V
Aves	Tytonidae	Tyto novaehollandiae	Masked Owl	V
Aves	Climacteridae	Climacteris picumnus	Brown Treecreeper	V

Aves	Acanthizidae	Pyrrholaemus saggitatus	Speckled Warbler	V
Aves	Meliphagidae	Certhionyx variegatus	Pied Honeyeater	V
Aves	Meliphagidae	Grantiella picta	Painted Honeyeater	V
Aves	Meliphagidae	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V
Aves	Meliphagidae	Xanthomyza phrygia	Regent Honeyeater	E1
Aves	Petroicidae	Melanodryas cucullata	Hooded Robin	V
Aves	Pomatostomidae	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V
Aves	Estrildidae	Stagonopleura guttata	Diamond Firetail	V
Aves	Estrildidae	Stagonopleura guttata	Diamond Firetail	V
Mammalia	Dasyuridae	Dasyurus maculatus	Spotted-tailed Quoll	V
Mammalia	Peramelidae	Macrotis lagotis	Bilby	E4
Mammalia	Phascolarctidae	Phascolarctos cinereus	Koala	V
Mammalia	Burramyidae	Cercartetus nanus	Eastern Pygmy-possum	V
Mammalia	Petauridae	Petaurus norfolcensis	Squirrel Glider	V
Mammalia	Macropodidae	Macropus dorsalis	Black-striped Wallaby	E1
Mammalia	Macropodidae	Petrogale penicillata	Brush-tailed Rock-wallaby	E1
Mammalia	Emballonuridae	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V
Mammalia	Molossidae	Mormopterus norfolkensis	Eastern Freetail-bat	V
Mammalia	Vespertilionidae	Chalinolobus dwyeri	Large-eared Pied Bat	V
Mammalia	Vespertilionidae	Chalinolobus picatus	Little Pied Bat	V
Mammalia	Vespertilionidae	Miniopterus australis	Little Bentwing-bat	V
Mammalia	Vespertilionidae	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V
Mammalia	Vespertilionidae	Nyctophilus timoriensis	Eastern Long-eared Bat	V
Mammalia	Vespertilionidae	Vespadelus troughtoni	Eastern Cave Bat	V
Mammalia	Muridae	Leporillus apicalis	Lesser Stick-nest Rat	E4
Mammalia	Muridae	Leporillus conditor	Greater Stick-nest Rat	E4
Mammalia	Muridae	Pseudomys gouldii	Gould's Mouse	E4
Mammalia	Muridae	Pseudomys pilligaensis	Pilliga Mouse	V

Search criteria: External Report of all Valid Records of threatened Faunafrom Selected Area - 56,229502,6429698,56,311814,6574424
Report generated on 17/01/2008 - 01:06 PM

CLASS_NAI	FAMILY_NA	SORT_ORD	SCIENTIFIC_	EXOTIC	COMMON_NAME	LEGAL_STATUS
Reptilia	Gekkonidae	33	Underwoodisaurus sph		Border Thick-tailed Geck	V
Reptilia	Pygopodida	34	Aprasia parapulchella		Pink-tailed Legless Lizarc	V
Reptilia	Elapidae	43	Hoplocephalus bitorqu		Pale-headed Snake	V
Aves	Anatidae	54	Stictonetta naevosa		Freckled Duck	V
Aves	Accipitridae	71	Erythrotriorchis radiatu		Red Goshawk	E1
Aves	Accipitridae	71	Hamirostra melanoster		Black-breasted Buzzard	V
Aves	Accipitridae	71	Lophoictinia isura		Square-tailed Kite	V
Aves	Cacatuidae	91	Calyptorhynchus lathar		Glossy Black-Cockatoo	V
Aves	Psittacidae	92	Lathamus discolor		Swift Parrot	E1
Aves	Psittacidae	92	Neophema pulchella		Turquoise Parrot	V
Aves	Strigidae	95	Ninox connivens		Barking Owl	V
Aves	Strigidae	95	Ninox strenua		Powerful Owl	V
Aves	Tytonidae	96	Tyto novaehollandiae		Masked Owl	V
Aves	Tytonidae	96	Tyto tenebricosa		Sooty Owl	V
Aves	Climacterid	108	Climacteris picumnus		Brown Treecreeper	V
Aves	Meliphagid	112	Grantiella picta		Painted Honeyeater	V
Aves	Meliphagid	112	Melithreptus gularis gu		Black-chinned Honeyeat	V
Aves	Meliphagid	112	Xanthomyza phrygia		Regent Honeyeater	E1
Aves	Petroicidae	113	Melanodryas cucullata		Hooded Robin	V
Aves	Pomatostor	115	Pomatostomus tempor		Grey-crowned Babbler (e	V
Aves	Estrildidae	134	Stagonopleura guttata		Diamond Firetail	V
Mammalia	Dasyuridae	146	Dasyurus geoffroii		Western Quoll	E4
Mammalia	Dasyuridae	146	Dasyurus maculatus		Spotted-tailed Quoll	V
Mammalia	Phascolarct	151	Phascolarctos cinereus		Koala	V
Mammalia	Petauridae	154	Petaurus australis		Yellow-bellied Glider	V

Mammalia	Petauridae	154	Petaurus norfolcensis	Squirrel Glider	V
Mammalia	Macropodi	160	Onychogalea fraenata	Bridled Nailtail Wallaby	E4
Mammalia	Macropodi	160	Petrogale penicillata	Brush-tailed Rock-wallab	E1
Mammalia	Emballonur	167	Saccolaimus flaviventri	Yellow-bellied Sheathtail	V
Mammalia	Molossidae	168	Mormopterus norfolke	Eastern Freetail-bat	V
Mammalia	Vespertilior	169	Chalinolobus dwyeri	Large-eared Pied Bat	V
Mammalia	Vespertilior	169	Chalinolobus picatus	Little Pied Bat	V
Mammalia	Vespertilior	169	Falsistrellus tasmanien	Eastern False Pipistrelle	V
Mammalia	Vespertilior	169	Miniopterus australis	Little Bentwing-bat	V
Mammalia	Vespertilior	169	Myotis adversus	Large-footed Myotis	V
Mammalia	Vespertilior	169	Nyctophilus timoriensi	Eastern Long-eared Bat	V
Mammalia	Vespertilior	169	Scoteanax rueppellii	Greater Broad-nosed Ba	V
Mammalia	Vespertilior	169	Vespadelus troughtoni	Eastern Cave Bat	V
Mammalia	Muridae	170	Conilurus albipes	White-footed Tree-rat	E4
Mammalia	Muridae	170	Pseudomys australis	Plains Rat	E4
Mammalia	Muridae	170	Pseudomys gouldii	Gould's Mouse	E4
Mammalia	Muridae	170	Rattus villosissimus	Long-haired Rat	V

Search criteria: External Report of all Valid Records of threatened Faunafrom Selected Area - 56,288084,6349623,56,389047,6438621
Report generated on 17/01/2008 - 01:08 PM

CLASS_NAME	FAMILY_NAME	SCIENTIFIC_NAME	COMMON_NAME	LEGAL_STATUS
Amphibia	Myobatrachidae	Crinia tinnula	Wallum Froglet	V
Amphibia	Myobatrachidae	Heleioporus australiacus	Giant Burrowing Frog	V
Amphibia	Myobatrachidae	Mixophyes balbus	Stuttering Frog	E1
Amphibia	Myobatrachidae	Mixophyes iteratus	Giant Barred Frog	E1
Amphibia	Myobatrachidae	Pseudophryne australis	Red-crowned Toadlet	V
Amphibia	Hylidae	Litoria aurea	Green and Golden Bell Frog	E1
Amphibia	Hylidae	Litoria booroolongensis	Booroolong Frog	E1
Amphibia	Hylidae	Litoria brevipalmata	Green-thighed Frog	V
Amphibia	Hylidae	Litoria daviesae	Davies' Tree Frog	V
Amphibia	Hylidae	Litoria littlejohni	Littlejohn's Tree Frog	V
Reptilia	Cheloniidae	Chelonia mydas	Green Turtle	V
Reptilia	Varanidae	Varanus rosenbergi	Rosenberg's Goanna	V
Reptilia	Elapidae	Hoplocephalus bitorquatus	Pale-headed Snake	V
Reptilia	Elapidae	Hoplocephalus stephensii	Stephens' Banded Snake	V
Aves	Anseranatidae	Anseranas semipalmata	Magpie Goose	V
Aves	Anatidae	Oxyura australis	Blue-billed Duck	V
Aves	Anatidae	Stictonetta naevosa	Freckled Duck	V
Aves	Procellariidae	Macronectes giganteus	Southern Giant Petrel	E1
Aves	Procellariidae	Pterodroma leucoptera leucoptera	Gould's Petrel	E1
Aves	Procellariidae	Pterodroma solandri	Providence Petrel	V
Aves	Procellariidae	Puffinus carneipes	Flesh-footed Shearwater	V
Aves	Diomedeidae	Diomedea exulans	Wandering Albatross	E1
Aves	Sulidae	Sula dactylatra	Masked Booby	V
Aves	Ardeidae	Botaurus poiciloptilus	Australasian Bittern	V
Aves	Ardeidae	Ixobrychus flavicollis	Black Bittern	V

Aves	Ciconiidae	Ephippiorhynchus asiaticus	Black-necked Stork	E1
Aves	Accipitridae	Erythrotriorchis radiatus	Red Goshawk	E1
Aves	Accipitridae	Hamirostra melanosternon	Black-breasted Buzzard	V
Aves	Accipitridae	Lophoictinia isura	Square-tailed Kite	V
Aves	Accipitridae	Pandion haliaetus	Osprey	V
Aves	Falconidae	Falco hypoleucos	Grey Falcon	V
Aves	Turnicidae	Turnix maculosa	Red-backed Button-quail	V
Aves	Scolopacidae	Calidris tenuirostris	Great Knot	V
Aves	Scolopacidae	Limicola falcinellus	Broad-billed Sandpiper	V
Aves	Scolopacidae	Limosa limosa	Black-tailed Godwit	V
Aves	Scolopacidae	Xenus cinereus	Terek Sandpiper	V
Aves	Rostratulidae	Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	E1
Aves	Jacanidae	Irediparra gallinacea	Comb-crested Jacana	V
Aves	Burhinidae	Burhinus grallarius	Bush Stone-curlew	E1
Aves	Haematopodidae	Haematopus fuliginosus	Sooty Oystercatcher	V
Aves	Haematopodidae	Haematopus longirostris	Pied Oystercatcher	V
Aves	Charadriidae	Charadrius leschenaultii	Greater Sand-plover	V
Aves	Charadriidae	Charadrius mongolus	Lesser Sand-plover	V
Aves	Laridae	Sterna albifrons	Little Tern	E1
Aves	Columbidae	Ptilinopus magnificus	Wompoo Fruit-Dove	V
Aves	Columbidae	Ptilinopus regina	Rose-crowned Fruit-Dove	V
Aves	Columbidae	Ptilinopus superbus	Superb Fruit-Dove	V
Aves	Cacatuidae	Callocephalon fimbriatum	Gang-gang Cockatoo	V
Aves	Cacatuidae	Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Aves	Psittacidae	Lathamus discolor	Swift Parrot	E1
Aves	Psittacidae	Neophema pulchella	Turquoise Parrot	V
Aves	Strigidae	Ninox connivens	Barking Owl	V
Aves	Strigidae	Ninox strenua	Powerful Owl	V
Aves	Tytonidae	Tyto capensis	Grass Owl	V
Aves	Tytonidae	Tyto novaehollandiae	Masked Owl	V
Aves	Tytonidae	Tyto tenebricosa	Sooty Owl	V
Aves	Climacteridae	Climacteris picumnus	Brown Treecreeper	V

Aves	Climacteridae	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspec	V
Aves	Acanthizidae	Pyrrholaemus saggitatus	Speckled Warbler	V
Aves	Meliphagidae	Grantiella picta	Painted Honeyeater	V
Aves	Meliphagidae	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern s	V
Aves	Meliphagidae	Xanthomyza phrygia	Regent Honeyeater	E1
Aves	Petroicidae	Melanodryas cucullata	Hooded Robin	V
Aves	Petroicidae	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V
Aves	Pomatostomidae	Pomatostomus temporalis tempora	Grey-crowned Babbler (eastern subs	V
Aves	Pachycephalidae	Pachycephala olivacea	Olive Whistler	V
Aves	Estrildidae	Stagonopleura guttata	Diamond Firetail	V
Mammalia	Dasyuridae	Dasyurus maculatus	Spotted-tailed Quoll	V
Mammalia	Dasyuridae	Phascogale tapoatafa	Brush-tailed Phascogale	V
Mammalia	Phascolarctidae	Phascolarctos cinereus	Koala	V
Mammalia	Burramyidae	Cercartetus nanus	Eastern Pygmy-possum	V
Mammalia	Petauridae	Petaurus australis	Yellow-bellied Glider	V
Mammalia	Petauridae	Petaurus norfolcensis	Squirrel Glider	V
Mammalia	Potoroidae	Aepyprymnus rufescens	Rufous Bettong	V
Mammalia	Potoroidae	Potorous tridactylus	Long-nosed Potoroo	V
Mammalia	Macropodidae	Macropus parma	Parma Wallaby	V
Mammalia	Macropodidae	Petrogale penicillata	Brush-tailed Rock-wallaby	E1
Mammalia	Macropodidae	Thylogale stigmatica	Red-legged Pademelon	V
Mammalia	Pteropodidae	Pteropus poliocephalus	Grey-headed Flying-fox	V
Mammalia	Emballonuridae	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V
Mammalia	Molossidae	Mormopterus norfolkensis	Eastern Freetail-bat	V
Mammalia	Vespertilionidae	Chalinolobus dwyeri	Large-eared Pied Bat	V
Mammalia	Vespertilionidae	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V
Mammalia	Vespertilionidae	Kerivoula papuensis	Golden-tipped Bat	V
Mammalia	Vespertilionidae	Miniopterus australis	Little Bentwing-bat	V
Mammalia	Vespertilionidae	Miniopterus schreibersii oceanensi	Eastern Bentwing-bat	V
Mammalia	Vespertilionidae	Myotis adversus	Large-footed Myotis	V
Mammalia	Vespertilionidae	Nyctophilus timoriensis	Eastern Long-eared Bat	V
Mammalia	Vespertilionidae	Scoteanax rueppellii	Greater Broad-nosed Bat	V

Mammalia	Vespertilionidae	Vespadelus troughtoni	Eastern Cave Bat	V
Mammalia	Muridae	Pseudomys oralis	Hastings River Mouse	E1
Mammalia	Otariidae	Arctocephalus forsteri	New Zealand Fur-seal	V
Mammalia	Dugongidae	Dugong dugon	Dugong	E1
Mammalia	Balaenopteridae	Megaptera novaeangliae	Humpback Whale	V

Search criteria: External Report of all Valid Records of threatened Florafrom Selected Area - 55,735888,6569116,56,235024,6895193
Report generated on 17/01/2008 - 01:04 PM

SCIENTIFIC_NAME	COMMON_NAME	LEGAL_STATUS
Lepidium aschersonii	Spiny Peppercress	V
Bertya sp. A Cobar-Coolabah	Coolabah Bertya	V
Desmodium campylocaulon	Creeping Tick-trefoil	E1
Goodenia macbarronii	McBarron's Goodenia	V
Haloragis exalata		V
Dichanthium setosum	Bluegrass	V
Philotheca ericifolia		V
Rulingia procumbens		V
Cadellia pentastylis	Ooline	V

Search criteria: External Report of all Valid Records of threatened Florafrom Selected Area - 56,229502,6429698,56,311814,6574424
Report generated on 17/01/2008 - 01:06 PM

SCIENTIFIC_NAME	COMMON_NAME	LEGAL_STATUS
Ozothamnus tesselatus		V
Prostanthera cineolifera	Singleton Mint Bush	V
Eucalyptus camaldulensis	Eucalyptus camaldulensis in the Hunter catchment	E2
Eucalyptus oresbia	Small-fruited Mountain Gum	V
Cymbidium canaliculatum	Cymbidium canaliculatum in the Hunter Catchment	E2
Diuris pedunculata	Small Snake Orchid	E1
Dichanthium setosum	Bluegrass	V
Pomaderris queenslandica	Scant Pomaderris	E1
Thesium australe	Austral Toadflax	V
Euphrasia ruptura		E4
Cadellia pentastylis	Ooline	V

Search criteria: External Report of all Valid Records of threatened Florafrom Selected Area - 56,288084,6349623,56,389047,6438621
Report generated on 17/01/2008 - 01:09 PM

SCIENTIFIC_NAME	COMMON_NAME	LEGAL_STATUS
Olearia cordata		V
Rutidosis heterogama	Heath Wrinklewort	V
Tetratheca juncea	Black-eyed Susan	V
Senna acclinis	Rainforest Cassia	E1
Dillwynia tenuifolia		V
Acacia bynoeana	Bynoe's Wattle	E1
Acacia pendula	Acacia pendula in the Hunter catchment	E2
Goodenia macbarronii	McBarron's Goodenia	V
Angophora inopina	Charmhaven Apple	V
Callistemon linearifolius	Netted Bottle Brush	V
Darwinia biflora		V
Eucalyptus camaldulensis	Eucalyptus camaldulensis in the Hunter catchment	E2
Eucalyptus camfieldii	Heart-leaved Stringybark	V
Eucalyptus fracta	Broken Back Ironbark	V
Eucalyptus glaucina	Slaty Red Gum	V
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V
Eucalyptus parramattensis subsp. decadens		V
Eucalyptus pumila	Pokolbin Mallee	V
Melaleuca biconvexa	Biconvex Paperbark	V
Melaleuca groveana	Grove's Paperbark	V
Syzygium paniculatum	Magenta Lilly Pilly	V
Cymbidium canaliculatum	Cymbidium canaliculatum in the Hunter Catchment	E2
Diuris pedunculata	Small Snake Orchid	E1
Diuris praecox	Rough Double Tail	V
Diuris tricolor	Pine Donkey Orchid	V

Pterostylis gibbosa	Illawarra Greenhood	E1
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V
Persoonia pauciflora	North Rothbury Persoonia	E1
Persoonia pauciflora	North Rothbury Persoonia	E1
Pomaderris bodalla	Bodalla Pomaderris	V
Rulingia prostrata	Dwarf Kerrawang	E1
Zannichellia palustris		E1

Castlereagh Barwon CMA sub region

Scientific Name	Common Name	Life cycle group	Level of Threat	Known or Predicted to occur
Phascolarctos cinereus	Koala	Arboreal mammal	Vulnerable	Known
Anomalopus mackayi	Five-clawed Worm-skink	Fossorial reptiles	Endangered	Known
Furina dunmalli	Dunmall's Snake	Fossorial reptiles	Vulnerable (Commonwealth listed only)	Predicted
Ardeotis australis	Australian Bustard	Ground dwelling bird	Endangered	Known
Phaps histrionica	Flock Bronzewing	Ground dwelling bird	Endangered	Known
Chalinolobus picatus	Little Pied Bat	Hollow dependant fauna	Vulnerable	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Hollow dependant fauna	Vulnerable	Known
Mormopterus 'Species 6'	Hairy-nosed Freetail Bat	Hollow dependant fauna	Endangered	Predicted
Mormopterus beccarii	Beccari's Freetail-bat	Hollow dependant fauna	Vulnerable	Known
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Hollow dependant fauna	Vulnerable	Predicted
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Hollow dependant fauna	Vulnerable	Known
Sminthopsis macroura	Stripe-faced Dunnart	Terrestrial mammals	Vulnerable	Known
Anseranas semipalmata	Magpie Goose	Wetland Bird	Vulnerable	Known
Ephippiorhynchus asiaticus	Black-necked Stork	Wetland Bird	Endangered	Known
Grus rubicunda	Brolga	Wetland Bird	Vulnerable	Known
Oxyura australis	Blue-billed Duck	Wetland Bird	Vulnerable	Known
Rostratula benghalensis	Painted Snipe	Wetland Bird	Endangered	Known
Stictonetta naevosa	Freckled Duck	Wetland Bird	Vulnerable	Known
Burhinus grallarius	Bush Stone-curlew	Woodland and Forest bird	Endangered	Known
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	Woodland and Forest bird	Vulnerable	Known
Calyptorhynchus lathami	Glossy Black-cockatoo	Woodland and Forest bird	Vulnerable	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Falco hypoleucos	Grey Falcon	Woodland and Forest bird	Vulnerable	Predicted
Lophoictinia isura	Square-tailed Kite	Woodland and Forest bird	Vulnerable	Known
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland and Forest bird	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Neophema pulchella	Turquoise Parrot	Woodland and Forest bird	Vulnerable	Known
Ninox connivens	Barking Owl	Woodland and Forest bird	Vulnerable	Known
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Pyrrholaemus saggitatus	Speckled Warbler	Woodland and Forest bird	Vulnerable	Known
Stagonopleura guttata	Diamond Firetail	Woodland and Forest bird	Vulnerable	Known
Tyto capensis	Grass Owl	Woodland and Forest bird	Vulnerable	Known
Ambassis agassizii - endangered population	Olive Perchlet population in Western NSW		Endangered Population	Known
Bidyanus bidyanus	Silver perch		Vulnerable	Known
Notopala sublineata	River snail		Endangered	Known

Hunter CMA Sub-Region

Scientific Name	Common Name	Life cycle	Level of Threat	Known or Predicted to occur
Anseranas semipalmata	Magpie Goose	Wetland bird	Vulnerable	Known
Archaeophya adamsi	Adam's emerald dragonfly	Aquatic fauna	Vulnerable	Known
Botaurus poiciloptilus	Australasian Bittern	Wetland bird	Vulnerable	Known
Burhinus grallarius	Bush Stone-curlew	Woodland and Forest bird	Endangered	Known
Calidris tenuirostris	Great Knot	Wetland bird	Vulnerable	Known
Callocephalon fimbriatum	Gang-gang Cockatoo	Woodland and Forest bird	Vulnerable	Known
Calyptorhynchus lathami	Glossy Black-cockatoo	Woodland and Forest bird	Vulnerable	Known
Caretta caretta	Loggerhead Turtle	NA	Endangered	Predicted
Cercartetus nanus	Eastern Pygmy-possum	Arboreal mammal	Vulnerable	Predicted
Chalinolobus dwyeri	Large-eared Pied Bat	Hollow-dependant fauna	Vulnerable	Known
Charadrius leschenaultii	Greater Sand-plover	Wetland bird	Vulnerable	Known
Charadrius mongolus	Lesser Sand-plover	Wetland bird	Vulnerable	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Crinia tinnula	Wallum Froglet	Non-burrowing amphibians	Vulnerable	Known
Dasyurus maculatus	Spotted-tailed Quoll	Terrestrial mammal	Vulnerable	Known
Dromaius novaehollandiae - endangered population	Emu population in the NSW North Coast Bioregion and Port Stephens LGA	Ground dwelling bird	Endangered Population	Known
Ephippiorhynchus asiaticus	Black-necked Stork	Wetland bird	Endangered	Known
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Hollow-dependant fauna	Vulnerable	Known
Grantiella picta	Painted Honeyeater	Wetland bird	Vulnerable	Known
Haematopus fuliginosus	Sooty Oystercatcher	Wetland bird	Vulnerable	Known
Haematopus longirostris	Pied Oystercatcher	Wetland bird	Vulnerable	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Hollow-dependant fauna	Vulnerable	Known
Irediparra gallinacea	Comb-crested Jacana	Wetland bird	Vulnerable	Known
Ixobrychus flavicollis	Black Bittern	Wetland bird	Vulnerable	Predicted
Lathamus discolor	Swift Parrot	Woodland and Forest bird	Endangered	Known
Limicola falcinellus	Broad-billed Sandpiper	Wetland bird	Vulnerable	Known
Limosa limosa	Black-tailed Godwit	Wetland bird	Vulnerable	Known
Litoria aurea	Green and Golden Bell Frog	Non-burrowing amphibians	Endangered	Known
Litoria brevipalmata	Green-thighed Frog	Non-burrowing amphibians	Vulnerable	Known
Lophoictinia isura	Square-tailed Kite	Woodland and Forest bird	Vulnerable	Known
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland and Forest bird	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Miniopterus australis	Little Bentwing-bat	Hollow-dependant fauna	Vulnerable	Known
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Arboreal mammal	Vulnerable	Known
Mormopterus norfolkensis	Eastern Freetail-bat	Hollow-dependant fauna	Vulnerable	Known
Myotis adversus	Large-footed Myotis	Arboreal mammal	Vulnerable	Known
Neophema pulchella	Turquoise Parrot	Woodland and Forest bird	Vulnerable	Known
Ninox connivens	Barking Owl	Woodland and Forest bird	Vulnerable	Known
Ninox strenua	Powerful Owl	Woodland and Forest bird	Vulnerable	Known
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Hollow-dependant fauna	Vulnerable	Known
Oxyura australis	Blue-billed Duck	Wetland bird	Vulnerable	Known

Pandion haliaetus	Osprey	Wetland bird	Vulnerable	Known
Petaurus australis	Yellow-bellied Glider	Arboreal mammal	Vulnerable	Known
Petaurus norfolcensis	Squirrel Glider	Arboreal mammal	Vulnerable	Known
Petrogale penicillata	Brush-tailed Rock-wallaby	Terrestrial mammal	Endangered	Known
Phascogale tapoatafa	Brush-tailed Phascogale	Hollow-dependant fauna	Vulnerable	Known
Phascolarctos cinereus	Koala	Arboreal mammal	Vulnerable	Known
Planigale maculata	Common Planigale	Terrestrial mammal	Vulnerable	Predicted
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Pseudophryne australis	Red-crowned Toadlet	Non-burrowing amphibians	Vulnerable	Known
Pteropus poliocephalus	Grey-headed Flying-fox	Arboreal mammal	Vulnerable	Known
Ptilinopus magnificus	Wompoo Fruit-dove	Woodland and Forest bird	Vulnerable	Known
Ptilinopus regina	Rose-crowned Fruit-dove	Woodland and Forest bird	Vulnerable	Known
Ptilinopus superbus	Superb Fruit-dove	Woodland and Forest bird	Vulnerable	Known
Pyrrholaemus saggitatus	Speckled Warbler	Woodland and Forest bird	Vulnerable	Known
Rostratula benghalensis	Painted Snipe	Wetland bird	Endangered	Known
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Hollow-dependant fauna	Vulnerable	Known
Scoteanax rueppellii	Greater Broad-nosed Bat	Hollow-dependant fauna	Vulnerable	Known
Stagonopleura guttata	Diamond Firetail	Woodland and Forest bird	Vulnerable	Known
Sterna albifrons	Little Tern	Wetland bird	Endangered	Known
Stictonetta naevosa	Freckled Duck	Wetland bird	Vulnerable	Known
Tyto novaehollandiae	Masked Owl	Woodland and Forest bird	Vulnerable	Known
Tyto tenebricosa	Sooty Owl	Woodland and Forest bird	Vulnerable	Known
Vespadelus troughtoni	Eastern Cave Bat	Arboreal mammal	Vulnerable	Known
Xanthomyza phrygia	Regent Honeyeater	Woodland and Forest bird	Endangered	Known
Xenus cinereus	Terek Sandpiper	Wetland bird	Vulnerable	Known

Liverpoool Plains CMA sub region

Scientific Name	Common Name	Life cycle	Level of Threat	Known or Predicted to occur
Bidyanus bidyanus	Silver perch	Aquatic fauna	Vulnerable	Known
Notopala sublineata	River snail	Aquatic fauna	Endangered	Known
Cercartetus nanus	Eastern Pygmy-possum	Arboreal mammal	Vulnerable	Known
Chalinolobus picatus	Little Pied Bat	Arboreal mammal	Vulnerable	Known
Petaurus australis	Yellow-bellied Glider	Arboreal mammal	Vulnerable	Predicted
Petaurus norfolcensis	Squirrel Glider	Arboreal mammal	Vulnerable	Known
Phascolarctos cinereus	Koala	Arboreal mammal	Vulnerable	Known
Vespadelus troughtoni	Eastern Cave Bat	Arboreal mammal	Vulnerable	Known
Ardeotis australis	Australian Bustard	Groun dwelling bird	Endangered	Known
Leipoa ocellata	Malleefowl	Ground dwelling bird	Endangered	Predicted
Alectura lathami - endangered population	Australian Brush-turkey population in the Nandewar and Brigalow Belt South bioregions	Ground dwelling bird/Woodland and Forest bird	Endangered Population	Known
Chalinolobus dwyeri	Large-eared Pied Bat	Hollow-dependant fauna	Vulnerable	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Hollow-dependant fauna	Vulnerable	Known
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Hollow-dependant fauna	Vulnerable	Known
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Hollow-dependant fauna	Vulnerable	Known
Aprasia parapulchella	Pink-tailed Worm-lizard	Saxicolous reptile	Vulnerable	Known
Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	Saxicolous reptile	Vulnerable	Known
Aepyprymnus rufescens	Rufous Bettong	Terrestrial mammal	Vulnerable	Predicted
Dasyurus maculatus	Spotted-tailed Quoll	Terrestrial mammal	Vulnerable	Known
Macropus dorsalis	Black-striped Wallaby	Terrestrial mammal	Endangered	Known
Petrogale penicillata	Brush-tailed Rock-wallaby	Terrestrial mammal	Endangered	Known
Pseudomys pilligaensis	Pilliga Mouse	Terrestrial mammal	Vulnerable	Predicted
Sminthopsis macroura	Stripe-faced Dunnart	Terrestrial mammal	Vulnerable	Predicted
Anseranas semipalmata	Magpie Goose	Wetland bird	Vulnerable	Predicted
Botaurus poiciloptilus	Australasian Bittern	Wetland bird	Vulnerable	Predicted
Ephippiorhynchus asiaticus	Black-necked Stork	Wetland bird	Endangered	Known
Grus rubicunda	Brolga	Wetland bird	Vulnerable	Predicted
Limosa limosa	Black-tailed Godwit	Wetland bird	Vulnerable	Predicted
Oxyura australis	Blue-billed Duck	Wetland bird	Vulnerable	Predicted
Rostratula benghalensis	Painted Snipe	Wetland bird	Endangered	Known
Stictonetta naevosa	Freckled Duck	Wetland bird	Vulnerable	Known

Burhinus grallarius	Bush Stone-curlew	Woodland and Forest bird	Endangered	Known
Calyptorhynchus lathami	Glossy Black-cockatoo	Woodland and Forest bird	Vulnerable	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Falco hypoleucos	Grey Falcon	Woodland and Forest bird	Vulnerable	Predicted
Grantiella picta	Painted Honeyeater	Woodland and Forest bird	Vulnerable	Known
Hamirostra melanosternon	Black-breasted Buzzard	Woodland and Forest bird	Vulnerable	Known
Lathamus discolor	Swift Parrot	Woodland and Forest bird	Endangered	Known
Lophoictinia isura	Square-tailed Kite	Woodland and Forest bird	Vulnerable	Known
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland and Forest bird	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecie	Woodland and Forest bird	Vulnerable	Known
Neophema pulchella	Turquoise Parrot	Woodland and Forest bird	Vulnerable	Known
Ninox connivens	Barking Owl	Woodland and Forest bird	Vulnerable	Known
Ninox strenua	Powerful Owl	Woodland and Forest bird	Vulnerable	Predicted
Polytelis swainsonii	Superb Parrot	Woodland and Forest bird	Vulnerable	Known
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Pyrrholaemus saggitatus	Speckled Warbler	Woodland and Forest bird	Vulnerable	Known
Stagonopleura guttata	Diamond Firetail	Woodland and Forest bird	Vulnerable	Known
Tyto novaehollandiae	Masked Owl	Woodland and Forest bird	Vulnerable	Known
Xanthomyza phrygia	Regent Honeyeater	Woodland and Forest bird	Endangered	Known

Liverpool Range CMA sub region

Scientific Name	Common Name	Life cycle	Level of Threat	Known or Predicted to occur
Bidyanus bidyanus	Silver perch	Aquatic fauna	Vulnerable	Known
Cercartetus nanus	Eastern Pygmy-possum	Arboreal mammal	Vulnerable	Predicted
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Arboreal mammal	Vulnerable	Known
Petaurus norfolcensis	Squirrel Glider	Arboreal mammal	Vulnerable	Known
Phascolarctos cinereus	Koala	Arboreal mammal	Vulnerable	Known
Chalinolobus dwyeri	Large-eared Pied Bat	Hollow-dependant fauna	Vulnerable	Predicted
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Hollow-dependant fauna	Vulnerable	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Hollow-dependant fauna	Vulnerable	Known
Nyctophilus timoriensis	Greater Long-eared Bat (south east	Hollow-dependant fauna	Vulnerable	Predicted
Phascogale tapoatafa	Brush-tailed Phascogale	Hollow-dependant fauna	Vulnerable	Predicted
Scoteanax rueppellii	Greater Broad-nosed Bat	Hollow-dependant fauna	Vulnerable	Known
Petrogale penicillata	Brush-tailed Rock-wallaby	Terrestrial mammal	Endangered	Known
Dasyurus maculatus	Spotted-tailed Quoll	Terrestrial mammal	Vulnerable	Predicted
Botaurus poiciloptilus	Australasian Bittern	Wetland bird	Vulnerable	Predicted
Oxyura australis	Blue-billed Duck	Wetland bird	Vulnerable	Predicted
Lathamus discolor	Swift Parrot	Woodland and Forest bird	Endangered	Predicted
Xanthomyza phrygia	Regent Honeyeater	Woodland and Forest bird	Endangered	Known
Calyptorhynchus lathami	Glossy Black-cockatoo	Woodland and Forest bird	Vulnerable	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspe	Woodland and Forest bird	Vulnerable	Known
Grantiella picta	Painted Honeyeater	Woodland and Forest bird	Vulnerable	Predicted
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form	Woodland and Forest bird	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern	Woodland and Forest bird	Vulnerable	Known
Neophema pulchella	Turquoise Parrot	Woodland and Forest bird	Vulnerable	Known
Ninox connivens	Barking Owl	Woodland and Forest bird	Vulnerable	Known
Ninox strenua	Powerful Owl	Woodland and Forest bird	Vulnerable	Known
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern sub	Woodland and Forest bird	Vulnerable	Known
Pyrrholaemus saggitatus	Speckled Warbler	Woodland and Forest bird	Vulnerable	Known
Stagonopleura guttata	Diamond Firetail	Woodland and Forest bird	Vulnerable	Known
Tyto novaehollandiae	Masked Owl	Woodland and Forest bird	Vulnerable	Known

Northern Basalt CMA sub region

Scientific Name	Common Name	Life cycle group	Level of Threat	Known or Predicted to occur
Pteropus poliocephalus	Grey-headed Flying-fox	Aboreal mammals	Vulnerable	Known
Vespadelus troughtoni	Eastern Cave Bat	Aboreal mammals	Vulnerable	Known
Ambassis agassizii - endangered population	Olive Perchlet population in Western NSW	Aquatic fauna	Endangered Population	Known
Bidyanus bidyanus	Silver perch	Aquatic fauna	Vulnerable	Known
Mogurnda adspersa - endangered population	Purple Spotted Gudgeon population in Western NSW	Aquatic fauna	Endangered Population	Known
Notopala sublineata	River snail	Aquatic fauna	Endangered	Known
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Arboreal mammals	Vulnerable	Known
Petaurus norfolcensis	Squirrel Glider	Arboreal mammals	Vulnerable	Known
Phascolarctos cinereus	Koala	Arboreal mammals	Vulnerable	Known
Oedura rhombifer	Zigzag Velvet Gecko	Arboreal reptiles	Endangered	Known
Anomalopus mackayi	Five-clawed Worm-skink	Fossorial reptiles	Endangered	Known
Furina dunmalli	Dunmall's Snake	Fossorial reptiles	Vulnerable (Commonwealth listed only)	Predicted
Geophaps scripta	Squatter Pigeon	Ground dwelling birds	Endangered	Known
Chalinolobus picatus	Little Pied Bat	Hollow dependant fauna	Vulnerable	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Hollow dependant fauna	Vulnerable	Known
Mormopterus 'Species 6'	Hairy-nosed Freetail Bat	Hollow dependant fauna	Endangered	Predicted
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Hollow dependant fauna	Vulnerable	Known
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Hollow dependant fauna	Vulnerable	Known
Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	Saxixolous reptiles	Vulnerable	Known
Macropus dorsalis	Black-striped Wallaby	Terrestrial mammals	Endangered	Known
Pseudomys delicatulus	Delicate Mouse	Terrestrial mammals	Endangered	Known
Sminthopsis macroura	Stripe-faced Dunnart	Terrestrial mammals	Vulnerable	Predicted
Ephippiorhynchus asiaticus	Black-necked Stork	Wetland Bird	Endangered	Known
Nettapus coromandelianus	Cotton Pygmy-goose	Wetland Bird	Endangered	Known
Rostratula benghalensis	Painted Snipe	Wetland Bird	Endangered	Predicted
Stictonetta naevosa	Freckled Duck	Wetland Bird	Vulnerable	Predicted
Lophoictinia isura	Square-tailed Kite	Woodland	Vulnerable	Known
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	Woodland and Forest Bird	Vulnerable	Predicted
Calyptorhynchus lathami	Glossy Black-cockatoo	Woodland and Forest Bird	Vulnerable	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Woodland and Forest Bird	Vulnerable	Known
Grantiella picta	Painted Honeyeater	Woodland and Forest Bird	Vulnerable	Known
Lathamus discolor	Swift Parrot	Woodland and Forest Bird	Endangered	Predicted
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland and Forest Bird	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Woodland and Forest Bird	Vulnerable	Known
Neophema pulchella	Turquoise Parrot	Woodland and Forest Bird	Vulnerable	Known
Ninox connivens	Barking Owl	Woodland and Forest Bird	Vulnerable	Known
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Woodland and Forest Bird	Vulnerable	Known
Pyrrholaemus saggitatus	Speckled Warbler	Woodland and Forest Bird	Vulnerable	Known
Stagonopleura guttata	Diamond Firetail	Woodland and Forest Bird	Vulnerable	Known
Tyto novaehollandiae	Masked Owl	Woodland and Forest Bird	Vulnerable	Known
Alectura lathami - endangered population	Australian Brush-turkey population in the Nandewar ar	Woodland and Forest Bird / Ground dwelling birds	Endangered Population	Known

Northern Outwash CMA sub region

Scientific Name	Common Name	Life cycles	Level of Threat	Known or Predicted to occur
Ambassis agassizii - endangered populati	Olive Perchlet population in Western NSW	Aquatic fauna	Endangered Population	Known
Bidyanus bidyanus	Silver perch	Aquatic fauna	Vulnerable	Known
Notopala sublineata	River snail	Aquatic fauna	Endangered	Known
Chalinolobus picatus	Little Pied Bat	Arboreal mammals	Vulnerable	Known
Phascolarctos cinereus	Koala	Arboreal mammals	Vulnerable	Known
Pteropus poliocephalus	Grey-headed Flying-fox	Arboreal mammals	Vulnerable	Predicted
Anomalopus mackayi	Five-clawed Worm-skink	Fossorial reptile	Endangered	Predicted
Furina dunmalli	Dunmall's Snake	Fossorial reptile	Vulnerable (Commonwealth listed on	Predicted
Ardeotis australis	Australian Bustard	Ground dwelling birds	Endangered	Known
Alectura lathami - endangered population	Australian Brush-turkey population in the Nandewar and Brigalow Belt South bioregions	Ground dwelling birds/Woodland and Forest bird	Endangered Population	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Hollow dependant fauna	Vulnerable	Predicted
Mormopterus 'Species 6'	Hairy-nosed Freetail Bat	Hollow dependant fauna	Endangered	Predicted
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Hollow dependant fauna	Vulnerable	Predicted
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Hollow dependant fauna	Vulnerable	Known
Macropus dorsalis	Black-striped Wallaby	Terrestrial mammals	Endangered	Known
Sminthopsis macroura	Stripe-faced Dunnart	Terrestrial mammals	Vulnerable	Known
Burhinus grallarius	Bush Stone-curlew	Woodland and Forest bird	Endangered	Predicted
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	Woodland and Forest bird	Vulnerable	Known
Calyptorhynchus lathami	Glossy Black-cockatoo	Woodland and Forest bird	Vulnerable	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Grantiella picta	Painted Honeyeater	Woodland and Forest bird	Vulnerable	Known
Lophoictinia isura	Square-tailed Kite	Woodland and Forest bird	Vulnerable	Known
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Woodland and Forest bird	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Neophema pulchella	Turquoise Parrot	Woodland and Forest bird	Vulnerable	Known
Ninox connivens	Barking Owl	Woodland and Forest bird	Vulnerable	Predicted
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Woodland and Forest bird	Vulnerable	Known
Pyrrholaemus saggitatus	Speckled Warbler	Woodland and Forest bird	Vulnerable	Predicted
Stagonopleura guttata	Diamond Firetail	Woodland and Forest bird	Vulnerable	Known
Tyto capensis	Grass Owl	Woodland and Forest bird	Vulnerable	Predicted

Appendix 2 – Assessment Matrix

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
222	1				1	edge of tsr							1		1	Barwon River NSW We lands Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species). S iver Perch (M) O ive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	Coolibah - Black Box Woodland avoid mature trees	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
223	1				1	edge of tsr							1		1	NSW Wetlands Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
224	1				1	edge of tsr							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor also rapid search for native grass species between 223 and 224	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
225	1				1	edge of tsr							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
226	1				1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
227	1				1	edge of tsr							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
228	1				1	edge of tsr							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
229	1	1			1	edge of tsr							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
230	1	1			1	edge of tsr	1	1	1				1		1	NSW Wetlands Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)		rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape construct could disrupt corridor
231		1	1		1	edge of tsr rip	1	1	1				1		1	Gnoura Creek NSW Wetlands Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).S iver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)		Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape
232		1	1		1	edge of tsr	1	1	1				1		1	NSW Wetlands Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)		Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape
233	1	1			1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape
234	1	1			1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape
235	1				1	edge of tsr	1	1	1				1		1	Boomi Creek Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape construct could disrupt corridor
236		1	1		1	edge of tsr	1	1	1				1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape
237		1	1		1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape may also be a fauna corridor especially along Gnoura Gnoura Creek native vegetation exists in a largely cleared highly fragmented landscape
238		1	1		1	edge of tsr								1				rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Koala record <200m away Check date of record assessment of koala hab tat on the route
239		1	1		1	edge of tsr								1				Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Koala record <200m away Check date of record assessment of koala hab tat on the route
240	1				1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape especia ly out of Boomi NR
241	1				1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape especia ly out of Boomi NR
242	1				1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape especia ly out of Boomi NR
243	1				1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape especia ly out of Boomi NR
244		1	1		1													Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	
245		1	1		1													Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	
246		1	1		1								1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
247		1	1		1													rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	
248		1	1			edge of tsr	1	1	1				1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape
249	1	1			1	edge of tsr	1	1	1				1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
250		1	1		1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape
251		1	1		1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important movement corridor in an already highly fragmented landscape
252	1				1	edge of tsr							1		1	Whalan Creek Lowland Dar ing River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
253	1	1			1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
254	1				1	edge of tsr							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
255	1				1	edge of tsr	1	1	1				1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section cou d be an important east-west corrido in an already highly fragmented landscape
256	1				1	`							1		1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
257	1			1		edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
258	1			1		edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
259				1		edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
260				1	1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
261	1					edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
262		1	1			edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
263		1	1			edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
264		1	1		1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
265	1					edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
266		1	1		1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
267		1	1			edge of tsr							1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
268	1				1	edge of tsr	1	1	1				1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Close records of threatened woodland birds highly fragmented landscape maybe only movement corridor construction impacts
269	1					edge of tsr	1	1	1				1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Close records of threatened woodland birds highly fragmented landscape maybe only movement corridor construction impacts
270		1	1			edge of tsr	1	1	1				1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Close records of threatened woodland birds highly fragmented landscape maybe only movement corridor construction impacts
271	1				1	edge of tsr	1	1	1				1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Close records of threatened woodland birds highly fragmented landscape maybe only movement corridor construction impacts
272	1				1	edge of tsr							1					Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
273	1			1	1	edge of tsr							1					Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
274	1			1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
275	1					edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
276				1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
277				1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
278				1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
279				1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
280				1															
281				1															
282				1															
283		1	1		1													rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	
284		1	1		1													rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	
285		1	1		1													rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	
286		1	1		1													rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
287					1		1	1	1				1		1	G l Creek Lowland Dar ing River aquatic ecological commun ty (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) O ive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
288					1		1	1	1				1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
289		1	1		1	edge of tsr	1	1	1				1					Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section could be an important movement corridor along Walon and G l G l creeks in an already highly fragmented landscape
290		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
291		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
292		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
293		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
294		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
295		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
296		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
297		1	1		1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
298	1				1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
299		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
300				1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
301	1			1		edge of tsr							1		1				Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
302	1					edge of tsr							1		1				Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
303	1					edge of tsr							1		1				Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
304	1		1			edge of tsr							1		1				Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
305	1		1		1	edge of tsr							1		1			rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Wallon and G l G l creeks in an already highly fragmented landscape
306				1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
307		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
308		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
309		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
310		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
311		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
312		1	1		1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
313	1			1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
314	1				1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
315		1	1		1								1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
316	1						1	1	1				1		1	Marshalls Pond Creek Lowland Darling River aquatic ecolbgical community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)			Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Marsha ls Pond Creek in an already highly fragmented landscape
317	1				1		1	1	1				1		1				Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape Avifauna this section cou d be an important movement corridor along Marsha ls Pond Creek in an already highly fragmented landscape
318	1			1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
319	1			1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
320	1			1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
321	1			1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
322	1			1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
323	1				1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
324			1	1	1	edge of tsr							1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
325			1	1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
326		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
327		1	1			edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
328			1	1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
329			1	1		edge of tsr							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
330	1			1									1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
331	1			1									1		1				Likely habitat for Anomalopus mackayi and striped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
332	1				1								1		1	Gwydir River Lowland Daring River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and stiped faced dunnart potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
333	1			1	1								1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
334	1				1								1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
335	1												1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
336		1	1																
337		1	1		1		1	1	1				1	1	1	unamed Creek Lowland Dar ing River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along Meehi River could be an important movement corridor in an already highly fragmented landscape Koala record close by
338	1				1	Good band of	1	1	1				1	1	1			Coolibah - Black Box Woodland avoid mature trees minimize disturbance corridor	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along Meehi River could be an important movement corridor in an already highly fragmented landscape
339		1	1		1		1	1	1				1	1	1	Mehi River Lowland Dar ing River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage	rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along Meehi River could be an important movement corridor in an already highly fragmented landscape Koala record close by
340		1	1																
341		1	1		1								1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape
342			1	1															
343		1																	
344		1	1																
345		1	1																
346		1	1																
347		1	1																
348		1	1		1								1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of EEC
349		1	1		1								1					rapid search for native grass species Swainsona murrayana and Sida rohlenae/or protect and rehabilitate grass sward	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of EEC
350				1															
351				1															
352				1															
353				1															
354				1															
355	1					Creek line onl	1	1	1				1	1	1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along riparian area could be an important movement corridor in an already highly fragmented landscape
356	1					Creek line onl	1	1	1				1	1	1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along riparian area could be an important movement corridor in an already highly fragmented landscape
357	1					Creek line onl	1	1	1				1	1	1	Tycannah Creek Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Olive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage		Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along riparian area could be an important movement corridor in an already highly fragmented landscape
358				1															
359				1															
360	1					Creek line only							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of creek ine
361		1		1															
362				1															
363		1	1																
364	1					Riparian vege	1	1	1				1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals this section along riparian area could be an important movement corridor in an already highly fragmented landscape
365	1					Riparian vege	1	1	1				1		1	unamed creek Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Oive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage		Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section along riparian area could be an important movement corridor in an already highly fragmented landscape
366	1					Riparian vege	1	1	1				1		1	Gurley Creek Lowland Darling River aquatic ecological community (EEC). River snail and threatened fish species (including migratory species).Silver Perch (M) Oive perchlet Purple spotted gudgeon Murray Cod (M)	Target search for river snail Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outside of migratory period or avo d blocking fish passage		Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna this section along riparian area could be an important movement corridor in an already highly fragmented landscape
367				1															
368				1															
369				1															

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
370	1					edge of TSR?							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of TSR?
371	1					edge of TSR?							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of TSR?
372	1					edge of TSR?							1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of TSR?
373			1	1															
374			1	1															
375			1	1															
376			1	1															
377			1	1															
378	1					Native vegetation on road ways cropping in between													
379	1				1	Native vegeta	1	1	1				1	1	1			rapid search for native grass species or protect and rehab litate grass sward	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals (koala) this section along riparian area could be an important movement corridor in an already highly fragmented
380	1				1	Native vegetation on road ways cropping in between												rapid search for native grass species or protect and rehab litate grass sward	
381				1															
382				1															
383				1															
384				1															
385				1															
386				1															
387				1															
388			1	1															
389				1															
390				1									1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape along Myall Ho low Creek
391		1	1										1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape along Myall Ho low Creek
392		1	1																
393		1	1																
394				1															
395				1									1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on presence cond tion of patch
396				1															
397				1															
398				1									1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on condition of drainage line
399				1	1	grasses on roadway												rapid search for native grass species or protect and rehab litate grass sward	
400				1									1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on condition of drainage line
401				1	1	grasses on roadway										unamed creek Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species). Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	rapid search for native grass species or protect and rehab litate grass sward	
402				1															
403				1															
404	1															unamed creek (2x) Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
405	1												1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
406	1												1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
407	1												1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
408	1																		
409	1																		
410				1															
411	1												1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
412	1												1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
413	1												1		1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
414		1	1																
415	1																		
416		1	1																
417		1	1																
418				1															
419				1												unamed creek Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
420				1															
421				1															
422				1									1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on condition of drainage line
423	1					Very narrow riparian on Spring creek							1			unamed creek Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on condition of drainage line
424				1															

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
425				1															
426		1	1													unamed creek Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
427		1	1			Thin riparian on spring creek tributary													
428			1																
429			1																
430			1																
431				1									1			unamed creek (2x) Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on condition of drainage line
432				1															
433				1									1						Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to sma l patches in the landscape likely dependant on condition of drainage line
434		1	1																
435		1	1																
436		1	1																
437	1												1						Likely habitat for Anomalopus mackayi and Hoplocephalus bitorquatus potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape
438		1	1										1	1					Likely habitat for Anomalopus mackayi and Hoplocephalus bitorquatus potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape / Koala record in buffer zone Koala hab tat check age of record potential construc ion impacts
439		1	1										1	1					Likely habitat for Anomalopus mackayi and Hoplocephalus bitorquatus potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape / Koala record in buffer zone Koala hab tat check age of record potential construc ion impacts
440		1	1																
441		1	1																
442		1	1																
443		1	1																
444				1															
445	1			1		very thin native vegetation on arm of Naomi south of 445													
446	1				1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
447	1				1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
448			1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
449			1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
450		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
451	1				1	edge of TSR	1	1	1				1	1	1			possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals (koala) this section along riparian area l kely an important movement corridor in an already highly fragmented landscape koala record in buffer of this TSR
452	1					edge of TSR	1	1	1				1	1	1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals (koala) this section along riparian area l kely an important movement corridor in an already highly fragmented landscape koala record in buffer of this TSR
453	1					edge of TSR	1	1	1				1	1	1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals (koala) this section along riparian area l kely an important movement corridor in an already highly fragmented landscape koala record in buffer of this TSR
454	1					edge of TSR	1	1	1				1	1	1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals (koala) this section along riparian area l kely an important movement corridor in an already highly fragmented landscape koala record in buffer of this TSR
455		1	1			edge of TSR	1	1	1				1	1	1				Likely habitat for Anomalopus mackayi and Striped faced dunnart potential construc ion disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the landscape/Av fauna and Arboreal Mammals (koala) this section along riparian area l kely an important movement corridor in an already highly fragmented landscape koala record in buffer of this TSR
456		1	1																
457	1																		
458				1															
459				1															
460		1	1		1								1					possibly Brigalow/ avoid mature trees rehabi itate topsoil and grasses	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
461	1				1								1					possibly Brigalow/ avoid mature trees rehabi itate topsoil and grasses	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
462	1	1			1								1					possibly Brigalow/ avoid mature trees rehabi itate topsoil and grasses	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
463		1	1																
464		1	1		1														
465		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
466		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
467		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
468				1														possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
469				1															
470		1	1																
471		1	1																

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
472				1															
473		1	1																
474		1	1																
475				1															
476	1				1								1					possibly Oo ine search for Cadellia pentastylis individuals/ avoid mature trees	Likely habitat for Anomalopus mackayi potential construction disturbance already fragmented landscape any populations in locality likely to be confined to small patches in the
477		1	1		1													possibly Oo ine search for Cadellia pentastylis individuals/ avoid mature trees	
478				1															
479				1												Namoi River Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species). Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
480		1	1									1							Flanks potential Aprasia parapulchella habitat record not far
481		1	1																
482				1															
483		1	1																
484		1	1																
485			1																
486			1																
487			1																
488			1																
489		1	1		1													Brigalow avoid a l mature trees	
490		1	1																
491		1	1																
492				1															
493				1		Some native vegetation on roadside													
494				1															
495				1															
496				1															
497		1	1																
498				1															
499		1	1																
500		1	1																
501	1					good strip of r	1	1	1				1	1	1	Namoi River Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species). Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		The riparian vegetation flanking Namoi River is likely to be an important corridor considering the highly fragmented landscape in the loca ity
502				1															
503				1															
504	1					good strip of r	1	1	1				1	1	1	Namoi River Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species). Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		The riparian vegetation flanking Namoi River is likely to be an important corridor considering the highly fragmented landscape in the loca ity
505		1	1		1													Brigalow avoid a l mature trees	
506		1	1		1													Brigalow avoid a l mature trees	
507		1	1																
508		1	1																
509		1	1																
510				1															
511		1	1																
512	1																		
513		1	1																
514		1	1																
515		1	1																
516		1	1																
517				1															
518				1															
519				1															
520				1															
521				1															
522		1	1																
523		1	1																
524		1	1																
525		1	1																
526	1			1	?		1	1	1				1	1	1				The riparian vegetation flanking Namoi River is likely to be an important corridor considering the highly fragmented landscape in the loca ity
527	1			1		native vegetat	1	1	1				1	1	1	Namoi River Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species). Silver Perch (M) Murray Cod (M).	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		The riparian vegetation flanking Namoi River is likely to be an important corridor considering the highly fragmented landscape in the loca ity/koala record in buffer
528		1	1																
529		1	1																
530		1	1																
531		1	1																
532		1	1											1					Koala record in buffer. Maybe movement corridor along riparian zone
533		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
534		1	1																
535		1	1																
536				1															
537	1			1		very narrow strip of native vegetation										Mooki River Lowland Darling River aqua ic ecological community (EEC). Threatened fish species (including migratory species). Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
538			1																
539				1															
540			1																
541			1																
542			1																
543			1																
544			1																
545			1																
546			1																
547			1																
548			1																
549			1																
550			1	1															
551				1															
552				1															
553				1															

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
554				1															
555				1															
556			1	1			1	1	1					1		Mooki Creek Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		The riparian vegetation flanking Mooki Creek is ikely to be an important corridor for av fauna considering the highly fragmented landscape in the local ty/ also Koala records might suggest that this is important hab tat considering surrounding cleared landscape
557				1			1	1	1					1					The riparian vegetation flanking Mooki Creek is ikely to be an important corridor for av fauna considering the highly fragmented landscape in the local ty/ also Koala records might suggest that this is important hab tat considering surrounding cleared landscape
558				1			1	1	1					1					The riparian vegetation flanking Mooki Creek is ikely to be an important corridor for av fauna considering the highly fragmented landscape in the local ty/ also Koala records might suggest that this is important hab tat considering surrounding cleared landscape
559				1		very narrow ri	1	1	1							Mooki Creek Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		The riparian vegetation flanking Mooki Creek is ikely to be an important corridor for av fauna considering the highly fragmented landscape in the local ty
560				1															
561				1															
562				1															
563				1															
564				1															
565			1																
566			1													Mooki Creek Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
567			1																
568				1															
569				1															
570				1															
571				1															
572				1															
573				1															
574				1															
575				1															
576				1															
577				1															
578				1															
579				1															
580				1															
581				1															
582				1		No riparian vegetation													
583				1															
584				1															
585			1																
588				1															
587				1															
588			1	1															
589			1	1															
590			1	1															
591			1	1	1	No riparian vegetation between 591-592										Quipolly Creek Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
592			1		1											Quipolly Creek Lowland Darling River aquatic ecological commun ty (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
593				1															
594				1															
595				1															
596				1															
597				1															
598				1															
599				1															
600				1															
601		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
602		1	1		1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
603		1	1																
604				1															
605				1	1	very narrow riparian vegetation												NPA Act Fisheries Act protection of River Oak	
606				1															
607				1															
608		1		1	1													possibly Native vegeta ion on Cracking clay soils' possible hab tat for Dichanthium setosum Digitaria porrecta/avo d mature trees rehabilitate topsoil and grasses	
609				1															
610				1															
611				1															
612				1												unamed creek Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
613			1													unamed creek Lowland Darling River aquatic ecological community (EEC). Threatened fish species (including migratory species).Silver Perch (M) Murray Cod (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
614			1																
615			1																
616			1																
617			1																
618			1																
619		1	1																
620		1	1																
621		1	1																

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
622		1	1																
623		1	1																
624		1	1																
625		1	1																
626		1	1																
627		1	1		1											unamed creek. Threatened fish species (including migratory species). Silver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	NPA Act Fisheries Act protection of River Oak	
628		1	1		1													NPA Act Fisheries Act protection of River Oak	
629		1	1			Very narrow riparian vegetation													
630		1	1																
631		1	1																
632		1	1																
633		1																	
634		1																	
635		1					1		1				1	1	1				potential movement corridor between Liverpool Range and Murrundi Pass due to surrounding fragmented landscape potential to disrupt if it is one
636	1						1		1				1	1	1				potential movement corridor between Liverpool Range and Murrundi Pass due to surrounding fragmented landscape potential to disrupt if it is one
637		1	1																
638		1	1																
639	1																		
640	1																		
641		1																	
642		1																	
643		1	1									1							potential for occurrence of Underwoodisaurus sphyrurus and Aprasia parapulchella low dispersal isolated population
644		1	1									1							potential for occurrence of Underwoodisaurus sphyrurus and Aprasia parapulchella low dispersal isolated population
645		1	1									1							potential for occurrence of Underwoodisaurus sphyrurus and Aprasia parapulchella low dispersal isolated population
646		1	1																
647		1	1																
648		1	1																
649		1	1																
650		1	1																
651		1	1																
652		1	1																
653		1	1																
654		1	1																
655		1	1																
656		1	1																
657		1	1				1		1			1							potential movement corridor between Burning Maid and Wingen Mountain NR due to surrounding fragmented landscape potential to disrupt if t is one
658		1	1				1		1			1				Petwyn Va ley Creek. Threatened fish species (including migratory species).S lver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		potential movement corridor between Burning Maid and Wingen Mountain NR due to surrounding fragmented landscape potential to disrupt if t is one
659		1	1				1		1			1							potential movement corridor between Burning Maid and Wingen Mountain NR due to surrounding fragmented landscape potential to disrupt if t is one
660		1	1		1		1		1			1						Search for Cymbidium canaliculatum avoid mature host trees	potential movement corridor between Burning Maid and Wingen Mountain NR due to surrounding fragmented landscape potential to disrupt if t is one
661		1					1		1			1							potential movement corridor between Burning Maid and Wingen Mountain NR due to surrounding fragmented landscape potential to disrupt if t is one
662		1			1													Search for Cymbidium canaliculatum avoid mature host trees	
663		1																	
664	1	1																	
665		1	1																
666		1	1																
667		1	1																
668		1	1																
669		1	1		1													Search for Cymbidium canaliculatum avoid mature host trees	
670		1	1																
671		1	1																
672		1	1																
673		1	1																
674		1	1																
675		1	1																
676			1																
677			1																
678			1																
679				1															
680		1	1																
681				1															
682				1															
683				1															
684	1																		
685	1																		
686		1																	
687			1																
688		1				Riparian vegetation very thin										Kingdom Ponds. Threatened fish species (including migratory species).S lver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
689			1																
690			1																
691			1																
692				1															
693				1														possible presence of Eucalyptus camaldulensis avoid all individuals poss ble presence of Diuris ticolor careful translocation required if disturbed*This species most evident in	
694				1												Hunter River. Threatened fish species (including migratory species).S lver perch (M)	Minimize impact to riparian zone Avoid crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	possible presence of Eucalyptus camaldulensis avoid all individuals poss ble presence of Diuris ticolor careful translocation required if disturbed	
695				1														possible presence of Eucalyptus camaldulensis avoid all individuals poss ble presence of Diuris ticolor careful translocation required if disturbed	
696			1															possible presence of Eucalyptus camaldulensis avoid all individuals poss ble presence of Diuris ticolor careful translocation required if disturbed	
697			1															possible presence of Diuris tricolor careful translocation required if disturbed	

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
698			1															possible presence of Diuris tricolor careful translocation required if disturbed	
699		1	1															possible presence of Diuris tricolor careful translocation required if disturbed	
700		1																possible presence of Diuris tricolor careful translocation required if disturbed	
701		1																possible presence of Diuris tricolor careful translocation required if disturbed	
702		1																possible presence of Diuris tricolor careful translocation required if disturbed	
703	1																	possible presence of Diuris tricolor careful translocation required if disturbed	
704	1																	possible presence of Diuris tricolor careful translocation required if disturbed	
705	1																	possible presence of Diuris tricolor careful translocation required if disturbed	
706	1																	possible presence of Diuris tricolor careful translocation required if disturbed	
707		1																possible presence of Diuris tricolor careful translocation required if disturbed	
708		1																possible presence of Diuris tricolor careful translocation required if disturbed	
709		1																possible presence of Diuris tricolor careful translocation required if disturbed	
710		1																possible presence of Diuris tricolor careful translocation required if disturbed	
711		1																possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
712		1																possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
713		1																possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
714		1																possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
715	1						1		1			1						possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	potential movement corridor across vegetated ridge due to surrounding fragmented landscape poten ial to disrupt if it is one
716	1						1		1			1						possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	potential movement corridor across vegetated ridge due to surrounding fragmented landscape poten ial to disrupt if it is one
717	1						1		1			1						possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	potential movement corridor across vegetated ridge due to surrounding fragmented landscape poten ial to disrupt if it is one
718	1						1		1			1						possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	potential movement corridor across vegetated ridge due to surrounding fragmented landscape poten ial to disrupt if it is one
719		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
720		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
721		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
722		1	1			Very narrow strip of riparian vegetation										unamed creek. Threatened fish species (including migratory species).Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	possible presence of Eucalyptus camaldulensis avoid all individuals	
723		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
724		1	1													unamed creek. Threatened fish species (including migratory species).Silver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
725		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
726		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
727		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
728		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
729		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
730		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
731		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
732		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
733		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
734		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
735		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
736		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
737		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
738		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
739		1	1			Very narrow strip of riparian vegetation												possible presence of Eucalyptus camaldulensis avoid all individuals	
740		1	1			Very narrow strip of riparian vegetation										Fal Brook Threatened fish species (including migratory species) Silver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	possible presence of Eucalyptus camaldulensis avoid all individuals	
741		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
742		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
743		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
744		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
745		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
746		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibian s	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
747		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
748		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
749		1	1															possible occurrence of Bo hriochloa biloba retain and rehabilitate top layer of soil and grass	
750		1	1																
751		1	1			Riparian vegetation virtually non-existent													
752		1	1																
753		1	1																
754		1	1																
755		1	1																
756		1	1			Very narrow strip of riparian vegetation										Glendon Brook. Threatened fish species (including migratory species).Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory		
757		1	1																
758		1	1																
759		1	1																
760		1	1																
761	1																		
762	1						1		1			1							potential movement corridor between two vegetated ridges across valley floor due to surrounding fragmented landscape potential to disrupt if t is one
763	1						1		1			1							potential movement corridor between two vegetated ridges across valley floor due to surrounding fragmented landscape potential to disrupt if t is one
764	1				1		1		1			1						possibly Lower Hunter potential Gum-Ironbark Forest avoid mature trees minimize disturbance	potential movement corridor between two vegetated ridges across valley floor due to surrounding fragmented landscape potential to disrupt if t is one
765	1																		
766		1	1																
767		1	1																
768			1			Very narrow strip of riparian vegetation													
769			1																
770			1																
771	1																		
772	1																		
773		1																	
774	1					Very narrow strip of riparian vegetation													
775		1	1																
776		1	1																
777			1																
778			1																
779	1		1			edge of native vegeta ion													
780		1	1													Hunter River. Threatened fish species (including migratory species).S lver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		Rocky outcrops adjacent
781			1	1															
782		1	1																
783		1	1													Hunter River. Threatened fish species (including migratory species).S lver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
784		1	1																
785	1				1													possibly Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion avo d mature trees minimize	
786		1	1																
787			1																
788			1			No riparian vegetation													
789			1																
790	1				1	centreline on native vegeta ion - southern side of corridor cleared												possibly Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion avo d mature trees minimize	
791	1				1	centreline on native vegeta ion - southern side of corridor cleared												possibly Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion avo d mature trees minimize	
792		1	1													unamed creek (792-797). Threatened fish species (including migratory species).Silver perch (M).	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory		
793			1													unamed creek (792-797). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory		
794			1													unamed creek (792-797). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory		
795			1	1												unamed creek (792-797). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory		
796			1	1												unamed creek (792-797). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory e i d o d b cki g i h sage		
797				1												unamed creek (792-797). Threatened fish species (including migratory species).Silver perch (M).	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
798				1															
799				1															
800				1												Hunter River. Threatened fish species (including migratory species).S lver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage		
801			1	1	1													Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	
802			1	1	1													Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	
803	1				1	alignment adjacent to we land area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea refuge habitat if GGBF located in wetland
804	1				1	alignment adjacent to we land area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea refuge habitat if GGBF located in wetland

KP	Na ive veg	scattere d trees	grazing	cropping/ ploughed	EECS	general comments	Woodland & Forest Birds	Hollow dependent birds	Ground dwe ling birds	Burrowing Amphibians	Non-Burrowing Amphibians	Saxicolous reptiles	Fossorial Reptiles	Arboreal mammals	Terrestrial Mammals	Aqua ic comments	Aquatic suggestion for mitigation/fur her survey	Name EEC - sugges ion for mitigation/further survey	Fauna comments -
805			1	1	1	alignment adjacent to we land area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea refuge habitat if GGBF located in wetland
806			1	1	1	alignment adjacent to we land area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea refuge habitat if GGBF located in wetland
807			1	1	1	alignment adjacent to we land area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea refuge habitat if GGBF located in wetland
808			1	1	1	alignment adjacent to we land area					1					unamed creek. Threatened fish species (including migratory species).Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea refuge habitat if GGBF located in wetland
809			1	1	1													Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	
810			1	1	1											unamed creek. Threatened fish species (including migratory species).Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	
811			1	1	1													Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	
812	1				1	wetland area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
813	1				1	wetland area					1			1				Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	Likely to be a koala corridor? potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
814	1				1	wetland area					1			1				Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	Likely to be a koala corridor? potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
815	1				1	wetland area					1			1		unamed creek (815-820). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	Likely to be a koala corridor? potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
816	1				1	wetland area					1					unamed creek (815-820). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
817	1				1	wetland area					1					unamed creek (815-820). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
818	1				1	wetland area					1					unamed creek (815-820). Threatened fish species (including migratory species) Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory e i d o d b cki g i h sage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
819	1				1	wetland area					1					unamed creek (815-820). Threatened fish species (including migratory species) Silver perch (M)	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory e i d o d b cki g i h sage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
820	1				1	wetland area					1					unamed creek (815-820). Threatened fish species (including migratory species).Silver perch (M).	crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory period or avo d blocking fish passage	Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
821	1				1	wetland area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
822	1				1	wetland area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
823	1				1	wetland area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
824	1				1	wetland area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
825	1				1	wetland area					1							Swamp Oak Forest/Freshwater we lands possibi ity of Zannichel ia palustris and Eucalyptus parrama tensis subsp. decadens underboring would reduce impact	potential to disrupt Litoria aurea habitat or dispersal routes between Hexham Swamp and Kooragang Is NR
Lateral																			
1																			
2																			
3																			
4																			
5																			
6																			
7							1	1	1					1					potential to disrupt avifauna in isolated patch in industrial area also Squirrel gl der records
8							1	1	1					1		unamed creek. Threatened fish species (including migratory species).Silver perch (M)	Minimize impact to riparian zone Avo d crossings where high value aquatic habitat occurs undertake works when water way is dry or undertake works outs de of migratory		potential to disrupt avifauna in isolated patch in industrial area also Squirrel gl der records
9							1	1	1					1					potential to disrupt avifauna in isolated patch in industrial area also Squirrel gl der records
10							1	1	1					1					

Appendix 3 – Occurrence and Impact on Threatened Species, Communities and Populations

Table 1: Flora. An evaluation of the likelihood and extent of impact to threatened flora recorded 10km either side of the corridor. Records are from a search of the DECC, Wildlife Atlas and the (EPBC) Environmental Reporting Tool for the Department of Environment Water, Heritage and the Arts.

Codes:

Presence of Habitat:

Present: Potential or known suitable abiotic factors such as soil type, geology, moisture content, topography, aspect and/or altitude are present within the Proposal Site. Associated species/vegetation type is present within the Proposal Site.

Absent: No suitable resources/landscape/vegetation type is present within the Proposal Site.

Likelihood of Occurrence

None: Species is not likely to occur.

Possible: Species could occur and proposal site may provide suitable conditions.

Present: Species was recorded during the field investigations.

Potential Impact

No: The proposal would not impact this species or its habitats.

Yes: The proposal could impact this species or its habitats and a 7 part test will be required following selection of a route.

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
FLORA					
Persoonia pauciflora	TSC CE EPBC CE	A small spreading shrub, 0.1 - 1.4 m high and 0.4 - 2.0 m wide, with bright green needle-like leaves up to 3.5 mm long and 0.8 mm wide that are moderately hairy while the plant is young. It has small yellow flowers which are borne singly between the leaf and plant stem and which produce fleshy green berries in autumn. Extremely restricted distribution; all but one of the plants which make up the only known population occur within a 2.5 km radius of the original specimen at North Rothbury in the Cessnock local government area. Within this range, there are three main sub-populations which comprise approximately 90% of the total population. The other 10% of the population occurs as scattered individuals in what is a relatively disturbed landscape.	No records in corridor	Possible but not likely	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		It is found in dry open forest or woodland dominated by Spotted Gum (*Corymbia maculata*), Broad-leaved Ironbark (E*ucalyptus fibrosa*) and/or Narrow-leaved Ironbark (*E. crebra*) and supporting a moderate to sparse shrub layer and grassy groundcover. The majority of the population is known to occur on silty sandstone soils derived from the Farley Formation. Flowers from January through to May. Its breeding system is unknown, but it is likely that native bees are required for pollination. Seedlings are present in most sub-populations which indicates that the population is capable of reproducing under favourable conditions. Its fire ecology is also unknown but, like other smooth-barked Persoonias, it is probably killed by fire. Disturbance events such as grazing, fire and slashing have impacted on both the size and age structure of the population. Plants are absent from comparable habitat that is grazed and/or frequently burnt or slashed. This species is found in the Hunter/Central Rivers catchment management authority regions.			
Eucalyptus castrensis	TSC-E	This mallee grows to 8m tall. Its bark is smooth, bronze-grey, and sheds in ribbons. The bark on the lower parts of the largest stems is thin dark grey and box-like. The juvenile leaves are blue-green, dull, disjunct-opposite, ovate to lanceolate, 60-115mm long, 15-40mm wide; with petioles (stem of the leaf) 2-12mm long. Adult leaves are glossy green, disjunct-opposite, lanceolate, acute or apiculate, 60-130mm long, 8-22mm wide; with petioles 4-15mm long. Mature buds are ovoid, 5-6mm long, 2-4mm diameter. Fruits are cup-shaped, 4-locular, 4-5mm long, 4-6mm diameter. Valves ar broadly triangular, obtuse, deeply enclosed, strongly raised and appressed against disc.	Not recorded in corridor	Unlikely, as corridor does not pass through suitable habitat	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Known only from a single dense stand near Singleton in the lower Hunter Valley. Here it is locally dominant stand over about ten hectares with a number of smaller outlying stands over a 2.5 km range. Very restricted in range, but locally dominant, occurring as a dense mallee stand over about three hectares, on a low broad ridgetop on loam over sandstone. Occurs on a low broad ridgetop on loam over sandstone. The understorey consists of grasses and scattered shrubs, with bare ground and litter. *Eucalyptus fibrosa* and *Corymbia maculata* grow adjacent to, but not within, the stand. This species is found in the Hunter/Central Rivers catchment management authority regions.			
Commersonia rosea	TSC-E	A prostrate shrub 0.1 - 0.3 m high, producing trailing branches up to 60 cm long. Branches are densely stellate-hairy (especially on young growth), becoming almost hairless and channelled on older branches. The leaves have a petiole 4-10 mm long, persistent linear stipules, 6-9 mm long and 1 mm wide, and blades that are narrowly oblong to narrowly elliptic, 24-70 mm long, 8-17 mm wide, and stellate-hairy on both surfaces. The inflorescence is a cyme of 1-3 flowers with densely stellate-hairy stalks 2-8 mm long. Flowers have 5 pink, 3-lobed petals. Fruit capsules are globe-shaped, lime-green turning pale brown with age, 10-16 mm diameter, and densely covered in 2-4 mm long bristles. Only known from four localities in the Sandy Hollow district of the upper Hunter Valley, New South Wales, all within an 8 km radius of Sandy Hollow. No populations are within a conservation reserve. *Commersonia rosea* occupies relatively small areas at its known	Not recorded in corridor	Unlikely, because of specific habitat requirements	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		sites and has a total population of less than 200 plants. Observed flowering in August, November, January and February. Occurs on skeletal sandy soils in scrub or heath vegetation with occasional emergents of *Eucalyptus crebra*, *Callitris endlicheri* or *Eucalyptus caleyi* subsp. *caleyi.* Given that fire had occurred within 6 - 12 months prior to the location of this species at three of the four sites, it may be a fire ephemeral (that is it appears after fires). This species is found in the Hunter/Central Rivers catchment management authority regions.			
Senecio linearifolius var. dangarensis	TSC-E	The many-stemmed, aromatic, perennial species, *Senecio linearifolius*, includes eight varieties and occurs in south-eastern Australia. They are weakly shrubby, to 2 metres high, glabrous or nearly so except on the lower surface of leaves, sometimes glaucous. The thin leaves are between 2-20 cm long, 1-40 mm wide. Yellow flowers appear in clusters of 20-31florets. *Senecio linearifolius* var. *dangarensis* is restricted to a single known population in the Goulburn River National Park where it has been recorded growing on an open scree slope and in woodland and rainforest communities on basalt. The population is estimated to contain 500 - 1000 individuals over an area of 20 hectares. Grows in woodlands and rainforest on basalt soils.	Not recorded in corridor	Unlikely, because of specific habitat requirements	N/A
Sida rohlenae	TSC-E	Shrub Sida grows to 1 m tall, with leaves between 1.5 - 5 cm long. Three or four yellow to orange flowers appear at the end of branches. Shrub Sida has a limited distribution in Queensland, the Northern Territory, South Australia and Western Australia. In NSW it has been recorded south of Enngonia, south of Bourke and north-west of Coonamble with one collection north of	Not recorded in corridor	Possible	Individuals could be translocated, thus reducing impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Bourke which is likely to have been transported from Queensland. Shrub Sida grows on flood-out areas, creek banks and at the base of rocky hills. NSW specimens have been found along roadsides in hard red loam to sandy-loam soils. The species can become locally abundant and is often more common in disturbed sites. Flowers appear in spring and summer. This species is found in the Central West and Western catchment management authority regions.			
Digitaria porrecta	TSC-E EPBC - E	Finger Panic Grass is a loosely tufted grass growing to 60 cm tall. Its grey leaves are 2 - 3 mm wide with sharp hairs along the middle. The flowers are clustered together along a stalk in a cylinder shape. These flower clusters, which appear during summer, spread stiffly from the flowering stem, with the lower flower clusters arranged in a whorl of four to six, each up to 30 cm long. Finger Panic Grass occurs in NSW and Queensland. In NSW it is found on the North West Slopes and Plains, from near Moree south to Tambar Springs and from Tamworth to Coonabarabran. It largely occurs on private land. In NSW, the most frequently recorded associated tree species are *Eucalyptus albens* and *Acacia pendula*. Common associated grasses and forbs in NSW sites include *Austrostipa aristiglumis*, *Enteropogon acicularis*, *Cyperus bifax*, *Hibiscus trionum* and *Neptunia gracilis*. Flowering season is summer or late summer from mid-January to late February, with seeds maturing and falling from the plant soon after. Native grassland, woodlands or open forest with a grassy	Has been recorded in areas adjacent to corridor	Possible; especially in TSRs	If grassland swards are protected and translocated, impacts could be reduced.

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		understorey, on richer soils. Often found along roadsides and travelling stock routes where there is light grazing and occasional fire. *Digitaria porrecta* is a perennial tussock-forming grass that can vegetatively reproduce. Fire, livestock grazing and trampling, and physical disturbance of habitat by road and farm machinery are types of disturbances known to occur in *Digitaria porrecta* sites. Field observations indicate that the grass does continue to persist in such habitats but the effect of the disturbances on the long term capability of the species to maintain a viable population is unknown. The total number of *Digitaria porrecta* individuals in the wild is estimated at over 200 000 plants. Plants have been recorded as occurring occasionally and frequently in populations. This species is found in the Border Rivers/Gwydir, Central West and Namoi catchment management authority regions.			
Tylophora linearis	TSC-E EPBC –E	Slender, almost hairless twiner with a clear sap. Leaves dark green, linear, 1-5 cm long, 0.5-3 mm wide. Flowers purplish, 3-6 mm in diameter, in radiating groups of 3-8. Found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes of NSW. Records include Crow Mountain near Barraba, Goonoo SF, Eura SF and Goobang NP. Also occurs in Qld, from near Glenmorgan in the western Darling Downs. Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa*, *Eucalyptus sideroxylon*, *Eucalyptus albens*, *Callitris endlicheri*, *Callitris glaucophylla* and *Allocasuarina luehmannii.* Also grows in association with *Acacia hakeoides*, *Acacia lineata*,	Has been recorded in areas adjacent to corridor	Possible, especially in TSRs	Reduce impact by avoiding clumps of woodland and shrubland

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Myoporum species and Casuarina species. Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later. Has been recorded in very low abundances. This species is found in the Border Rivers/Gwydir, Central West and Namoi catchment management authority regions.			
Desmodium campylocaulon	TSC-E	Prostrate twining herb or erect perennial forb to 1 m high, stems long and stout, covered with hooked hairs. Leaves with 3 leaflets, each lance-shaped, 2-10 cm long and 5-20 mm wide. Flowers pea-like and numerous, pink or bluish, about 6 mm long. Pod saw-like, 15-20 mm long, composed of 3-6 segments, downy when young, membranous and slightly net-veined, swollen when ripe but not splitting at maturity. Occurs chiefly in the Collarenebri and Moree districts in the north-western plains of NSW. Also occurs in the NT and Darling Downs district of south-eastern Queensland. Creeping Tick-Trefoil is confined to clay soils, usually with Astrebla and Iseilema species. In NSW Desmodium campylocaulon grows on cracking black soils in the Narrabri, Moree and Walgett local government areas. Associated species include *Acacia harpophylla*, *Astrebla pectinata* and *Sorghum*, *Dichanthium* and P*anicum* species. Flowers summer and autumn. The species is said to be hardy, but grazed where sheep have regular access. Plants are strongly stoloniferous and well-cropped by cattle. Plants are recorded as uncommon, occasional, common and frequent in populations. This species is found in the Border Rivers/Gwydir and Western catchment management authority regions.	Has been recorded in areas adjacent to corridor	Possible, especially in TSRs where protected from grazing	If grassland swards are protected and translocated, impacts could be reduced.
Pomaderris queenslandica	TSC-E	Scant *Pomaderris* is a medium-sized shrub 2 - 3m tall. The stems are whitish with tiny star-shaped hair clusters. The leaves are	Not recorded in the corridor	Possible, especially	Potentially along

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		oval to narrow elliptical, 2.5 - 7 cm long and 10 - 25 mm wide. They are shiny on the top and woolly underneath. The small creamy yellow flowers appear during spring-summer. Widely scattered but not common in north-east NSW and in Queensland. It is only known from a few locations on the New England Tablelands and North West Slopes, including near Torrington and Coolatai, and also from several locations on the NSW north coast. Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks. This species is found in the Border Rivers/Gwydir, Central West, Hunter/Central Rivers, Namoi and Northern Rivers.		along creeklines	creeklines
Monotaxis macrophylla	TSC-E	Large-leafed Monotaxis is an erect herb to 25 cm tall. Its leaves are up to 50 mm long by 15 mm wide. The flowers are small, yellow and form dense clusters on short stalks at the ends of the branches. Plants have separate male and female flowers, with a few female flowers surrounded by numerous males. Large-leaf Monotaxis is recorded from several highly disjunct populations in NSW: eastern edge of Deua NP (west of Moruya), Bemboka portion of South East Forests National Park, Cobar area (Hermitage Plains), the Tenterfield area, and Woodenbong (near the Queensland border). It is also in Queensland. A recent record from the eastern spur of the Nandewar Range is in the Naomi catchment. The distribution and supposed rarity of *Monotaxis macrophylla* within NSW is related to the occurrence of fire. At least within NSW, the species has not been found in the absence of fire. There is a great diversity in the associated vegetation within NSW (less though in Queensland), encompassing coastal heath, arid shrubland, forests and montane heath from almost sea level to 1300 m altitude.	Not recorded in corridor	Possible, although it is possible that no suitable habitat occurs within corridor	Significant if individuals destroyed

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Monotaxis macrophylla displays the properties of a fire ephemeral species in many ways. Germination is stimulated by the passage of fire, individual plants have a short life span, a large biomass is produced in a short period of time, flowering occurs shortly after germination, and populations do not persist in the absence of fire. Flowers in August. Plants have a short life span and do not seem to persist longer than six months. Plants germinate, attain heights of up to 50 cm and reach flowering stage within 2 to 3 months. In only a few months after germination, the species was observed to produce a thick sward that dominated the community, yielding a very large biomass in a short time. Many hundreds of plants have been observed growing with *Muehlenbeckia costata* on recently burnt rock outcrops. Plants are recorded as common but localised in populations. In the northern NSW sites, *Monotaxis macrophylla* was locally abundant on outcrops especially where burnt. This species is found in the Border Rivers/Gwydir, Central West, Lachlan, Namoi, Northern Rivers and Southern Rivers.			
Cyperus conicus	TSC-E	Tufted, greyish perennial sedge with short thick underground stem. Leaves somewhat rough, 3-5 mm wide. Flowerhead simple or compound with 4-10 branches to 8 cm long, comprising numerous spikelets 2.5-3 mm long and about 0.8 mm wide, pale brown tinged yellow or red-brown. Fruit a triangular black nut, about 1.8 mm long and 0.8 mm diameter. Occurs rarely in the Pilliga area of NSW and is also found in Victoria, Qld, the NT and WA. Grows in open woodland on sandy soil. In central Australia, the species grows near waterholes and on the banks of streams in sandy soils. In Qld the species usually found on heavy soils. Recorded from *Callitris* forest in the Pilliga area, growing in	Previous records in areas adjacent to corridor	Possible in creeklines	Impacts would be reduced by underboring; individuals could be translocated to reduce impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		sandy soil with *Cyperus gracilis*, C. *squarrosus* and *C. fulvus*. Interstate habitats include floodplains, creek beds and banks, swamps, run-on areas and various watercourses, near or in dams and bores, and in vegetation communities such as Melaleuca swamps, open Box woodland and sedgelands. Soils are usually sandy or silty and damp to wet. Often associated with other sedge species including *C. victoriensis*, *C. difformis, C. iria, C. compressus, C. nervulosus, C. dactylotes, Fimbristylis* and *Eleocharis* species. *Cyperus conicus* has been recorded as very rare and occasional, to common and abundant in populations. This species is found in the Border Rivers/Gwydir and Namoi catchment management authority regions.			
Lepidium monoplocoides	TSC-E	Erect annual herb or perennial forb, 15-20 cm high, with angular and striped stems roughened with small warts. Leaves narrow and linear, mostly 2-7 cm long. Flowers small, borne in elongated clusters, the petals minute or absent. Fruit a 2-celled, flattened circular pod on a spreading stalk, 5 mm long and about 4 mm wide, with pointed wings extending to a narrow notch at the tip. Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. There is a single collection from Broken Hill and only two collections since 1915, the most recent being 1950. Also previously recorded from Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarie. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by *Allocasuarina luehmannii* (Bulloak) and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or *Eucalyptus populnea* (Poplar Box). The field layer of the surrounding	No records in corridor	Possible in creeklines	Impacts would be reduced by underboring; individuals could be translocated to reduce impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising *Eragrostis australasicus, Agrostis avenacea, Austrodanthonia duttoniana, Homopholis proluta, Myriophyllum crispatum, Utricularia dichotoma* and *Pycnosorus globosus,* on waterlogged grey-brown clay. Also recorded from a *Maireana pyramidata* shrubland. Flowers from late winter to spring, or August to October. The species is highly dependent on seasonal conditions. Occurs in periodically flooded and waterlogged habitats and does not tolerate grazing disturbance. The number of plants at each site varies greatly with seasonal conditions, but sites tend to be small in area with local concentrations of the plant. Has been recorded as uncommon to locally common with hundreds of plants at sites. This species is found in the Lachlan, Lower Murray/Darling, Murray, Murrumbidgee and Western CMA areas.			
Lepidium hyssopifolium	TSC-E	Aromatic Peppercress is an erect perennial herb to 50 cm tall with variable leaves to 40 mm long by 2.5 mm wide. These may be divided, toothed or entire. Flower clusters are similar in form to that of many weedy members of this family such as Wild Mustard. Individual flowers are very small. Fruits are flattened pods to 5 mm long by 2.5 mm wide. In NSW, there is a population consisting of 6 plants near Bathurst, a population near Bungendore and Crookwell both on the Southern Tablelands. The species was also recorded near Armidale in 1945 and 1958 however it is not known whether it remains in this areas. A specimen collected in the Cooma area about 100 years ago may also be Aromatic Peppercress. The species occurs in a variety of habitats including woodland with a grassy understorey and grassland. This species is found in the Central West, Lachlan and Northern	Not recorded in corridor	Possible but unlikely	Impacts would be reduced by underboring; individuals could be translocated to reduce impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Rivers catchment management authority regions.			
Hakea pulvinifera	TSC-E EPBC-E	Lake Keepit Hakea is described as a root-suckering shrub to about 4 m high with thick tessellated bark, young branchlets softly hairy. Its leaves are 10 cm long and divided into two to nine sharply pointed, pine needle shaped segments. Each leaf segment is 2 - 4 cm long and 2 mm wide. The small yellow-white flowers are about 1 cm long and grow in pairs. Lake Keepit Hakea is confined to the North West Slopes of NSW, where it is known from a single population near Lake Keepit, north-east of Gunnedah. Associated species at the site include *Alstonia constricta* and *Acacia decora* also prevalent as shrubs. A sparse cover of grasses and forbs forms a ground layer but at least fifty percent of the site is bare earth or rock. The most common ground cover species is the introduced plant *Petrorhagia nanteuilii*. Other common species are the grasses *Themeda australis*, *Cymbopogon obtectus* and *Aristida* species. Recorded from a single population on a hard rocky hillside below a dam. The site is also recorded as being hot and dry and well drained. The altitude of the site is around 320 metres above sea level and the *Hakea pulvinifera* population is relatively well protected from wildfire due to the proximity of river and general lack of fine fuels. Flowering time is September to October. Flowering within the population is short and synchronous, lasting around 2 to 3 weeks. No fruiting has ever been recorded. Large individuals at the type locality have been speculated to be hundreds of years old. Apparently reproduces only by root suckers. It is not known whether *Hakea pulvinifera* is fire resistant (the site has not been burnt in recent years) but judging by the corky	Not recorded in corridor	Unlikely, because of specialised habitat	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		bark it may well tolerate at least low intensity burns. The total population of *Hakea pulvinifera* is recorded as being spread over an area of about a third of a hectare and comprising approx. 150 individual plants. No young seedlings were recorded but there were about 30 plants of less than one metre in height. At least two size classes within the population have been recorded, suggesting that reproduction may accompany environmental "episodes". This species is found in the Namoi catchment management authority regions.			
Zannichellia palustris	TSC-E	A submerged aquatic plant. Leaves 2-7 cm long by less than 1 mm wide. In NSW, known only from the lower Hunter. Grows in fresh or slightly saline stationary or slowly flowing water. Flowers during warmer months. NSW populations behave as annuals, dying back completely every summer. This species is found in the Hunter/Central Rivers catchment management authority regions.	Has been recorded near corridor	likely	Underboring would reduce impact
Rhizanthella slateri	TSC-V EPBC –E	An Underground Orchid with a whitish, fleshy underground stem to 15 cm long and 15 mm diameter. The flowering heads mature below the soil surface or may extend to 2 cm above the ground. Each flower head has up to 30, tubular, purplish flowers. Occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is	Possible in Hunter	Possible; Unable to detect	If grass swards are protected and translocated, it is possible that individuals of this species would survive

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		disturbed. Flowers October to November. This species is found in the Hawkesbury/Nepean, Hunter/Central Rivers and Southern Rivers catchment management authority regions.			
Prostanthera cineolifera	TSC-V EPBC-V	Erect shrub, 1 - 4 m high, strongly aromatic; branches moderately to densely covered with short, curled hairs and more or less sessile glands. Leaves more or less narrow-ovate, 12 - 50 mm long, 4 - 12 mm wide; apex obtuse; base cuneate to obtuse; margins entire; surfaces light green, mostly hairless, sparsely to densely hairy on midrib on lower surface, densely glandular with more or less sessile glands. Flowers clustered at the ends of branches; bracteoles not persistent, 1 - 2 mm long. Sepals 3 - 4 mm long; tube 2 - 2.5 mm long; upper lobe 1 - 2 mm long, not enlarged in fruit. Petals 8 - 11 mm long, pale mauve to dark purple-mauve, darker in throat. The taxonomic status of this species is uncertain. Restricted to only a few localities near Walcha, Scone and St Albans. Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands. Fire response is unknown, but other *Prostantheras* are fire sensitive, with recruitment occurring from the soil seed bank following a fire. Life span is unknown but is expected to be in the vicinity of 10-20 years while the estimated minimum time to produce seed is approximately 3-4 years. This species is found in Hawkesbury/Nepean, Hunter/Central Rivers and Northern Rivers catchment management authority regions	Recorded near corridor	Possible, although areas where this species may occur are generally grazed	Significant local impact if individuals are destroyed
Pomaderris bodalla	TSC-V	Bodalla *Pomaderris* is a shrub between 2 and 4 metres high. The young stems have spreading rusty simple hairs and dense greyish stellate hairs. The leaves are elliptic, broad-elliptic, broad-obovate to + rhombic, mostly 2-3 cm long and 12-15 mm	Recorded in areas near corridor	Unlikely, as there is not suitable habitat in corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		wide. The upper leaf surface is dark green and glabrous and the lower surface has sparse spreading rusty hairs above short greyish stellate hairs. The flowers are cream and display in loose, irregular clusters. Bodalla Pomaderris is endemic to NSW and is currently known to occur on the south coast between Bodalla and Merimbula, and in the upper Hunter Valley near Muswellbrook. There are ten populations of Bodalla Pomaderris currently known, and a further two imprecisely described locations from which the species was collected approximately 40 years ago. The majority of populations are small with seven of the populations having estimates of less than a hundred plants each. All populations have locally restricted distributions. The largest known population is in Wollemi National Park and is unlikely to include more than one thousand plants. Bodalla Pomaderris is in the conservation reserves of Kooraban National Park on the south coast, and in Wollemi National Park and Wingen Maid Nature Reserve in the north of its range. Other populations on the south coast are located in State Forests and on private land. On the south coast *Pomaderris bodalla* occurs in moist open forest along sheltered gullies or along stream banks. In the upper Hunter valley, it occurs in open forest or woodland on open slopes. This species is found in the Hunter/Central Rivers and Southern Rivers catchment management authority regions.			
Philotheca ericifolia	TSC-V EPBC-V	Much-branched and wide spreading shrub, 1-2 m high, with sparsely warty branchlets. Leaves needle-like, 4-8 mm long and about 0.5 mm wide, sparsely warty and narrow-grooved above. Flowers 1-6 in stalkless clusters, petals about 9 mm long, possibly pink, glandular warty. Fruit composed of 5 small fruitlets, each about 5 mm long and abruptly narrowed into a beak. Known only from the upper Hunter Valley and Pilliga to Peak Hill	Recorded near corridor	possible	Conserved in several conservation areas; the loss of several individuals would not result in a

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		districts of NSW. The records are scattered over a range of over 400 km between West Wyalong and the Pilliga Scrub. Site localities include Pilliga East State Forest, Goonoo State Forest, Hervey Range, Wingen Maid Nature Reserve, Toongi, Denman, Rylestone district and Kandos Weir. Grows chiefly in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops. Associated species include *Melaleuca uncinata, Eucalyptus crebra, E. rossii, E. punctata, Corymbia trachyphloia, Acacia triptera, A. burrowii, Beyeria viscosa, Philotheca australis, Leucopogon muticus* and *Calytrix tetragona*. Flowering time is in the spring. Fruits are produced from November to December. Noted as being a "moisture-loving plant", with plants common on the sides of a particular spur of the Hervey Ranges where soakage from the high background provides sufficient moisture for the plants. Also recorded growing in a recently burnt site (wildfire) and within a regeneration zone resulting from clearing. Populations comprise from 3-12 adult plants to approx. 200 plants (mostly seedlings in one population). Also described as uncommon, scattered, common, locally occasional and locally frequent. Populations in Pilliga State Forest consist of hundreds or thousands of individuals. A very large population occurs in Lincoln State Forest near Gilgandra. This species is found in the Central West, Hawkesbury/Nepean, Hunter/Central Rivers, Lachlan and Namoi catchment management authority regions.			significant impact
Dichanthium setosum	TSC-V EPBC-V	Bluegrass is an upright grass less than 1 m tall. It has mostly hairless leaves about 2-3 mm wide. The flowers are densely hairy and are clustered together along a stalk in a cylinder-shape. The flower-clusters grow in pairs at the end of an 8 cm-long stem and appear mostly during summer.	Recorded near corridor	Possible, in areas of grassland	Impact would be reduced if grass swards are protected and

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, as well as in Queensland and Western Australia. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas. Associated with heavy basaltic black soils. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. (Often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched). It is open to question whether the species tolerates or is promoted by a certain amount of disturbance, or whether this is indicative of the threatening processes behind its depleted habitat. Flowering time is mostly in summer. Associated species include *Eucalyptus albens, Eucalyptus melanophloia, Eucalyptus melliodora, Eucalyptus viminalis, Myoporum debile, Aristida ramosa, Themeda triandra, Poa sieberiana, Bothriochloa ambigua, Medicago minima, Leptorhynchos squamatus, Lomandra aff. longifolia, Ajuga australis, Calotis hispidula* and *Austrodanthonia, Dichopogon, Brachyscome, Vittadinia, Wahlenbergia* and *Psoralea* species. Locally common or found as scattered clumps in populations. This species is found in the Border Rivers/Gwydir, Central West, Namoi and Northern Rivers catchment management authority regions.			translocated
Diuris tricolor	TSC-V EPBC-V	The Pine Donkey Orchid (formerly known as *Diuris sheaffiana*) is a terrestrial species (it grows from the ground rather than from rocks or vegetation). It has between one and three leaves, to 30 centimetres long and 4mm wide. The flower stalk is between 20-40cm high and has 2-6 flowers, which are bright yellow to orange, speckled with red to purple and white markings. The sepals (the down-pointing slender green segments) are very long	Recorded near corridor	Likely, although difficult to detect out of flowering season (Spring)	If grass swards are protected and translocated, it is possible that individuals of this species

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		and often crossed. Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the far north of NSW. Localities include the Condobolin-Nymagee road, Wattamondara towards Cowra, Cooyal, Adelong, Red Hill north of Narrandera, Coolamon, near Darlington Point, Eugowra, Girilambone, Dubbo, Muswellbrook, and several sites west of Wagga Wagga. Disturbance regimes are not known, although the species is usually recorded from disturbed habitats. Associated species include *Callitris glaucophylla*, *Eucalyptus populnea, Eucalyptus intertexta,* Ironbark and *Acacia shrubland*. The understorey is often grassy with herbaceous plants such as Bulbine species. Flowers from September to November or generally spring. The species is a tuberous, deciduous terrestrial orchid and the flowers have a pleasant, light sweet scent. The Pine Donkey Orchid grows in sclerophyll forest among grass, often with native Cypress Pine (*Callitris* spp.). It is found in sandy soils, either on flats or small rises. Also recorded from a red earth soil in a Bimble Box community in western NSW. Usually recorded as common and locally frequent in populations, however only one or two plants have also been observed at sites. The species has been noted as growing in large colonies. This species is found in the Central West, Hawkesbury/Nepean, Hunter/Central Rivers, Lachlan, Murrumbidgee, Western and Namoi catchment management authority regions.			would survive
Goodenia macbarronii	TSC-V	Narrow Goodenia is an annual or short-lived perennial herb to 30 cm tall. Its leaves, at the base of the plant, are fleshy and slightly toothed, to 11 cm long by 5 mm wide. The sprays of small yellow 'crinkly' five-petalled flowers are generally produced in spring and summer.	Recorded in areas near corridor	possible	Impacts as a result of loss of individuals may not be significant

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Narrow Goodenia grows on the western slopes of the Great Dividing Range in NSW, south from the Guyra and Inverell districts. It is widely distributed throughout the tablelands, western slopes and western plains. The species also occurs in north-eastern Victoria and the Darling Downs in Queensland. In NSW it has been recorded at Tingha, Guyra, the Warrumbungle Ranges, east of Rylstone, the Pilliga and Denobollie State Forests, the Narrabri, Coonabarabran, Torrington and Tocumwal districts, Grenfell, Weddin Mountain, Gungal, the Milthorpe district, and Holbrook (the Type locality). Flowers chiefly from October to March and is described as a short-lived annual herb. The flowers are insect pollinated. Narrow Goodenia is an annual which appears seasonally and opportunistically in ephemerally damp or wet sitesand is often common at sites after good winter-rainfall periods. It favours moist, shaded, sandy sites, soils with impeded drainage, damp muddy areas of winter inundation, spring-fed paddocks and open areas where water is more available. Often found in sites with some form of recent disturbance, such as depressions and clearings made by grading and excavation along roadsides, open grazing land and paddocks inundated by weed species and areas previously cleared and grazed by cattle. Associated species at Goobang National Park sites include *Eucalyptus blakelyi, Eucalyptus sideroxylon, Eucalyptus bridgesiana, Eucalyptus melliodora, Acacia vestita, Acacia deanei subsp. paucijuga, Acacia penninervis, Acacia mollifolia, Acacia implexa, Callitris endlicheri, Leptospermum divaricatum, Exocarpos strictus, Allocasuarina diminuta subsp. diminuta, Pultenaea foliosa, Hibbertia obtusifolia, Hibbertia riparia, Baeckea cunninghamii and Lomandra longifolia.* Found to be uncommon and scattered within localised populations recorded in Goobang National Park. The species has been recorded as rare, scattered, locally common and frequent in populations, with the yellow-flowering plants forming a closed			because of numbers and distribution

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		carpet in one population. This species is found in the Border Rivers/Gwydir, Central West, Hunter/Central Rivers, Lachlan, Murray, Namoi and Western catchment management authority regions. This species was recently removed from the EPBC Act list and there is a proposal for it to be removed from the TSC Atc.			
Swainsona murrayana	TSC-V EPBC-V	A sparsely-downy forb with greyish, thin or tapered, stiffly leathery pods. The pea-like flowers are pink or purple with red stripes on densely and darkly hairy slender stalks. It is distinguished by the strongly twisted hypanthium and keel with retracted tip. Found throughout NSW , it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. Plants produce winter-spring growth, flower in spring to early summer and then die back after flowering. They re-shoot readily and often carpet the landscape after good cool-season rains. The species may require some disturbance and has been known to occur in paddocks that have been moderately grazed or occasionally cultivated. This species is found in the Border Rivers/Gwydir, Central West, Hunter/Central Rivers, Lachlan, Murray, Namoi and Western	Recorded in areas near corridor	possible	May be significant local impact of individuals are destroyed

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		catchment management authority regions.			
Thesium australe	TSC-V EPBC-V	Austral Toadflax is a small, straggling herb to 40 cm tall. Leaves are pale green to yellow-green, somewhat succulent, 1 - 4 cm long and 0.5 - 1.5 mm wide. Flowers are minute and white, emerging where the leaves meet the stems and appearing in spring. The fruit is small and nut-like, developing in summer. This species is often hidden amongst grasses and herbs. Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Often found in damp sites in association with Kangaroo Grass (*Themeda australis*). A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass. This species is found in the Border Rivers/Gwydir, Hunter/Central, Rivers Murray, Murrumbidgee, Namoi, Northern Rivers and Southern Rivers catchment management authority regions.	Recorded in areas near corridor	Possible, but difficult to detect	Has been recorded in large numbers recently; Impact could be reduced if swards of Kangaroo grass are protected and relocated
Pterostylis cobarensis	TSC-V EPBC-V	Terrestrial orchid with 7-11, narrow-elliptic leaves forming a basal rosette, each 1.5-2.5 cm long and 5-8 mm wide. Flowers 3-8 on stems to 40 cm high, with 3-5 closely sheathing stem leaves. The flowers are transparent with brown and green markings, each flower about 1.2 cm long. Known chiefly from the Nyngan-Cobar-Bourke district in the far western plains of New South Wales. Recorded districts include Narrabri, Nyngan, Cobar, Nymagee, Mt Gundabooka, Mt Grenfel and Mutawintji National Park. There are also records from the Darling Downs district of Queensland. Habitats are eucalypt woodlands, open mallee or Callitris	Not recorded in corridor	Unlikely and difficult to detect	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		shrublands on low stony ridges and slopes in skeletal sandy-loam soils. Associated species include *Eucalyptus morrisii, E. viridis, E. intertexta, E. vicina, Callitris glaucophylla, Geijera parviflora, Casuarina cristata, Acacia doratoxylon, Senna spp*. and E*remophila* spp. Flowers from September to November. Vegetative reproduction is not common in this group of Greenhoods, but some species may form more than one dropper annually. Plants are deciduous and die back to the large, underground tubers after seed release. New rosettes are produced following soaking autumn and winter rains. Pollinated by the males of small gnats which are attracted to the flower by some pseudosexual perfume. The group includes some of the most drought tolerant orchids in Australia. Survival strategies include the large tuberoids which store moisture, the overlapping rosette leaves which trap moisture and direct it to the root zone, and the tendency to grow in sites of litter accumulation and near rocks where run-off is concentrated. *Pterostylis cobarensis* occurs as frequent to abundant plants sometimes occasional) in usually very localised populations. This species is found in the Central West, Namoi and Western following catchment management authority regions.			
Rulingia procumbens	TSC-V	Prostrate shrub with slender trailing stems to 30 cm long. Plants covered with star-shaped hairs on all parts. Leaves rounded to lance-shaped, 2-5 cm long, 15-25 mm wide, with wavy or lobed margins, upper surface green and sprinkled with star-shaped hairs, lower surface densely white-hairy. Petals about 2 mm long, pinkish. Fruit capsule 6-8 mm in diameter, covered with both star-shaped hairs and bristles. Endemic to NSW, mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas.	Not recorded in corridor	Unlikely, no examples of preferred habitat occur within corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Recent collections made from the Upper Hunter region, and four additional populations found in Goonoo SF. Grows in sandy sites, often along roadsides. Recorded in *Eucalyptus dealbata* and *Eucalyptus sideroxylon* communities, *Melaleuca uncinata* scrub, under mallee eucalypts with a *Calytrix tetragona* understorey, and in a recently burnt Ironbark and Callitris area. Also in *Eucalyptus fibrosa subsp. nubila, Eucalyptus dealbata, Eucalyptus albens* and *Callitris glaucophylla* woodlands north of Dubbo. Other associated species include *Acacia triptera, Callitris endlicheri, Eucalyptus melliodora, Allocasuarina diminuta, Philotheca salsolifolia, Xanthorrhoea species, Exocarpos cupressiformis, Leptospermum parvifolium and Kunzea parvifolia.* Fruiting period is summer to autumn. Flowers from August to December. Appears to produce seed which persists for some time in the seed bank. Large numbers of seedlings have been observed germinating after fire at sites where the species was not apparent above ground before the fires. Clusters of individuals may be clonal. The species is often found as a pioneer species of disturbed habitats. It has been recorded colonising disturbed areas such as roadsides, the edges of quarries and gravel stockpiles and a recently cleared easement under power lines. Has been recorded in populations of 50+ individuals of various ages, 28 plants on the western side of the road and 58 plants on the sunnier eastern side. Populations may comprise a single cohort of individuals, or have a multi-aged structure where some individuals appear to be old with thickened runners. This species is found in the Border Rivers/Gwydir, Central West, Hunter/Central Rivers, Namoi and Western catchment management authority regions.			

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
Bertya sp. A	TSC-V EPBC V	Coolabah Bertya is a slender shrub to 4 m tall. It may be multi-stemmed or have a single trunk up to 70 - 90 mm in width. The branches and stems are densely covered with whitish to brown intertwined hairs. The thick leaves are smooth and dark green above and covered in velvety hairs below and are mostly arranged in pairs along the stems. The leaves measure 10 - 80 mm long by 5 - 25 mm wide and the margins are curved under. The yellow-brown flowers appear during July and August and are followed by rounded seed capsules 8 - 9 mm long which contain two to three seeds. This species has currently undergone taxonomic review and the coastal populations (Barool National Park and Kangaroo River State Forest) have been identified as a separate species to the inland populations (Cobar-Coolabah and Jacks Creek State Forest). This plant is currently known from only four scattered sites in NSW: the Cobar-Coolabah area in western NSW, Jacks Creek State Forest near Narrabri on the North West Slopes, Barool National Park on the eastern edge of the New England Tablelands, and Kangaroo River State Forest near Grafton on the north coast. Flowering time for the western populations is July and August, although seed formation can commence as early as July, especially in Jacks Creek State Forest. The coastal populations flower slightly later and are still in seed-set around January and February. The disturbance agents of fire and mechanical disturbance appear to trigger germination and/or suckering in Coolabah Bertya. The most appropriate time interval between disturbance events is not known. Coolabah Bertya occurs in a range of habitats ranging from stony mallee ridges and cypress pine forest on red soils in the west, to coastal cliff edges in open eucalypt forest in the east. The wide	Not recorded in corridor	Unlikely, no examples of preferred habitat occur within corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		variation in habitat type between the populations makes the identification of critical habitat very difficult. Consideration of disturbance regimes and grazing management are probably more important to the survival of populations in the long term. Associated species at Jacks Creek State Forest include *Eucalyptus chloroclada*, *Callitris glaucophylla* and *Eucalyptus fibrosa.* The Gibraltar Range habitat is recorded as a ridge crest immediately above the cliff, with *Eucalyptus campanulata, Eucalyptus notabilis* and *Allocasuarina littoralis* woodland. Each population of Coolabah Bertya has a slightly different age structure, ranging from senescent to a similar number of juveniles and adults. This species is found in the Namoi, Northern Rivers and Western catchment management authority regions.			
Cadellia pentastylis	TSC-V EPBC-V	Ooline is a medium-sized spreading tree usually about 10 m tall, and rarely to 25 m. It is very slow-growing. The glossy green leaves are 2 - 4 cm long and 15 - 20 mm wide, with broadly rounded tips. The upper sides of the leaves are darker and glossier than the undersides. The white flowers are small and usually single. Each flower produces a cluster of up to five rounded, brown berries, 3 - 5 mm wide. *Cadellia pentastylis* is of considerable biogeographic interest as it is a relic of an extensive rainforest vegetation that covered much of Australia in the past. Occurs along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield. Also occurs in Queensland. The natural range of Ooline is from 24ºS to 30ºS in the 500 to 750 mm per annum rainfall belt. Forms a closed or open canopy mixing with eucalypt and cypress pine species. There appears to be a strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth.	Individuals occur near corridor	Possible in several locations to east of Gunnedah	Significant local impact if individuals are destroyed; trees and shrubs should be avoided

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Has the capacity to resprout from rootstock and coppice vigorously from stumps, a feature which may be critical for the species survival in a fire-prone environment. Populations display a variety of age classes including large mature trees, suckering regrowth and seedlings. The total area occupied by Ooline is only about 1200 hectares, with remaining populations in NSW still threatened to various degrees by clearing for agriculture and grazing pressures. Appears to flower spasmodically, during a general flowering period of October to January. Dispersal of fruit and seed is probably by "passive fall" or by birds. Seeds showed a high rate of infertility at all sites, although they have been successfully germinated and established after heat application. This species is found in the Border Rivers/Gwydir and Namoi following catchment management authority regions.			
Rutidosis heterogama	TSC-V EPBC -V	Heath Wrinklewort is in the daisy family, in a group sometimes called wrinkleworts. It is a small perennial herb to 30 cm tall, with a woody base bearing sparse upright, or sometimes horizontal, branches with upright shoots at the end. The stalkless leaves are very narrow, up to 3.5 cm long, with a rough feel and curved-back edges. The bright yellow daisy heads are up to 2 cm wide. There are six to eight rows of shiny and translucent golden-tawny scales on the lower part of the flower head. Scattered coastal locations between Wyong and Evans Head, and on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes. Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides. This species is found in the Border Rivers/Gwydir,	Not recorded in corridor	unlikely	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Hunter/Central Rivers and Northern Rivers catchment management authority regions.			
Angophora inopina	TSC-V EPBC –V	A small to large tree, up to 8 m high, often multi-stemmed, and with persistent shortly fibrous bark throughout. Adult leaves are moderately glossy, leathery and opposite, 4 – 11 cm long. Inflorescences (groups of buds, flowers or fruits) are compound and terminal; the stalk of each group is bristly. Fruits are also bristly, vaguely ribbed, cup- or pear-shaped, usually 3-celled, 11 – 15 mm long, and 9 – 2 mm in diameter. Endemic to the Central Coast region of NSW. The known northern limit is near Karuah where a disjunct population occurs; to the south populations extend from Toronto to Charmhaven with the main population occurring between Charmhaven and Morisset. There is an unconfirmed record of the species near Bulahdelah. Approximately 1250 ha of occupied habitat has been mapped in the Wyong–southern Lake Macquarie area. This species is a member of the *A. bakeri* complex, which also includes *A. crassifolia, A. paludosa and A. exul*. It is most similar to *A. crassifolia* from which it is distinguished by the broader leaves with shorter petioles. None of these related species are known from the same area as *A. inopina*, although *A. bakeri* does occur sporadically in the ranges to the west, and near Kurri Kurri. Occurs most frequently in four main vegetation communities: (i) *Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest; (ii) *Hakea teretifolia–Banksia oblongifolia* wet heath; (iii) *Eucalyptus resinifera–Melaleuca sieberi–Angophora inopina* sedge woodland; (iv) *Eucalyptus capitellata–Corymbia gummifera–Angophora inopina* woodland/forest. Ecological knowledge about this species is limited. Is lignotuberous, allowing vegetative growth to occur following disturbance. However, such vegetative reproduction may	Not recorded in corridor	Unlikely, corridor does not pass through suitable habitat	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		suppress the production of fruits/seeds, necessary for the recruitment of new individuals to a population, and the time between such disturbance and the onset of sexual reproduction is not known. Flowering appears to take place principally between mid-December and mid-January, but is generally poor and sporadic. Preliminary experiments indicate that neither pollination or seed viability are limiting factors in the life cycle. This species is found in the Hunter/Central Rivers catchment management authority regions.			
Cryptostylis hunteriana	TSC-V EPBC-V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*). Little is known about the ecology of the species; being leafless it is expected to have limited photosynthetic capability and probably depends upon a fungal associate to meet its nutritional requirements from either living or dead organic material. In addition to reproducing from seed, it is also capable of vegetative reproduction and thus forms colonies which can become more or less permanent at a site.	Not recorded near corridor, although extremely cryptic and not well studied	Probably unlikely	If grassland swards are protected and translocated, impacts could be reduced.
Eucalyptus parramattensis subsp. decadens	TSC-V EPBC –V	A woodland tree, up to 15 m, but usually to about 8 – 10m in height. Bark sheds in large plates to leave a smooth, granular and mottled white or grey surface. Juvenile and adult leaves are disjunct. Juvenile leaves are narrow-lanceolate to lanceolate, dull green both sides. Adult leaves are usually lance-shaped to about 15 cm long and 2 cm wide. Inflorescences are 7–flowered.	Recorded near corridor	Possible, in area between 802 to 825	Avoid trees, to reduce impacts

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Buds are ovoid 4 – 10mm long, 4 – 6 mm in diameter with a scar present. Fruit is hemispherical or globose 4 – 9 mm long, 5 – 9 mm in diameter, with the disc flat or slightly raised, usually with four exserted valves. There are two separate meta-populations of *E. parramattensis* subsp. *decadens*. The Kurri Kurri meta-population is bordered by Cessnock—Kurri Kurri in the north and Mulbring—Abedare in the south. Large aggregations of the sub-species are located in the Tomalpin area. The Tomago Sandbeds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. In the Kurri Kurri area, *E. parramattensis subsp. decadens* is a characteristic species of 'Kurri Sand Swamp Woodland in the Sydney Basin Bioregion', an endangered ecological community under the TSC Act. In the Tomago Sandbeds area, the species is usually associated with the 'Tomago Swamp Woodland' as defined by NSW NPWS (2000). Very little is known about the biology or ecology of this species. Flowers from November to January. Propagation mechanisms are currently poorly known. Seed dispersal is likely to be effected by wind and animals. Likely to be sensitive to over-frequent fire, however there is evidence (i.e. coppicing, epicormic shoots) that the species may be tolerant of low intensity fires. The species has a canopy stored seed bank for dispersal after fire events. This species is found in the Hunter/Central Rivers catchment			

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		management authority regions.			
Melaleuca biconvexa	TSC-V EPBC –V	Biconvex Paperbark is a shrub or small tree, usually up to 10 m tall, though occasionally as high as 20 m. The bark is that of a typical paperbark. The leaves are small, to 18 mm long and 4 mm wide; each leaf has a centre-vein in a groove and the leaf blade curves upwards on either side of this centre-vein. The placement of the leaves is also distinctive, with each pair of leaves emerging at right angles from the branch. Each pair is offset at right angles to the previous pair so the branch has a squarish appearance when looked at 'end-on'. This species' white flowers are usually clustered in dense heads and the fruit is urn-shaped and 3 - 5 mm in diameter. Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Flowering occurs over just 3-4 weeks in September and October. Resprouts following fire. This species is found in the Hawkesbury/Nepean, Hunter/Central Rivers, Northern Rivers and Southern Rivers catchment management authority regions.	Not recorded in corridor	Unlikely, corridor does not pass through suitable habitat	N/A
Melaleuca groveana	TSC-V	Grove's Paperbark is a shrub or small tree from 2 – 5 m tall, rarely to 10 m, with firm fibrous-papery bark. The narrow, curved leaves are alternate, 20 – 55 mm long, 3 – 8 mm wide and have a mid vein and lateral veins. The leaves point along the stem and branchlets. The fluffy white flowers form on short spikes 2 – 3 cm long, and appear in the spring. The woody fruit is barrel-shaped with a smooth outer surface, 4 – 7 mm in diameter. Widespread, scattered populations in coastal districts north of Port Stephens to southeast Queensland. Grove's Paperbark	Not recorded in corridor	Unlikely, no suitable habitat in corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		grows in heath and shrubland, often in exposed sites, at high elevations, on rocky outcrops and cliffs. It also occurs in dry woodlands. This species is found in the Hawkesbury/Nepean, Hunter/Central Rivers and Northern Rivers following catchment management authority regions.			
Persoonia hirsuta subsp. hirsuta	TSC-V	The Hairy Geebung is best distinguished by its hairiness - long coarse hairs on flowers and branchlets and short stiff ones on the leaves. It is a spreading shrub with small leaves of variable shape. They are from 6 - 12 mm long, from oblong to narrow in shape and crowded along the stems; they are curled under at the edges. Groups of flowers grow into a leafy shoot. The tubular flowers are yellow or orange and about 1 cm long and also hairy. There are two subspecies - both are considered to be endangered. The Hairy Geebung has been recorded in the Sydney coastal area (subsp. *hirsuta* - Gosford to Berowra to Manly to Royal National Park), the Blue Mountains area (subsp. *evoluta* - Springwood, Lithgow, Putty) and the Southern Highlands (subsp. *evoluta* - Balmoral, Buxton, Yanderra and Hill Top areas). The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other *Persoonia* species are) but will regenerate from seed. This species is found in the Hawkesbury/Nepean, Hunter/Central Rivers and Sydney Metro following catchment management authority regions.	Not recorded in corridor	Unlikely, no suitable habitat in corridor	N/A
Syzygium paniculatum	TSC-V	The Magenta Lilly Pilly is a small to medium sized rainforest tree that grows to 8 m tall. The bark is flaky and the leaves are shiny, dark-green above and paler underneath. Leaves can be up to 10	Not recorded in corridor	Unlikely, no suitable habitat in corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		cm long. Plants produce white flower-clusters at the end of each branch, between November and February. The petals are small and are accompanied by prominent long stamens. The deep magenta fruits, which may be spherical or egg-shaped, mature in May, and contain a single seed. The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities. This species is found in the Hawkesbury/Nepean, Hunter/Central Rivers, Southern Rivers and Sydney Metro catchment management authority regions.			
Tetratheca glandulosa	TSC-V EPBC V	Small, spreading shrub which grows 20 - 50cm in height. Stems often become entwined among other small shrubs, sedges and grasses. Leaves are opposite 5 - 10 mm long and 1 mm wide with recurved (rolled under) margins. Leaf margins have small stiff hairs that give them a “toothed” appearance. The flower stalk and sepals (leaf-like structure at base of flower) are covered with dark-red gland-tipped hairs, which distinguishes *T. glandulosa* from other Tetratheca species. *T. glandulosa* flowers have four petals, which are dark pink, or occasionally pale pink. The flower stalk is 3 - 10 mm long and the petals are approximately 4.5 - 10.5 mm long. Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. There are approximately 150 populations of this plant ranging from Sampons Pass (Yengo NP) in the north to West Pymble (Lane Cove NP) in the south. The eastern limit is at Ingleside (Pittwater LGA) and the western limit is at East Kurrajong (Wollemi NP). There are historical collections	Not recorded in corridor	Unlikely, no suitable habitat in corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		of this species south to Manly, Willoughby and Mosman, however these populations are now extinct. The current north-south range is approximately 65km. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Benson & Howell's Sydney Sandstone Ridgetop Woodland (Map Unit 10ar). Common woodland tree species include: *Corymbia gummifera, C. eximia, Eucalyptus haemastoma, E. punctata, E. racemosa*, and/or *E. sparsifolia,* with an understorey dominated by species from the families Proteaceae, Fabaceae, and Epacridaceae. Flowers July-November however residual flowers may persist until late December. Flowering influenced by seasonal weather conditions and/or the microclimate effects (eg. exposure) of each particular site. The age of individual plants is difficult to determine and the life span of the plant is unknown. Life expectancy is approximately six to ten years, however, based on field investigations which indicate that the plant resprouts from a woody root following fire, this may be an underestimate. The breeding system for this species is poorly known. In comparison to a similar species, *Tetratheca juncea*, it is expected that this plant is unable to self-pollinate due to the physical characteristics of the plant's reproductive parts, and that a pollen vector (possibly a species of native bee) is required for			

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		successful pollination. Seedbank dynamics (fecundity, viability, dispersal, longevity, dormancy etc) for this species are poorly known. Juveniles appear to be uncommon within any given population, with the majority of plants usually consisting of resprouting adults. Resprouts from a woody root following fire, however the role fire plays in seed germination and persistence of the species is unclear. In a similar species, *Tetratheca hirsuta*, it has been shown that exposure of the seed to cold smoke and/or smoked water derived from burnt native vegetation promoted germination. Field observations following fire indicate that the plant is likely to be clonal. Tetrathecas are reported to be readily propagated by cuttings, however the long term survival of these plants is poorly known. This species is found in the Hawkesbury/Nepean, Hunter/Central Rivers and Sydney Metro catchment management authority regions.			
Tetratheca juncea	TSC-V EPBC V	A low shrub that grows in clumps of single or multiple stems. Flowers face downwards and usually have 4 petals which range from white to pink to dark purple in colour. They are borne singly or in twos along the stem. Stems are 30 to 60 cm long, usually leafless with 2 to 3 narrow wings that give them an angular appearance. Plants are usually sprawling and can be difficult to detect amongst other vegetation when not flowering. It may be readily distinguished from other Tetratheca species with which its grows by its distinct winged stem and reduced leaves. Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. Herbarium records It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also	Recorded in areas near corridor	Possible; difficult to detect when not flowering	Some local impact if individuals destroyed

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While the species has a preference for cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites and occurs on ridges, although it has also been found on upper slopes, mid-slopes and occasionally in gullies. It usually spreads via underground stems which can be up to 50 cm long. Consequently, individual plants may be difficult to identify. It also reproduces sexually but this requires insect pollination. Large populations of this species are particularly important. This species is found in the Hunter/Central Rivers catchment management authority regions.			
Velleia perfoliata	TSC-V EPBC -V	A small herb with light green, spoon-shaped leaves 10 - 12 cm long by 3 - 4 cm wide, radiating in a cluster from the base. Flower stalks are up to 50 cm and branched, secondary leaves forming around each branching in a 7 cm diameter disc-like funnel. Flowers are yellow, 12 mm in length, with five petals, two pointing up and three down. Only known from the Hawkesbury district and upper Hunter Valley. Found in shallow depressions on Hawkesbury sandstone shelves or under cliffs. Occurs on fairly shallow soils of sandy loam texture. Generally found growing on moss mats formed on the rock shelf. Flowering variable and can occur in any season, though peaking generally in spring to early summer. This species is found in the Hawkesbury/Nepean and Hunter/Central Rivers catchment management authority regions.	Recorded in region, although in specific habitat	Unlikely, corridor does not pass through suitable habitat	N/A
Melaleuca deanei	TSC-V EPBC - V	Deane's Paperbark is a shrub to 3 m high with fibrous, flaky bark. New stems are furry and white, though the mature stems are hairless. The smooth leaves are not paired. They are narrow, to 25 mm long and 6 mm wide, with pointed tips. The many white	Not recorded in corridor	Unlikely; probably out of distribution range	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		flowers form spikes to 6 cm long, on a furry stem. The five petals are less than 5 mm long; each is paired with a bundle of 17 - 28 stamens. The woody fruits are barrel-shaped, to 7 mm in diameter. Deane's Paperbark occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. The species grows in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate. This species is found in the Hawkesbury/Nepean, Southern Rivers and Sydney Metro following catchment management authority regions.			
Bothriochloa biloba	EPBC - V	*Bothriochloa biloba*, a perennial grass, was included on Schedule 2 of the Threatened Species Conservation Act when it came into effect on January 1 1996. *Bothriochloa biloba* occurs in a variety of grassland and woodland associations. The species has a broad distribution in northern New South Wales, but most records have been from the northern portions of the Brigalow Belt South and Nandewar bioregions. The majority of confirmed herbarium specimens of *Bothriochloa biloba* have come from roadsides and travelling stock routes. Recent targeted surveys and intensive flora surveys within the known range of the species have located many more occurrences, including areas away from roadsides (e.g. paddocks and travelling stock reserves) (Bean 1999, Hunter and Earl 1999, Earl and Kahn 2001, Austen 2002, NSW National Parks & Wildlife Service 2002). The abundance and distribution of the species now appears to be greater than is indicated by previous records.	Recorded in areas near corridor	Possible	Possibly occurs in adequate numbers; local impact may not be significant; protect and translocate grass swards to reduce impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		A number of records of *Bothriochloa biloba* are also known from stands of the Endangered Ecological Community 'White Box Yellow Box Blakely's Red Gum Woodland' (Earl and Kahn 2001, Austen 2002). There are conflicting views on the response of *B. biloba* to grazing. At some sites the species appears to tolerate some grazing (Bean 1999; Earl and Kahn 2001) and it may persist in areas that are regularly slashed and mowed (Bean 1999; S. Lewer, pers. comm.). Indeed, in areas without grazing, other perennial grasses (such as *Aristida ramosa*) may competitively exclude *Bothriochloa biloba* (Bean 1999). However, the species appears to be more prevalent in areas that are conservatively grazed e.g. on roadsides and travelling stock routes (W. Hawes, pers. comm.; A. Eade, pers. comm.) or rotationally grazed (B. McGufficke, pers. comm.), which suggests that overstocking may act to the detriment of the *Bothriochloa biloba* shows a preference for heavier textured soils (Bean 1999), which are favoured for clearing and conversion to cultivation. There is evidence that *Bothriochloa biloba* may successfully recolonise cultivated areas provided the period of cultivation was no greater than four to five years, but the success of recolonisation by the species after longer periods of cultivation is believed to be low (Earl and Kahn 2001).			
Homopholis belsonii	EPBC - V	Perennial grass to 0.5 m high. Leaves with ligule 0.8-1.5 mm long; blade 2-4.5 mm wide, glabrous though sometimes ciliate at the base. Inflorescence not fully exserted, common axis 8-15 cm long; primary branches 8-15 cm long, with hairy axils. Spikelets 2 or 3 on a typical lowermost branch, laterally compressed, 4.8-8 mm long. Lower glume equal to the spikelet, 7-nerved, glabrous, with a pronounced rachilla above; upper 4.5-6 mm long, sparsely hairy. Lower lemma 4.2-5.5 mm long, 7-nerved, glabrous to shortly hairy, sterile, palea reduced or absent. Upper lemma ca 65% the length of the spikelet, 5-7-nerved, the margins	Recorded in areas near corridor	Possible	protect and translocate grass swards to reduce impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		membranous. North from the Warialda district and into Queensland. Grows in dry woodland (eg. Belah) on poor soils. Habitat and ecology appear to be poorly known This species is found in the Border Rivers/Gwydir catchment management authority regions.			
Diuris tricolor, the Pine Donkey orchid population in the Muswellbrook LGA	TSC - EP	The Muswellbrook local government area (LGA) population of Diuris tricolour comprises the large-flowered form of the species. The population of Diuris tricolour in the Muswellbrook LGA, in the Hunter Valley, comprises a number of occurrences, ranging from a few scattered individuals to a few thousand individuals. The area of occupancy of the population is less than 50 km2. Therefore, the geographic distribution of the population is estimated to be highly restricted. The population of Diuris tricolour in the Muswellbrook LGA is at the eastern limit of the geographic range of the species. All other populations of the species are located west of the Great Dividing Range. The distance of the Muswellbrook LGA population to the nearest population of the species to the west is about 100 km. Therefore the population in the Muswellbrook LGA is disjunct and at the limits of its geographic range.	Populations recorded near corridor	Possible	Significant local impact if individuals or their habitat destroyed
Acacia pendula population in the Hunter Catchment	TSC - EP	A disjunct population of fewer than 1000 individuals that occurs in the Hunter Valley at the eastern distributional limit of the species' range. The trees are erect or spreading 5-13 m high with a pendulous habit. Their bark is hard, fissured, dark grey to black. Phyllodes are narrowly elliptic, straight to recurved, 5-14 cm long, and 4-10 mm wide with an innoculous apex. Inflorescences 2-7 headed racemes. Flowers light golden. The species occurs on the western slopes, western plains and far western plains of NSW, and south into Victoria and north into	Not recorded near corridor	unlikely	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Queensland. This Hunter population is known to occur naturally as far east as Warkworth, and extends northwest to Muswellbrook and to the west of Muswellbrook at Wybong. Only recorded to date at 6 locations: Jerrys Plains, Edderton, Wybong, Appletree Creek, Warkworth and Appletree Flat. These locations occur within the Muswellbrook and Singleton Local Government Areas, with the population potentially also occurring within the Mid-Western Regional and Upper Hunter LGA's. The stand at Jerrys Plains is part of the community known as "Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley". This is listed under Commonwealth legislation as a "Critically Endangered Ecological Community". Within the Hunter catchment the species typically occurs on heavy soils, sometimes on the margins of small floodplains, but also in more undulating locations. It is not known to occur within any conservation areas.			
Cymbidium canaliculatum R. Br. Population in the Hunter Catchment	TSC - EP	*Cymbidium canaliculatum* (family Orchidaceae) is not currently listed as an endangered species in Part 1 of Schedule 1 or as a critically endangered species in Part 1 of Schedule 1A and as a consequence populations of this species are eligible to be listed as endangered populations. *C. canaliculatum* is a large epiphytic orchid, and has the common names of Tiger Orchid (Harden 1993) and Black Orchid (Bishop 1996). *C. canaliculatum* is described in Harden, G.J. (ed) (1993) The Flora of NSW Vol. 4. UNSW Press, Sydney, page 240. *C. canaliculatum* has a scattered distribution in northern and eastern Australia from northeast NSW, through Queensland and the Northern Territory to Western Australia (Harden 1993). In NSW it occurs within dry sclerophyll forests and woodlands of tablelands and western slopes, growing in hollows of trees (Bishop 1996, Harden 1993).	Recorded near corridor	possible	Significant local impact if host trees are destroyed

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		The Hunter Catchment population of *C. canaliculatum* refers to all plants of *C. canaliculatum* occurring within the Hunter Catchment, as defined by Australia's River Basins (Geoscience Australia 1997). The Hunter Catchment includes the local government areas of Cessnock, Maitland, Dungog, Singleton, Muswellbrook, Newcastle, Port Stephens, part of Mid-western Regional, and part of Upper Hunter. The population of *C. canaliculatum* in the Hunter Catchment is at the south-eastern limit of the geographic range for this species (Peake 2005). This population is of significant conservation value because it is one of the few epiphytic orchids occurring at temperate latitudes. Within the Hunter Catchment, *C. canaliculatum* is most commonly found in *Eucalyptus albens* (white box)-dominated woodlands, usually occurring singly or as a single clump, typically between two and six metres above the ground (Peake pers. comm.). It has been found, less commonly, to grow on *E. dawsonii* (slaty box), *E. crebra* (narrow-leaved ironbark), *E. moluccana* (grey box), *Angophora floribunda* (rough-barked apple), *Acacia salicina* (cooba) (Peake pers. comm.) and on some other species. The number of plants of *C. canaliculatum* in the Hunter Catchment is currently estimated to be very low, as few as 90. There could be as many as 300 to 500 individuals in the population, assuming an average density of about one plant per 30 square kilometres of estimated habitat for *C. canaliculatum* population in the Hunter Catchment (T Peake pers. comm.). In the Hunter Catchment *C. canaliculatum* is known to occur within Wollemi and Goulburn River National Parks but it is estimated that about 90% of the population occurs on land not managed for conservation. Although it may be present in other reserves in the Hunter Catchment, recent surveys of Manobalai Nature Reserve (Peake & Bell unpubl.), Wingen Maid Nature Reserve (Hill et al. 2001), Wallabadah Nature Reserve (Peake			

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		2004) and Towarri National Park (Hill et al. 2001) did not detect any occurrences *of C. canaliculatum*. There were no records of *C. canaliculatum* in a survey of Yengo National Park (Sanders et al. 1988).			
Eucalyptus camaldulensis population in the Hunter Catchment	TSC - EP	The population of River Red Gum in the Hunter is unique in NSW being the only one to occur in a coastal catchment. It is disjunct and at the limit of range of the species, it may be genetically distinct, and is of conservation significance as the community dominant in distinct riparian and floodplain vegetation types. The Hunter population occurs from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter. Prior to European settlement, between 10,000 and 20,000 ha of habitat suitable for the River Red Gum occurred in the Hunter catchment. Today only 19 stands are known, occupying at most c. 100 ha, the largest remnant being 15 - 20 ha in extent. Smaller remnants contain only one to several trees. The total number of individuals is estimated to be between 600 - 1000 mature or semi mature trees. May occur with *Eucalyptus tereticornis, Eucalyptus melliodora, Casuarina cunninghamiana subsp. cunninghamiana* and *Angophora floribunda*. Most of the occurrences are on private land and there are no known occurrences in conservation reserves. Prior to European settlement, it is likely that the species formed extensive stands of woodland and open woodland on the major floodplains of the Hunter and Goulburn rivers, especially in areas where water impoundment occurs after flood. Since settlement, most of the floodplains have been cleared of woody vegetation. Flood mitigation works now prevent most minor floods from	Not recorded in areas near corridor	Possible, along watercourses	Significant local impact if individuals are destroyed. Avoid mature trees along watercourses

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		inundating floodplains. These flow changes, coupled with the clearing of native vegetation, have greatly reduced the extent of habitat favourable to the River Red Gum in the Hunter catchment.			
Leionema lamprophyllum subsp. obovatum population in the Hunter Catchment	TSC - EP	The Hunter Catchment population of *L lamprophyllum* subsp. *obovatum* occurs east of Maitland near Pokolbin in the Hunter Valley. The Hunter Catchment population of *L. lamprophyllum* subsp. *obovatum* occurs at the north-east limit of the geographic range for this taxon, approximately 350 km from other known occurrences of the taxon to the south-west, primarily south of Tidbinbilla Range in the Canberra area. The Hunter Catchment population of *L. lamprophyllum subsp. obovatum* refers to all plants of *L. lamprophyllum subsp. obovatum* occurring in the Hunter Catchment. *L. lamprophyllum subsp. obovatum* occurs in dry eucalypt forest on exposed rocky terrain. The Hunter Catchment population is considered to be highly genetically isolated due to the distance to the nearest recorded occurrence of this taxon, and the lack of specialised mechanisms for long distance dispersal of seed or pollen. There is currently only one known location in the Hunter Catchment where *L. lamprophyllum subsp. obovatum* is found. The total number of mature individuals of *L. lamprophyllum* subsp. *obovatum* in the Hunter Catchment population is estimated to be very low with only 4 individuals currently known. Flowers late winter to spring.	Not recorded in corridor	Possible, although suitable habitat does not occur in the corridor	Significant local impact if individuals are destroyed

TSC – CE: Threatened Species Conservation Act - Critically Endangered Species
TSC– E: Threatened Species Conservation Act - Endangered Species
TSC– V: Threatened Species Conservation Act - Vulnerable Species
TSC – EP: Threatened Species Conservation Act – Endangered Population
EPBC – V: Environment Protection and Biodiversity Conservation Act - Vulnerable Species
EPBC – E: Environment Protection and Biodiversity Conservation Act - Endangered Species

Table 2: Fauna (refer to Table 3 for aquatic species). An evaluation of the likelihood and extent of impact to threatened and migratory fauna recorded from 25km either side of the pipeline corridor. Records are from a search of the DECC, Wildlife Atlas, and the (EPBC) Environmental Reporting Tool for the Department of Environment & Water Resources.

Codes:

Presence of Habitat:

Present: Potential or known foraging, roosting, nesting, refuge, movement corridor (including movement of genetic material) or other habitat is present within the Proposal Site.

Absent: No potential foraging, roosting, nesting or other habitat is present within the Proposal Site.

Likelihood of Occurrence

None: Species is not likely to occur

Vagrant: Species could occur on occasion as a vagrant or passing over/across the Proposal Site (usually applies to more mobile species)

Possible: Species could occur and utilise resources in the Proposal Site.

Present: Species was recorded during the field investigations

Potential Impact

No: The proposal would not impact this species or its habitats.

Yes: The proposal could impact this species or its habitats. A 7-Part Test may be required for this species once a route is determined.

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
FAUNA				
WOODLAND AND FOREST BIRDS	Australian Brush-turkey Population Barking Owl Black-breasted Buzzard Black-chinned Honeyeater Brown Treecreeper (eastern subspecies) Bush-stone Curlew	Present along vegetated areas, especially in landscapes dominated by agricultural activities	Present	Numerous locations have been identified as potential movement corridors for avifauna or patches of native vegetation in a fragmented landscape. Construction activity has the potential to disrupt dispersal movements along such corridors which are often the only means of dispersal across these fragmented landscapes. For patches, these islands may provide important habitat for threatened species, considering the nature of the surrounding landscape in many circumstances. Dispersal between natal territory and other areas of habitat is made by juveniles or sub-adults in an attempt to establish new territories. This

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
	Diamond Firetail Flock Bronzewing Gang-gang cockatoo Glossy Black Cockatoo Gilberts Whistler Grey -crowned Babbler Grey Falcon Hooded Robin Masked Owl Mallee Fowl Osprey Regent Honeyeater Rose-crowned fruit-dove Sooty Owl Speckled Warbler Square-tailed Kite Superb Parrot Swift Parrot Squatter Pigeon Turquoise Parrot Wompoo Pigeon			could also significant effects on the occupancy of suitable habitat elsewhere, such as nature reserves. Patches of vegetation may provide breeding and refuge habitat. Habitat and Matrix Assessment [1]should be undertaken to determine if a movement corridor is present. Bird surveys will provide additional information to undertake a site-specific analysis on both corridors and patches in terms of bird populations and habitat quality. Possible outcomes of these works could include recommendations on the timing of the surveys, and analysis of the quality of habitat present compared with other potential corridors, and the importance of such habitat in the landscape.

[1] The dominant and most extensive (and often most modified) patch type in the landscape is often referred to as a matrix (Lindenmayer & Fischer 2006).

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
HOLLOW-DEPENDANT BIRDS	Barking Owl Brown Treecreeper (eastern subspecies) Gang-gang cockatoo Glossy Black Cockatoo Masked Owl Pink Cockatoo Red-tailed Black-Cockatoo Sooty Owl Superb Parrot Turquoise Parrot		Present	Numerous locations have been identified as potential movement corridors for avifauna or patches of native vegetation in a fragmented landscape. (see above). These areas may also contain breeding habitat for hollow-dependant species, which increases the habitat quality. Construction activity has the potential to disrupt breeding activity, with these resources likely to be limited in a fragmented landscape. Habitat and Matrix Assessment should be undertaken to determine if a movement corridor is present. Bird surveys will provide additional information to undertake a site-specific analysis on both corridors and patches in terms of bird populations and habitat quality. Possible outcomes of the survey could include recommendations on the timing of the surveys, and analysis of the quality of habitat present compared with other potential corridors, and the importance of such habitat in the landscape.
GROUND DWELLING BIRDS	Australian Brush-turkey Population Australian Bustard Bush-stone Curlew Emu populations in the NSW North Coast Bioregion and Port Stephens LGA Flock Bronzewing Grass Owl Mallee Fowl Squatter Pigeon	Present	Possible	Numerous locations have been identified as potential movement corridors for avifauna or patches of native vegetation in a fragmented landscape. Construction activity has the potential to disrupt dispersal movements along such corridors which are often the only means of dispersal across these fragmented landscapes. For patches, these islands may provide important habitat for threatened species, considering the nature of the surrounding landscape in many circumstances. Dispersal between natal territory and other areas of habitat is made by juveniles or sub-adults in an attempt to establish new territories. This could also significant effects on the occupancy of suitable habitat elsewhere, such as nature reserves. Patches of vegetation may provide breeding and refuge habitat.

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
				Habitat and Matrix Assessment should be undertaken to determine if a movement corridor is present. Bird surveys will provide additional information to undertake a site-specific analysis on both corridors and patches in terms of bird populations and habitat quality. Possible outcomes of the survey could include recommendations on the timing of the surveys, and analysis of the quality of habitat present compared with other potential corridors, and the importance of such habitat in the landscape.
WETLAND BIRDS	Australasian Bittern Black bittern Black-necked Stork Black-tailed Godwit Blue-billed Duck Broad billed Sandpiper Brolga Comb-crested Jacana Cotton Pygmy-goose Freckled Duck Great Knot Greater Sand plover Lesser Sand plover Magpie Goose Osprey Terek Sandpiper	Present	Present, Hunter Estuary Wetlands are RAMSAR listed (International Importance).	Main threats to this group would include reductions in water quality, disturbance from construction activities, chemical spills, alterations to natural flow regimes and alteration of habitat. Directional drilling of wetlands – particularly those associated with the Hunter Rover, would minimise these threats combined with management of construction activities and it is unlikely that a significant impact would occur. Where open trenching is proposed, a significant impact, particularly on RAMSAR sites, has potential to occur. Any construction by this method must be in concurrence with DECC & DEWHR.

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
BURROWING AMPHIBIANS	None			
NON-BURROWING AMPHBIANS	Green and Golden Bell Frog *Litoria aurea* Green thighed Frog *Litoria brevipalmata* Red-crowned Froglet *Pseudophryne australis* Wallum toadlet *Crinia tinnula*	GGBF - Present, Key populations around Kooragang Island and Hexham Swamp	Present, based on information within recovery plan	Green and golden bell frog Mortality from construction equipment, introduction of Chytridiomycosis (*Chytrid Fungus*) and disturbance and removal of habitat are key threats. Avoidance of impact to habitat and habitat retention is recommended. Significant impact likely through areas of key populations. Unavoidable impacts may be able to be offset by compensatory measures. Additional information must be sought on key population status, review of literature, then surveys by experienced frog personnel. Chytrid management of vehicles, machinery and staff. All other species – Potential threats to these species include destruction and degradation of wetlands as a result of the works. Reduction of water quality and modification to acidity in coastal wetlands. Chytrid management as outlined above. Directional drilling should occur in important riparian areas or wetlands. Where not possible, active fauna management within trenches such as providing wet refuge, should be undertaken, and trenches cleared daily.
SAXICOLOUS REPTILES	Border Thick-tailed Gecko *Underwoodisaurus sphyrurus* Pink-tailed Worm-lizard *Aprasia parapulchella*	Present where rock outcropping exists.	Possible	Construction of gas pipeline through rock outcrops could significantly impact on a population of these species should one be present. If avoidance of suitable habitat not possible, further investigation required by site surveys and habitat assessment.

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
FOSSORIAL REPTILES	Five-clawed Worm-Skink *Anomalopus mackayi* Dunmall's Snake *Furina dunmalli*	Present where rock outcropping exists.	Possible	Construction of gas pipeline through rock outcrops could significantly impact on a population of these species should one be present. If avoidance of suitable habitat not possible, further investigation required by site surveys and habitat assessment.
ABOREAL REPTILES	Pale-headed Snake *Hoplocephalus bitorquatus* Zig-zag gecko *Oedura rhombifer*	Present north of Gunnedah. Especially riparian areas for *H.bitorquatus.* O.rhombifer only known from 3 records in NSW, all around 150kms and 60kms east of the pipeline		Being arboreal, these species are unlikely to be significantly impacted by activities. Large trees should be retained in woodland patches. The species may forage on the ground at night and is therefore susceptible to being captured within an open trench. Morning clearance surveys of the open trench would remove this threat.
ARBOREAL MAMMALS	Brushtailed Phascogale Eastern Pygmy Possum Koala Squirrel Glider Yellow-bellied Glider	Present in woodland patches, and lineal corridors. Indicated by Atlas records	Possible	Hollow-bearing trees will be retained. However construction activity around these features may limit their usage and subsequently, their potential to contribute to the life cycle of these species. This threat can be managed by keeping construction activity to a distance from these resources wherever possible. Koala presence, and corridors of vegetation that could be used by a local population of koala, should be assessed for their habitat value with a site-specific analysis to make informed recommendations to avoid, or allow construction with caveats specifically for

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
				koala management.
TERRESTRIAL MAMMALS	Black-striped Wallaby Brush-tailed Rock-wallaby Common Planigale (CP) Delicate mouse Parma Wallaby Pilliga Mouse Red-legged Pademelon Rufous Bettong Spotted-tailed Quoll Stripe-faced Dunnart (SFD)	No habitat present for Pilliga Mouse or Delicate Mouse (only known from disjunct locations from extensive surveys/		
		SFD - Present, especially north of KP 527	Possible, especially in areas of native grassland and riparian areas	This species shelters amongst soil cracks and in grass tussocks making it difficult to survey, and easily disturbed by construction activity. SFD also are likely to have a small home range (~0.34ha to 1ha) and are considered to have a low-fecundity, all of which would make this species highly susceptible to local extinctions by stochastic events. If present, disturbance by construction could result in disruption to normal ecological activities including breeding. Habitat assessment and trapping required at potential sites.
		CP – Present around riparian areas	Possible around riparian areas. Old record from 1927 near Scone.	As with SFD, CP also would be expected to have a low fecundity and a small home range. However, the species may appear to rely more on microhabitat features such as fallen timber, rock outcrops, which could be avoided during construction. Placement of artificial habitat in appropriate areas along with the daily morning clearance of the pipeline trench, a significant impact on this species is unlikely.

Life Cycle Group	Species	Presence of habitat	Likelihood of occurrence	Potential impact
		All other species – present	Present	Remaining species would be managed by minimising corridor width through riparian areas, and daily morning clearance of open trench and escape ramps for larger animals.
INVERTEBRATES	Adams Emerald Dragonfly *Archaeophya adamsi* River Snail *Notopala sublineata*	Present	Possible, in gravely in sandy creeks and in natural and artificial water bodies	Erosion and sediment control measures and management of machinery (spills) will ensure that no impact is likely on this group.

Table 3: Aquatic Fauna. An evaluation of the likelihood and extent of impact to threatened aquatic fauna recorded from the Hunter, Namoi and Border/Gwyndir Catchment areas. Records are from a search of the DECC Bionet database, the (EPBC) Environmental Reporting Tool for the Department of Environment & Water Resources, DPI website and the relevant Catchment Management Authority (CMA) websites.

Codes:
Potential Impact

No: The proposal would not impact this species or its habitats.
Yes: The proposal could impact this species or its habitats. A 7-Part Test may be required for this species once a route is determined.

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
Lowland Darling River aquatic ecological community F - EEC	The aquatic ecological community of the lowland Darling River includes all native fish and aquatic invertebrates within all natural creeks, rivers, streams and associated lagoons, billabongs, lakes, anabranches, flow diversions to anabranches and floodplains of the Darling River within NSW. The listing includes: • the Menindee Lakes • the Barwon River • the main Barwon-Darling channel from Mungindi (Qld-NSW border) to the convergence with the Murray River • the arid zone intermittent intersection streams (Warrego, Culgoa, and Narran rivers) • the border rivers (Macintyre, Severn and Dumaresq rivers) • the regulated tributaries (Gwydir, Namoi, Macquarie, Castlereagh, and Bogan rivers). Artificial canals, water distribution and drainage works, farm dams and off-stream reservoirs are excluded from the aquatic ecological community.	NA	Border/Gwyndir Namoi	Yes	Yes

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
Notopala sublineata River snail F-E	The River snail is a freshwater snail that was once common and widespread in the Murray-Darling river system. Populations of this species have declined rapidly over the last few decades, apparently as a result of weir building and other activities associated with river flow management. They now seem to be virtually extinct throughout their natural range. In the last decade only a few dead shells (no living specimens) have been found in natural waterways, although there have been reports of some populations surviving in irrigation pipelines. The river snail once occurred in flowing rivers throughout the Murray-Darling system, where it was found along the banks attached to logs and rocks or crawling in the mud. Like other species in the family *Viviparidae*, the females brood their young to a crawl-away stage, rather than having drifting or swimming larvae. As a result they have limited dispersal abilities.	No	Border/Gwyndir	Yes	Yes May impact habitat in certain waterways depending on crossing technique.
Carcharias taurus Grey Nurse Shark F-E EPBC-CE	Grey nurse sharks are found predominantly in inshore coastal waters. They have been recorded at various depths, but are mainly found in waters between 15 and 40 m deep, and spend the majority of the time in waters less than 30 m deep. The deepest depth recorded in NSW DPI tracking of grey nurse sharks is 98 m. Grey nurse sharks gather at a number of key sites along the coast of NSW and southern Queensland. These sites have gravel or sand filled gutters, rocky reefs or caves, and are called aggregation sites. Individuals spend most of their time in proximity to aggregation sites (typically within 300–1300 m); however, this varies between individual sites. Grey nurse sharks migrate between aggregation sites. In NSW, tagged sharks have been recorded moving over 800 km between sites in relatively short periods of time, and	Yes, may swim over 800km.	Hunter/Central (3)	No, marine species	No

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
	show site fidelity by returning to the same sites in consecutive years. The species is mainly active at night, and feeds on a wide range of bony fishes, sharks and rays. Mating is believed to occur in spring, and females are likely to give birth in late winter and early spring at their aggregation sites.				
Epinephelus daemelii Black Cod F-V	Adult Black cod are usually found in caves, gutters and beneath bommies on rocky reefs. They are territorial and often occupy a particular cave for life. Small juveniles are often found in coastal rock pools, and larger juveniles around rocky shores in estuaries. They are opportunistic carnivores, eating mainly other fish and crustaceans. They can change from one colour pattern to another in just a few seconds. They are usually black in estuaries and banded around clear water reefs. Black cod are apparently slow growing. Smaller fish are mostly females, but they generally change sex to become males at around 100-110cm in length.	No	Hunter/Central (2)	No, marine species	No
Bidyanus bidyanus Silver Perch F-V	Silver perch, also known as bidyan or black or silver bream, are a moderate to large freshwater fish native to the Murray-Darling river system. Silver perch seem to prefer fast-flowing, open waters, especially where there are rapids and races. They are omnivorous, feeding on small aquatic insects, molluscs, earthworms and green algae. Males reach sexual maturity at three years of age, when around 25 cm in length, and females at five years, when around 29 cm. Adults migrate upstream in spring and summer to spawn. Juveniles also sometimes move upstream in response to rising water temperatures and levels. Females can shed 300,000 or more semi-buoyant eggs of about 2.75 mm in diameter. The eggs develop in a few days to become feeding larvae that drift downstream.	Yes. Adults migrate upstream in spring and summer to spawn. Juveniles migrate upstream in response to rising water temperatures and levels.	Hunter/Central (5) Namoi (13) Border Rivers/Gwindir (15)	Yes	Yes May impact on migrations depending on type of crossing technique and/or timing of works. May impact habitat in certain waterways depending on crossing

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
					technique.
Pristis zijsron Green sawfish F-E	Green sawfish are found all along the NSW coast and estuaries except along the south eastern corner of the State. Green sawfish live on muddy or sandy-mud soft bottom habitats in inshore areas. They also enter estuaries, where they have been found in very shallow water. They feed on slow-moving, shoaling fish such as mullet, which they stun with sideswipes of the snout. They also use their saw to sweep other prey, such as molluscs and small crustaceans, out of the sand and mud. Green sawfish probably don't reach sexual maturity until they are at least 2-3 metres in length. Like all sharks and rays, they have internal fertilisation and give birth to a limited number of live young.	Unknown	Hunter/Central (2)	No, marine/estuarine species	No
Maccullochella Macquariensis Trout cod F-E	The trout cod is a large freshwater fish endemic to inland waters of the southeastern Australian region. It was once abundant and widespread in the southern Murray-Darling river system but has undergone dramatic declines in its distributional range and abundance over the past century. The last known reproducing natural population of Trout Cod in southern NSW along the Murray River. Trout cod are often found close to cover and in relatively fast currents, especially in fairly deep water close to the bank, and often congregate around snags. They tend to remain at the one site and to have small home ranges. They are carnivores, preying mainly on other fishes as well as crustaceans and aquatic insects. Trout cod reach sexual maturity at 3-5 years, when approximately 35 cm (males) or 43 cm (females) in length, and 0.75 to 1.5 kg in weight. They form pairs and spawn during spring and early summer.	No	Namoi (1)	Yes, but not native to the Namoi Catchment and not known to reproduce in this catchment.	No

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
Ambassis agassizii Olive perchlet Western population F-E pop	Olive perchlets are a small native fish that occur in both eastern (coastal) and western (Murray-Darling) drainages, but these populations may be genetically distinct. The western population of the olive perchlet was once widespread throughout the Murray-Darling system of South Australia, Victoria, western New South Wales and southern Queensland. This population has suffered a serious decline and is now found only at a few sites in the Darling River drainage. The species is extinct in Victoria and has not been found in South Australia since 1983. Olive perchlets inhabit rivers, creeks, ponds and swamps. They are usually found in slow-flowing or still waters, often near overhanging vegetation or amongst logs, dead branches and boulders. They often congregate around suitable shelter (e.g. snags and vegetation) during the day, but disperse during the night to feed. They feed mainly on micro-crustaceans and insects, including larvae. Males and females reach sexual maturity in one year. Spawning occurs in November and December, when water temperatures reach about 23°C.	No	Border Rivers/Gwindir (1)	Yes	Yes. May impact habitat in certain waterways depending on crossing technique.
Mogurnda adspersa Purple spotted gudgeon Western population F- E pop	Purple spotted gudgeons occur in inland drainages of the Murray-Darling basin as well as coastal drainages of northern NSW and Queensland. Purple spotted gudgeons are found in slow-moving or still waters of rivers, creeks and billabongs, often amongst weeds, rocks or snags. They feed mainly on insect larvae, but also consume worms, tadpoles, small fish and some plant matter. Males reach maturity at about 4.5 cm and females at about 5 cm in length. Females can spawn several times. The adhesive eggs are deposited in a cluster on a hard surface and hatch after 3- 8 days.	No	Border Rivers/Gwindir (34)	Yes	Yes. May impact habitat in certain waterways depending on crossing technique.
Macquaria	They are found in the Murray-Darling Basin and parts of	Upstream	Border	Yes, but not	No

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
australasica Macquarie perch F - V	south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries. They are quiet, furtive fish that feed on aquatic insects, crustaceans and molluscs. Sexual maturity occurs at two years for males and three years for females. The species spawn in spring or summer in shallow upland streams or flowing parts of rivers. Females produce around 50,000-100,000 eggs which settle among stones and gravel of the stream or river bed. Macquarie perch have proven difficult to breed in captivity and a conservation stocking program does not appear to be feasible at this stage.	migration between October and November to spawn. Migration may not be necessary in stream populations.	Rivers/Gwindir (1)	native to the Catchment and not known to reproduce in the catchment.	
Prototroctes maraena Australian grayling EPBC - V	Australian grayling, also sometimes called the cucumber mullet, cucumber herring or Yarra herring, occur in streams and rivers on the eastern and southern flanks of the Great Dividing Range from Sydney southwards to the Otway Ranges in Victoria, and Tasmania. Australian grayling do not occur in the inland Murray–Darling Basin system. Australian grayling occur in freshwater streams and rivers, especially clear gravelly streams with a moderate flow, as well as estuarine areas. They occur in fast-moving shoals and are a shy fish, fleeing when disturbed. They reach sexual maturity at 1–2 years of age when approximately 150 mm in length. Spawning takes place during late summer or autumn. Females can lay up to 82 000 small (approx. 1 mm) eggs, probably in the middle reaches of rivers, where they presumably settle among the gravel of the streambed. Once hatched, the larvae swim towards the water surface where they are swept downstream to the sea. The larvae and young juveniles have a marine stage before returning to freshwater	Yes, juveniles swim back from the sea to freshwater streams during spring.	Hunter/Central	No, mostly occurs south of Sydney	No

Fish Species and Status	Ecology	Migratory	Catchment where species is known to occur (if previous records are known for a catchment these are noted in parenthesis)	Potential for occurrence within project specific waterways of catchment (migration and/or habitat potential)	Potential impact
	rivers during spring when they are about 6 months old. The rest of their life cycle is spent in freshwater. Australian grayling are opportunistic omnivores, with a mixed diet of aquatic algae and insects.				
Maccullochella peelii peelii Murray Cod EPBC - V	Murray cod, also referred to as cod or codfish, were once abundant throughout the Murray-Darling river system, but overfishing and environmental changes have drastically reduced its numbers. The species has been selectively stocked in other river systems in New South Wales, Victoria and Western Australia, but has generally failed to establish itself in those areas. Murray cod generally prefer slow flowing, turbid water in streams and rivers, favouring deeper water around boulders, undercut banks, overhanging vegetation and logs. However, Murray cod habitat can vary greatly, from quite small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin. Murray cod make strong upstream spawning migrations in late winter and spring. Migratory tendencies and distances travelled varied considerably between individual Cod, but many fish travelled 40 or 50 kilometres upstream and some travelled up to 120 kilometres upstream. Floods were important in stimulating these migrations — fish tended not to migrate if there were no floods. Interestingly, most Murray cod returned downstream to the exact same snag after spawning migrations. This remarkable homing behaviour is almost unknown in freshwater fish and emphasises the importance of snags to Murray cod.	Yes, upstream migrations during late winter/spring to spawning	Namoi Border Rivers/Gwydir	Yes	Yes. May impact on migrations depending on type of crossing technique and/or timing of works. May impact habitat in certain waterways depending on crossing technique.

F – E: Fisheries Management Act - Endangered Species
F – V: Fisheries Management Act - Vulnerable Species
F – EEC: Fisheries Management Act - Endangered Ecological Community
F – EP: Fisheries Management Act - Endangered Population
EPBC – V: Environment Protection and Biodiversity Conservation Act - Vulnerable Species
EPBC – CE: Environment Protection and Biodiversity Conservation Act - Critically Endangered Species

Table 4: Endangered Ecological Communities. An evaluation of the likelihood and extent of impact to EECs recorded 10km either side of the corridor. Records are from a search of the DECC, Wildlife Atlas and the (EPBC) Environmental Reporting Tool for the Department of Environment Water, Heritage and the Arts.

Codes:

Presence of Habitat:

Present: Potential or known suitable abiotic factors such as soil type, geology, moisture content, topography, aspect and/or altitude are present within the Proposal Site.

Absent: No suitable resources/landscape/vegetation type is present within the Proposal Site.

Likelihood of Occurrence

None: Community is not likely to occur.

Possible: Community could occur and proposal site may provide suitable conditions.

Present: Community has been recorded in the area.

Potential Impact

No: The proposal would not impact this community or its habitats.

Yes: The proposal could impact this community and a 7 part test will be required following selection of a route.

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
EEC's					
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	TSC - EEC	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low woodlands, scrubs or reedlands with scattered trees.	Present within or adjacent to Corridor, especially from Hunter estuary to Hunter River crossing	Present	There are extensive stands of this vegetation type in the region, although some stands may be fragmented or isolated by clearing for the corridor. Impact would not be

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		This community has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermagui. The understorey is characterised by frequent occurrences of vines, *Parsonsia straminea, Geitonoplesium cymosum* and *Stephania japonica* var. *discolor*, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter. The extent of the Swamp Oak Floodplain Forest prior to European settlement has not been mapped across its entire range. However, the remaining area of Swamp Oak Floodplain Forest is likely to represent much less than 30% of its original range.			significant.
Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions	TSC - EEC	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. The structure of the community is typically open forest, although partial clearing may have reduced the canopy to scattered trees. The most widespread and abundant dominant trees include *Eucalyptus robusta* (swamp mahogany), *Melaleuca quinquenervia* (paperbark) and, south from Sydney, *Eucalyptus botryoides* (bangalay) and *Eucalyptus longifolia* (woollybut). Other trees may be scattered throughout at low abundance or may be locally common at few sites, including *Callistemon salignus*	Present near Pacific Highway (813)	Present	Several small stands of this vegetation type may be fragmented or isolated as a result of clearing for the corridor. Impact will not be significant if mature trees, especially *Eucalyptus robusta* are retained.

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		(sweet willow bottlebrush), *Casuarina glauca* (swamp oak) and *Eucalyptus resinifera subsp. hemilampra* (red mahogany), *Livistona australis* (cabbage palm) and *Lophostemon suaveolens* (swamp turpentine). A layer of small trees may be present, including *Acacia irrorata* (green wattle), *Acmena smithii* (lilly pilly), *Elaeocarpus reticulatus* (blueberry ash), *Glochidion ferdinandi* (cheese tree), *Melaleuca linariifolia* and *M. styphelioides* (paperbarks). Shrubs include *Acacia longifolia*, *Dodonaea triquetra*, *Ficus coronata*, *Leptospermum polygalifolium* subsp. *polygalifolium* and *Melaleuca* spp.. Occasional vines include *Parsonsia straminea*, *Morinda jasminoides* and *Stephania japonica* var. *discolor.* The groundcover is composed of abundant sedges, ferns, forbs, and grasses including *Gahnia clarkei*, *Pteridium esculentum*, *Hypolepis muelleri*, *Calochlaena dubia*, *Dianella caerulea*, *Viola hederacea*, *Lomandra longifolia*, *Entolasia marginata* and *Imperata cylindrica*. The exact amount of its original extent is unknown but it is much less than 30%.			
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and south east corner bioregions	TSC - EEC	Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally occur below 20 m elevation on level areas. They are dominated by herbaceous plants and have very few woody species. The structure and composition of the community varies both spatially and temporally depending on the water regime. In the 1990s the extent remaining were: 3% in the NSW North Coast bioregion, 66% in the	Present, mainly in association with Hunter estuary and floodplain	Present	Possibility of significant impact; underboring is an appropriate alternative

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		lower Hunter – Central coast region, 40% on the Cumberland Plain, 70% in the Sydney – South Coast region, and 30% in the Eden region.			
Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion	TSC - EEC	Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion is the name given to the ecological community that occurs principally on Permian geology in the central to lower Hunter Valley. The Lower Hunter Spotted Gum - Ironbark Forest is dominated by *Corymbia maculata*, (Spotted Gum) and *Eucalyptus fibrosa* (Broad-leaved Ironbark), while *E. punctata* (Grey Gum) and *E. crebra* (Grey Ironbark) occur occasionally. The understorey is marked by the tall shrub, *Acacia parvipinnula*, and by the prickly shrubs, D*aviesia ulicifolia*, *Bursaria spinosa*, *Melaleuca nodosa* and *Lissanthe strigosa*. The ground layer is diverse; frequent species include *Cheilanthes sieberi*, *Cymbopogon refractus*, *Dianella revoluta*, *Entolasia stricta*, *Glycine clandestina*, *Lepidosperma laterale*, *Lomandra multiflora*, *Microlaena stipoides*, *Pomax umbellata*, *Pratia purpurascens*, *Themeda australis* and *Phyllanthus hirtellus*. In an undisturbed condition the structure of the community is typically open forest. If thinning has occurred, it may take the form of woodland or a dense thicket of saplings, depending on post-disturbance regeneration. Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion is restricted to a range of approximately 65 km by 35 km centred on the Cessnock - Beresfield area in the Central and Lower Hunter Valley (NPWS 2000). Within this range, the community was once widespread. A fragmented core of the community still occurs between Cessnock and Beresfield. Remnants occur within the Local Government Areas of Cessnock, Maitland, Singleton, Lake Macquarie, Newcastle, Port Stephens and Dungog but may also occur elsewhere	Likely	Vegetation types mapped as “Grey Box-Red Gum-Ironbark” and “Ironbark”, as well as “Hunter Spotted Gum-ironbark” need to be considered.	Stands of these Vegetation types along the floodplain mainly occur as scattered trees. Mature Ironbark, Spotted Gum or Forest Redgum should be retained where possible. Proposed Corridor would fragment a large stand of Hunter Spotted Gum-ironbark Forest to the west of Maitland, south of the New England Highway; possibly with significant impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		within the bioregion. Outliers are also present on the eastern escarpment of Pokolbin and Corrabare State Forests on Narrabeen Sandstone. The community is currently mapped as occurring in more than 4 800 fragments, of which more than 4 500 are less than 10 ha in area (House 2003). The four largest patches now cover about 7 000 ha, representing less than one-quarter of the current distribution, or about 10% of the estimated pre-European distribution (House 2003).			
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	TSC - EEC	Native Vegetation on Cracking Clay Soils of the Liverpool Plains is mainly a native grassland community which includes a range of small forb and herb species. The main grass species include Plains Grass (*Austrostipa aristiglumis*), Queensland Bluegrass (*Dichanthium sericeum*) and Coolibah Grass (*Panicum queenslandicum*). It also contains scattered and patchy shrubs and trees, including Boree (*Acacia pendula*), Rough-barked Apple (*Angophora floribunda*), Fuzzy Box (*Eucalyptus conica*), Bimble Box (*E. populnea*) and Yellow Box (*E. melliodora*). In wetter locations rushes and sedges are common. This community is located around Coonabarabran, Gunnedah, Murrurundi, Narrabri, Tamworth and Quirindi, on the North West Slopes and Plains of NSW. The vast majority of this vegetation community has been converted through agriculture and no examples are within conservation reserves. Most surviving remnants of the community are on Travelling Stock Routes. Occurs on the highly fertile cracking clay soils of the Liverpool Plains. Native Vegetation on Cracking Clay Soils of the Liverpool Plains is not known to be conserved in any area managed by the National Parks and Wildlife Service.	Likely	Components of "Liverpool Plains Grassland", as well as "Eastern Clay Grassland" need to be considered.	Clearing for the Corridor may result in loss of edges of some stands, although only one stand (533) would be fragmented. Avoid mature trees to reduce impact
Brigalow within the	TSC – EEC	The Brigalow community is a low woodland or forest	Present	Present	Proposed

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
Brigalow Belt South, Nandewar and Darling Riverine Plains bioregions Brigalow (*Acacia harpophylla* dominant and co-dominant)	EPBC- EEC	community dominated by Brigalow *Acacia harpophylla*, with pockets of Belah *Casuarina cristata* and Poplar Box *Eucalyptus populnea* subsp. *bimbil*. The canopy tends to be quite dense and the understorey and ground cover are only sparse. Scattered remnants on the North West Slopes and Plains and Darling River Plains in NSW and also in Queensland. Usually occurs on heavy clay soils. This community has been extensively cleared for agriculture, with most surviving remnants along roadsides and paddock edges. It provides important habitat for rare native wildlife such as the Black-striped Wallaby. Brigalow ecological community is poorly represented in the existing reserve system with only one reserve, "Brigalow Park Nature Reserve", of 202 hectares containing this community.			corridor extends along the margins of some stands (490, 466, 453) and would fragment one stand (460). Avoid mature trees to reduce impact
Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions Brigalow (*Acacia harpophylla* dominant and co-dominant)	TSC – EEC EPBC- EEC	This community occurs north of Bourke between the Culgoa and Warrego Rivers on soft red earths and heavy grey clays on level to slightly undulating plains. The structure of Brigalow-Gidgee ranges from woodland to shrubland and scrub depending on local conditions. The canopy is dominated by either Brigalow *Acacia harpophylla* or Gidgee *Acacia cambagei* with the other species being co-dominant or part of the shrub layer, depending on site disturbance. Recorded from parts of the local government areas of Bourke and Brewarrina, but may occur elsewhere in the Mulga Lands and Darling Riverine Plains Bioregions. The community has been extensively modified with at least 79% of the estimated original 190,000 ha cleared or thinned. Brigalow-Gidgee has not been recorded from any conservation reserves.	Possible	unlikely	N/A
Cadellia pentastylis (Ooline) community	TSC- EEC	The *Cadellia pentastylis* community is a forest community with the canopy dominated or co-	Possible	Possibility of occurrence of	Any individuals of *Cadellia*

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
in the Nandewar and Brigalow Belt South bioregions		dominated by the tree *Cadellia pentastylis* (Ooline). Other canopy species include *Eucalyptus albens*, *Eucalyptus beyeriana*, *Eucalyptus chloroclada*, *Eucalyptus melanophloia*, *Eucalyptus pilligaensis*, *Eucalyptus viridis* and *Callitris glaucophylla*. Understorey species include *Alstonia constricta*, *Beyeria viscosa*, *Carissa ovata*, *Einadia hastata*, *Geijera parviflora*, *Notelaea microcarpa* and *Aristida* and *Stipa* species. Stands of *Cadellia pentastylis* occur in northern NSW on undulating terrain on a variety of soil types, usually between 300-450 m asl. The distribution of the community falls within the Nandewar and Brigalow Belt South bioregions in the IBRA scheme. The Cadellia community also occurs in Queensland, where it has been extensively cleared. Stands of the community occur under a variety of tenures. Some areas are conserved in the Scrub Myrtle Flora Reserve, Gamilaraay Nature Reserve and under a voluntary conservation agreement.		individuals of *Cadellia pentastylis*	*pentastylis* should be retained and protected
Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	TSC - EEC	A woodland community of flora and fauna is found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The structure of the community may vary from tall riparian woodlands to very open 'savanna like' grassy woodlands with a sparse midstorey of shrubs and saplings. Typically these woodlands form mosaics with grasslands and wetlands, and are characterised by Coolibah (*Eucalyptus coolabah*) and, in some areas, Black Box (*E. largiflorens*). Other tree species may be present including River Cooba (*Acacia stenophylla*), Cooba (*A. salicina*), Belah (*Casuarina cristata*) and Eurah (*Eremophila bignoniiflora*). The community is currently known from parts of the Local Government Areas of Brewarrina, Central Darling, Cobar, Coonamble, Moree	Present	Present	Corridor would fragment some small stands, from south of Garah to Queensland Border. Mature trees should be retained and protected to reduce impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Plains, Narrabri, and Walgett but may occur elsewhere in these bioregions.			
Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions	TSC - EEC	An open forest which characterises the gentle slopes of depressions and drainage flats on the Hunter Valley floor. The most common canopy tree species are *Eucalyptus tereticornis* (Forest Red Gum) and *E. punctata* (Grey Gum). Other frequently occurring canopy species are *Angophora costata*, *Corymbia maculata*, *E. crebra* and *E. moluccana*. The mid-storey is open and characterised by sparse shrubs such as *Breynia oblongifolia*, *Leucopogon juniperinus*, *Daviesia ulicifolia* and *Jacksonia scoparia*. The ground cover typically comprises grasses and herbs. Occurs from Muswellbrook to the Lower Hunter in the Sydney Basin and North Coast bioregions. It has been recorded from the Maitland, Cessnock, Port Stephens, Muswellbrook and Singleton local government areas, but may occur elsewhere in these bioregions. Less than 500 ha or about 27% of the community remains. HLRF occurs on the Permian sediments of the Hunter Valley floor. Much of the remaining community is disturbed and fragmented. The floristic composition and structure of the community is influenced by both the size and disturbance history of the remaining fragments. Consequently at heavily disturbed sites only some of the species which characterise the community may be present.	Present	Present	Proposed corridor would affect vegetation edges in the Elderslie and Muswellbrook areas. Retain and protect all mature trees to reduce impacts
Fuzzy Box on alluvials of South West Slopes, Darling Riverine Plains & the Brigalow Belt South	TSC - EEC	Tall woodland or open forest dominated by Fuzzy Box *Eucalyptus conica*, often with Grey Box *Eucalyptus microcarpa*, Yellow Box *Eucalyptus melliodora*, or Kurrajong *Brachychiton populneus*. Buloke *Allocasuarina luehmannii* is common in places. Shrubs are generally sparse, and the groundcover moderately dense, although this will vary with season. Alluvial soils of the South West Slopes, Brigalow Belt South and	Unlikely	Proposed corridor probably does not pass through or near this vegetation type	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Darling Riverine Plains Bioregions. Mainly in the Dubbo-Narromine-Parkes-Forbes area. Community occurs on brown loam or clay, alluvial or colluvial soils on prior streams and abandoned channels or slight depressions on undulating plains or flats of the western slopes. Community often occurs upslope from River Red Gum communities above frequently inundated areas of the floodplain. It also occurs on colluvium soils on lower slopes and valley flats. Less than 5% of the original extent is estimated to remain. Shrubs include Wilga, Deane's Wattle, Hop Bush, Cassia, Water Bush and Sifton Bush.			
White Box Yellow Box Blakely's Red Gum Woodland White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	TSC – EEC EPBC- EEC	White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation) , in which the most obvious species are one or more of the following: White Box *Eucalyptus albens*, Yellow Box *E. melliodora* and Blakely's Red Gum *E. blakelyi*. Intact sites contain a high diversity of plant species, however intact stands are rare. Modified sites include the following: Areas where the main tree species are present ranging from an open woodland formation to a forest structure, and the groundlayer is predominantly composed of exotic species; and Sites where the trees have been removed and only the grassy groundlayer and some herbs remain. Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW. Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. The trees may occur as pure stands, mixtures of the three species or in mixtures with other trees, including wattles. Commonly co-occurring	Possible	These vegetation types generally occur upslope of the proposed corridor	Stands occur near Murrurundi, although they are separated from the proposed corridor by the New England Highway. Other stand around KP 641, 660, 662 and 668-669

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		eucalypts include Apple Box (*E. bridgesiana*), Red Box (*E. polyanthemos*), Candlebark (*E. rubida*), Snow Gum (*E. pauciflora*), Argyle Apple (*E. cinerea*), Brittle Gum (*E. mannifera*), Red Stringybark (*E. macrorhyncha*), Grey Box (*E. microcarpa*), Cabbage Gum (*E. amplifolia*) and others. The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (*Themeda australis*) Poa Tussock (*Poa sieberiana*), wallaby grasses (*Austrodanthonia spp.*), spear-grasses (*Austrostipa spp.*), Common Everlasting (*Chrysocephalum apiculatum*), Scrambled Eggs (*Goodenia pinnatifida*), Small St John's Wort (*Hypericum gramineum*), Narrow-leafed New Holland Daisy (*Vittadinia muelleri*) and blue-bells (*Wahlenbergia spp.*). Shrubs are generally sparse or absent, though they may be locally common. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant. Disturbed remnants are considered to form part of the community, including where the vegetation would respond to assisted natural regeneration.			
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	TSC - EEC	Inland Grey Box Woodland includes those woodlands in which the most characteristic tree species, *Eucalyptus microcarpa* (Inland Grey Box), is often found in association with *Eucalyptus populnea* subsp. *bimbil*, *Callitris glaucophylla*, *Brachychiton populneus*, *Allocasuarina luehmannii* or *Eucalyptus melliodora*, and sometimes with *Eucalyptus albens*. Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most sites. At severely disturbed sites the ground layer may be absent. The community generally	Unlikely	Stands are mapped several Km to the east of the proposed corridor, in the Quirindi area	No potential for significant impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		occurs as an open woodland 15–25 m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey. In NSW the community principally occurs within the Riverina and South West Slopes Bioregions and is also found in portions of the Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. Inland Grey Box Woodland may occur elsewhere in the nominated bioregions. Inland Grey Box Woodland occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375- 800 mm pa and the mean maximum annual temperature is 22- 26°C. There is a correlation between the distribution of *Eucalyptus microcarpa* communities and soils of Tertiary and Quaternary alluvial origin, largely corresponding with the Red Brown Earths. The majority of remnant patches of Inland Grey Box Woodland survive with trees largely intact but with the shrub or ground layers degraded to varying degrees through grazing or pasture modification. Some species that are part of the community appear intolerant to heavy grazing by domestic stock and are confined to the least disturbed remnants.			
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes bioregions	TSC - EEC	This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree	Present	Proposed corridor extends along edges of some stands and may fragment stands at 296 and 275.	Fragmentation of two stands at 275 and 296 likely to have significant local impact

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub stratum may have been reduced or eliminated by clearing or heavy grazing. This EEC is known from parts of the Local Government Areas of Berrigan, Bland, Bogan, Carrathool, Conargo, Coolamon, Coonamble, Corowa, Forbes, Gilgandra, Griffith, Gwydir, Inverell, Jerilderee, Lachlan, Leeton, Lockhart, Moree Plains, Murray, Murrumbidgee, Narrabri, Narranderra, Narromine, Parkes, Urana, Wagga Wagga and Warren, and but may occur elsewhere in these bioregions.			
Artesian Springs Ecological Community	TSC - EEC	Naturally restricted to the artesian springs of the Great Artesian Basin in north-western NSW. The springs occur where artesian water emerges at the surface through fault-lines in the overlying rock and produce mounds from the salts and sediments as the water evaporates. The vegetation within the community frequently consists of sedges or similar vegetation, however, trees and shrubs may be adjacent to the springs or nearby. Occurs at the edges of the Great Artesian Basin. Mostly found in Queensland and South Australia, however, a few occur in the Mulga Lands, Darling Riverine Plains and Cobar Peneplain Bioregions of New South Wales. Flow rates, water depth, water temperature and chemistry vary within and between springs; this provides a variety of habitat types. Vegetation structure and floristics may be influenced by grazing pressure; the persistence of some species is dependent upon grazing by native herbivores to	Unlikely	No stands mapped within proposed corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		control competitors. Though further study is required, it is thought that fire may assist in maintaining or increasing flows from the vent and may help control the dominant plant species that out compete other plant species of conservation concern (e.g., *Ericaulon carsonii*).			
Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions	TSC - EEC	This was a previously an open forest community of flora and fauna that may now exist as woodland or as remnant trees. Characteristic tree species are Carbeen (*Corymbia tessellaris*) and White Cypress-pine (*Callitris glaucophylla*). Associated trees include *Corymbia dolichocarpa, Eucalyptus populnea, E. camaldulensis, Casuarina cristata* and *Allocasuarina leuhmannii.* Found on riverine plains of the Meehi, Gwydir, MacIntyre and Barwon Rivers and in small remnants farther south. Occurs on siliceous sands, earthy sands and clayey sands. Less than 500 ha of the Carbeen Open Forest Community is found within Boomi, Boomi West and Boronga Nature Reserves.	Present	One stand occurs at 251, on edge of TSR	This stand would be fragmented by the proposed corridor; likely to have significant local impact
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	TSC - EEC	Coastal Saltmarsh occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea. It is frequently found as a zone on the landward side of mangrove stands. Characteristic plants include *Baumea juncea*, *Juncus krausii*, *Sarcocornia quinqueflora*, *Sporobolus virginicus*, *Triglochin striata*, *Isolepis nodosa*, *Samolus repens*, *Selliera radicans*, *Suaeda australis* and *Zoysia macrantha*. Occasionally mangroves are scattered through the saltmarsh. Tall reeds may also occur, as well as salt pans. This community occurs in the intertidal zone along the NSW coast. Species composition varies with elevation and latitude, with Saltmarsh in southern NSW being generally more species-rich than further north. The sediment surface may support a diversity of seaweed species. Species restricted to coastal saltmarshes include Distichlis	Unlikely	No mangrove or saltmarsh stands mapped in or near proposed corridor	If this vegetation type occurs, underboring would be an appropriate alternative.

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		distichophylla (endangered), Halosarcia pergranulata subsp. pergranulata, Wilsonia backhousei (vulnerable) and Wilsonia rotundifolia (endangered).			
Upland Wetlands of the New England Tablelands and the Monaro Plateau	EPBC- EEC	A majority of wetlands in this ecological community are on basalt-derived soils (81%). The remainder occur on soils derived primarily from granite or silcrete, with a few others on soils based on different rock types. The vegetation of the Upland Wetlands of the New England Tablelands (New England Tableland Bioregion) and the Monaro Plateau (South Eastern Highlands Bioregion) ecological community ranges from closed to mid-dense sedgeland and grasslands which occur on the shores of open water, or extend across shallow or dry wetlands. There are no shrub or tree species that occur naturally within this ecological community. The Upland Wetlands of the New England Tablelands (New England Tableland Bioregion) and the Monaro Plateau (South Eastern Highlands Bioregion) occur in the Border Rivers/Gwydir, Northern Rivers, Southern Rivers and Murrumbidgee NHT regions of New South Wales, and the Lachlan-Murrumbidgee and Namoi-Gwydir NAP regions. These wetlands have a naturally restricted distribution (3195 ha in total). The key threats to the survival of the ecological community are alteration of water regimes through draining or damming wetlands; grazing and trampling of wetlands by stock; pollution from agricultural chemicals such as fertiliser and herbicides; and, weed invasion, which is facilitated through a combination of the aforementioned threats.	Unlikely	No stands mapped, no suitable landscape forms within proposed corridor	N/A
Weeping Myall – Coobah – Scrub Wilga Shrubland of the Hunter Valley	EPBC – Critically EEC	This ecological community consists of a woodland of Weeping Myall (*Acacia pendula*) up to 10 m high with Coobah (*Acacia salicina*) and Scrub Wilga (*Geijera salicifolia*). Yarran (*Acacia omalophylla*) and Stiff Canthium (*Canthium buxifolium*) are also present in	Unlikely	Not mapped within proposed corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		the small tree/shrub layer. The ground stratum is dense and primarily grassy. Grasses include Kangaroo Grass (*Themeda triandra/australis*), Wallaby Grass (*Austrodanthonia* spp.), Snow Grass (*Poa sieberiana*) and Barbed Wire Grass (*Cymbopogon refractus*) (Benson in prep.). Some exotic grasses have also invaded the site. The ecological community occurs in a small stand on heavy, brown clay soil at Jerry's Plains in the Hunter Valley, in the South Hunter Province of the Sydney Basin Bioregion (Benson in prep.). There is one patch of two hectares of the Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley ecological community remaining. The patch contains about 200 Weeping Myall trees. The patch occurs at Jerry's Plains, including the cemetery (Benson in prep.). None of this ecological community exists in protected areas (Benson in prep.). The Weeping Myall that dominates this ecological community is disjunct from the major occurrences on the Liverpool Plains, 100 km to the west. It is probably a relic from the last ice age when the Hunter Valley would have been dominated by 'western semi-arid' flora (Benson in prep).			
Bluegrass (*Dichanthium spp.*) dominant grasslands of the Brigalow Belt Bioregions (North and South)	EPBC- EEC	Grasslands dominated by Bluegrass (*Dichanthium* spp.) occur over a broad geographic range in Queensland including the Brigalow Belt (North and South), the Desert Uplands and the Gulf Plains. However, species composition of these grasslands is strongly influenced by soil type and accordingly displays a high degree of variation across their national distribution. The species, *Dichanthium sericeum*, also occurs in New South Wales, but current information indicates that it does not dominate any grassland communities there. The ecological community Bluegrass (*Dichanthium* spp.) dominant grasslands of the Brigalow Bioregions (North and South) includes: *Dichanthium sericeum*	Present (probably)	May occur within stands mapped as “native & naturalised grasslands/chenopods”, “Moree Grassland” and “Northern Clay Plain Grassland”	Potential for significant impact if large stands are disturbed.

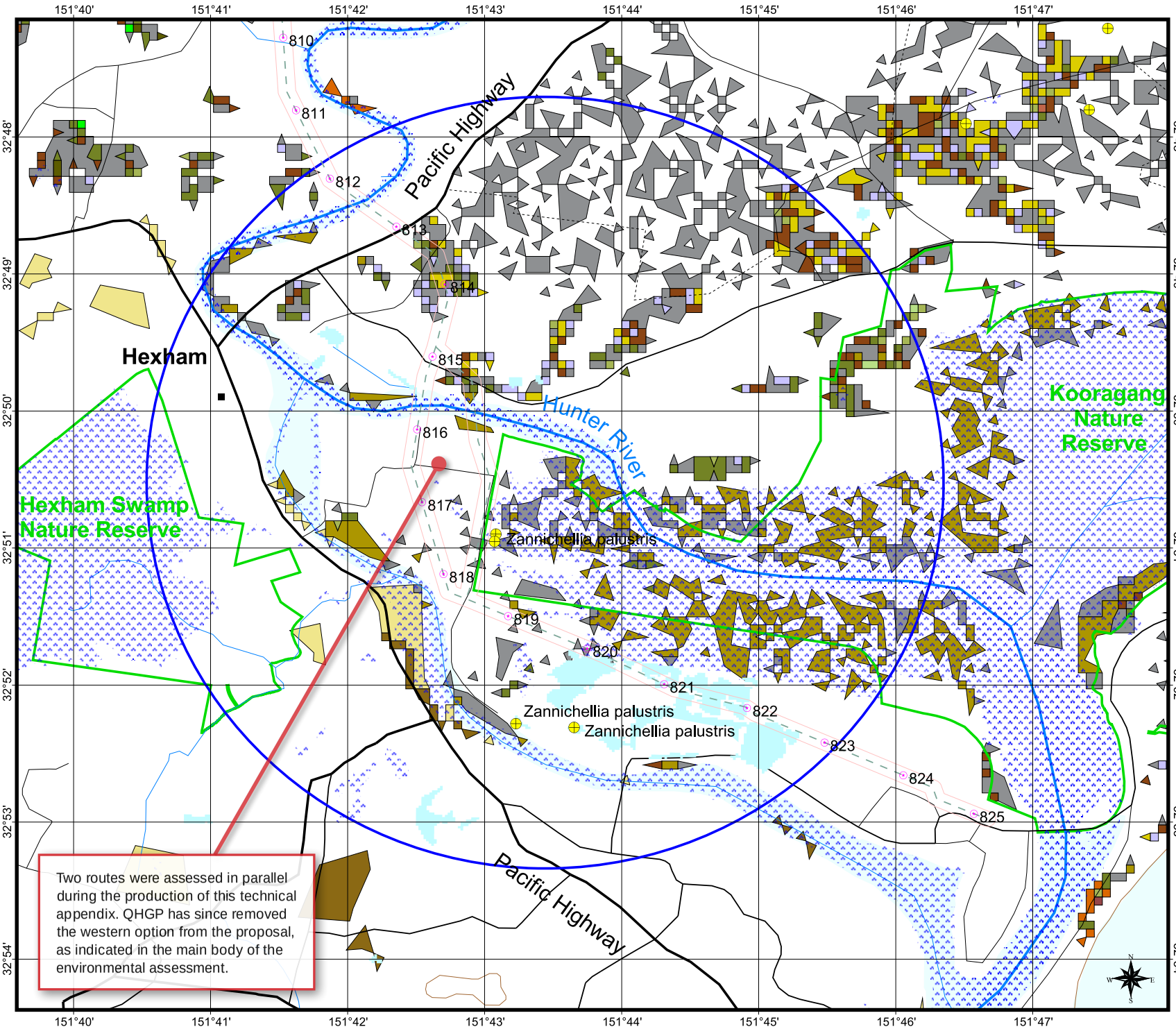
Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		grassland + emergent trees open woodland on Cainzoic igneous rocks, in particular fresh basalt; Grassland of *Dichanthium* spp., +/- *Astrebla* spp. on Cainozoic clay plains including weathered Tertiary basalt. Patches of low *Acacia harpophylla* in places; Grassland of *Dichanthium sericeum* and or *Astrebla* species on Cainzoic alluvial clay plains; and *Dichanthium sericeum* grassland with clumps of *Acacia harpophylla* on Cainozoic fine-grained sedimentary rocks.			
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	EPBC- EEC	Ecological communities dominated by buloke (also known as bull oak) are widely recognised in the scientific community to represent distinct woodland communities containing Buloke, *Allocasuarina luehmannii*, or occasionally other species, as structural dominants. Slender Cypress Pine, *Callitris gracilis*, and Grey Box, *Eucalyptus microcarpa,* are locally dominant in some occurrences of the nominated community. The nominated community occurs in southern New South Wales, Victoria and South Australia, within the boundaries of the specified bioregions, which are nationally recognised biogeographical areas. The woodlands are distributed widely across the bioregions, occurring in tracts or as patches within open forests or woodlands dominated by other species. A feature common to many areas where the woodlands occur is the presence of clayey and/or alkaline sub-soils. The nominated woodland's component communities are generally characterised as woodland or open woodland with a well developed ground stratum that is usually grassy, but also includes many subshrubs and herbs; some component communities have understoreys that are predominantly shrubby or herbaceous. Most component communities lack a well-developed tall shrub layer. Buloke is common to all component	Unlikely	No stands mapped in or near proposed corridor	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		communities, but slender cypress-pine and grey box may be structurally dominant in some. The composition of the ground stratum varies considerably among component communities.			
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	EPBC- EEC	Semi-evergreen vine thickets are widely scattered with a common structure (architecture) but considerable regional variation in floristic associations. Semi-evergreen vine thickets occur within Queensland, New South Wales, the Northern Territory and Western Australia. It is difficult to quantify the degree to which the community has declined across its range. In NSW, approximately 2,500 hecatres remains but the original extent is unknown. The ecological community includes: Semi-evergreen vine thicket and semi-deciduous notophyll rainforest on Cainozoic alluvial plains; Semi-evergreen vine thicket +/- *Casuarina cristata* on Cainozoic clay plains including extensively weathered Tertiary basalt; Semi-evergreen vine thicket on remnant Tertiary surfaces and sometimes eroded scarp slopes. Deep red and yellow earths; Semi-evergreen vine thicket and microphyll/notophyll rainforest on Cainozoic igneous rocks. Lowlands; Semi-evergreen vine thicket on Cainozoic to Proterozoic consolidated, fine-grained sediments. Emergents may be present including *Acacia harpophylla*, *Eucalyptus populnea*, *Casuarina cristata*, *Cadellia pentastylis* and *Brachychiton* spp.; Semi-evergreen vine thicket on Mesozoic to Proterozoic moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. Lowlands; Low microphyll rainforest on Quaternary coastal dunes and beaches; Semi-evergreen vine thicket which may have emergent *Acacia harpophylla*, *Casuarina cristata*, *Eucalyptus* spp. on Cainozoic igneous rocks. Steep hillsides; *Macropteranthes leichhardtii* thicket on	Unlikely	Not mapped within proposed corridor, although stands occur further upslope	N/A

Species	Listing	Ecology	Presence of habitat	Likelihood of occurrence	Potential impact
		Cainozoic igneous rocks. Steep hills; *Macropteranthes leichhardtii* thicket on Cainozoic to Proterozoic consolidated, fine-grained sediments. Lowlands; Semi-evergreen vine thicket in the Brigalow Belt South and Nandewar Bioregions (NSW SAC, 1999).			

TSC – EEC: Threatened Species Conservation Act - Endangered Ecological Community
EPBC – EEC: Environment Protection and Biodiversity Conservation Act – Endangered Ecological Community
EPBC – Critically EEC: Environment Protection and Biodiversity Conservation Act – Critically Endangered Ecological Community

Appendix 4 – Vegetation and orthophoto mapping



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 1 - LOWER HUNTER VALLEY

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

Watercourses (250,000)
- Major
- Minor

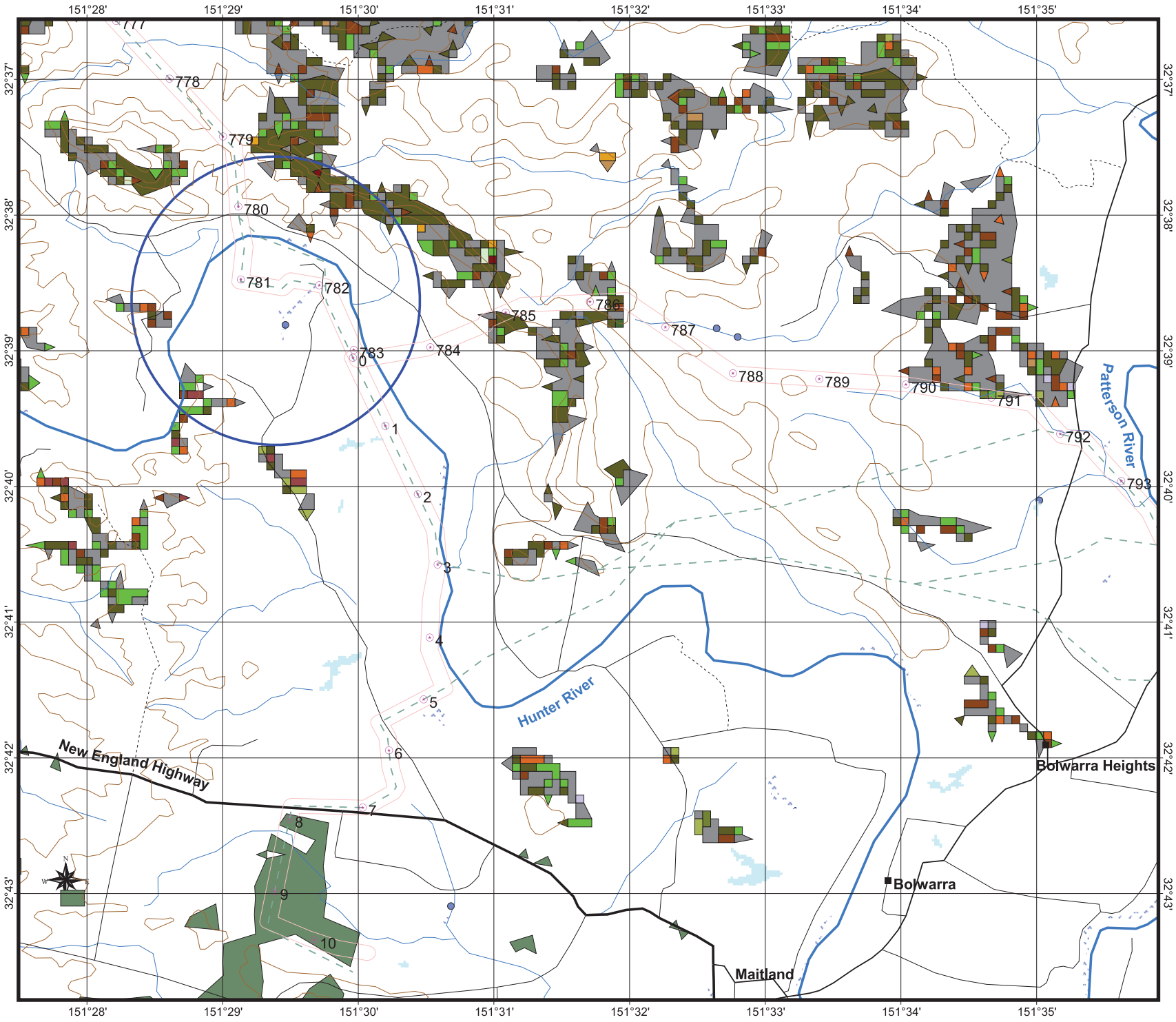
NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H
- QHGP KPs Rev H
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
- Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Forest Ecosystems (Northern CRA) on this map sheet
- 5 Banksia
- 247 Coastal Bastard Mahogany Forest
- 27 Coastal Sands Blackbutt
- 47 Escarpment Redgum
- 54 Grey Box-Red Gum-Grey Ironbark
- 71 Ironbark
- 112 Paperbark
- 122 Rough-barked Apples
- 130 Smoothbarked Apple-Sydney Peppermint-Stringybark
- 139 Stringybark-Apple
- 142 Swamp Mahogany
- 143 Swamp Oak

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 3- BOLWARRA AREA (North of Maitland)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

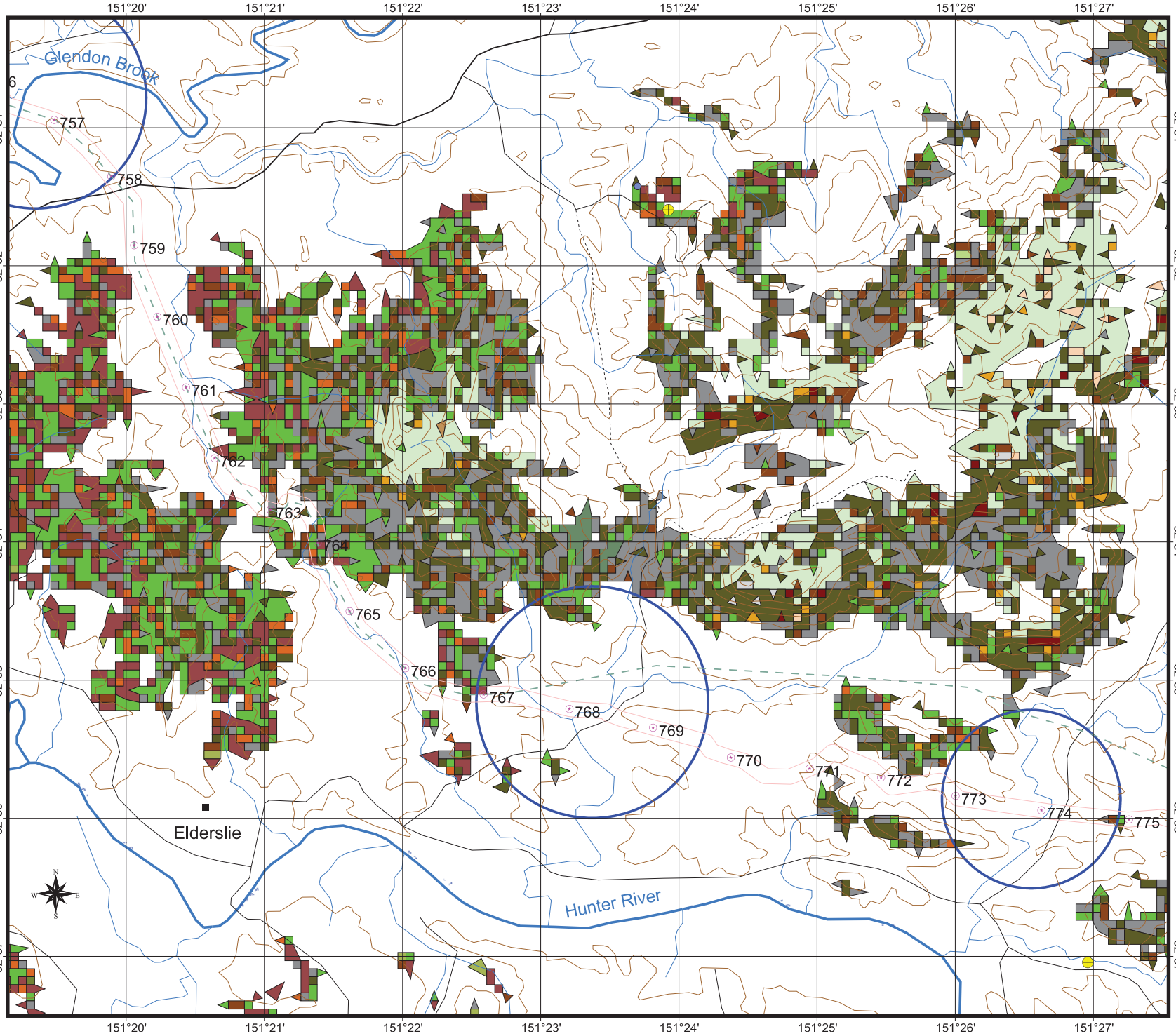
- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H / Tile factory lateral Rev D
- QHGP KPs Rev H / Tile factory lateral Rev D
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
- Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Forest Ecosystems (Northern CRA) on this map sheet

- 7 Barrington Moist Blue Gum-White Mahogany
- 21 Lowlands Grey Box
- 33 Dry Foothills Spotted Gum
- 47 Escarpment Redgum
- 54 Grey Box-Red Gum-Grey Ironbark
- 71 Ironbark
- 89 Moist Foothills Spotted Gum
- 99 New England Stringybark-Blakelys Red Gum
- 134 South Coast Shrubby Grey Gum
- 135 South Coast Tallowwood-Blue Gum
- 139 Stringybark-Apple
- 142 Swamp Mahogany
- 143 Swamp Oak
- 153 Wet Coastal Tallowwood-Brushbox
- 207 Hunter Spotted Gum-Ironbark

ngh environmental

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 4 - ELDERSLIE AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

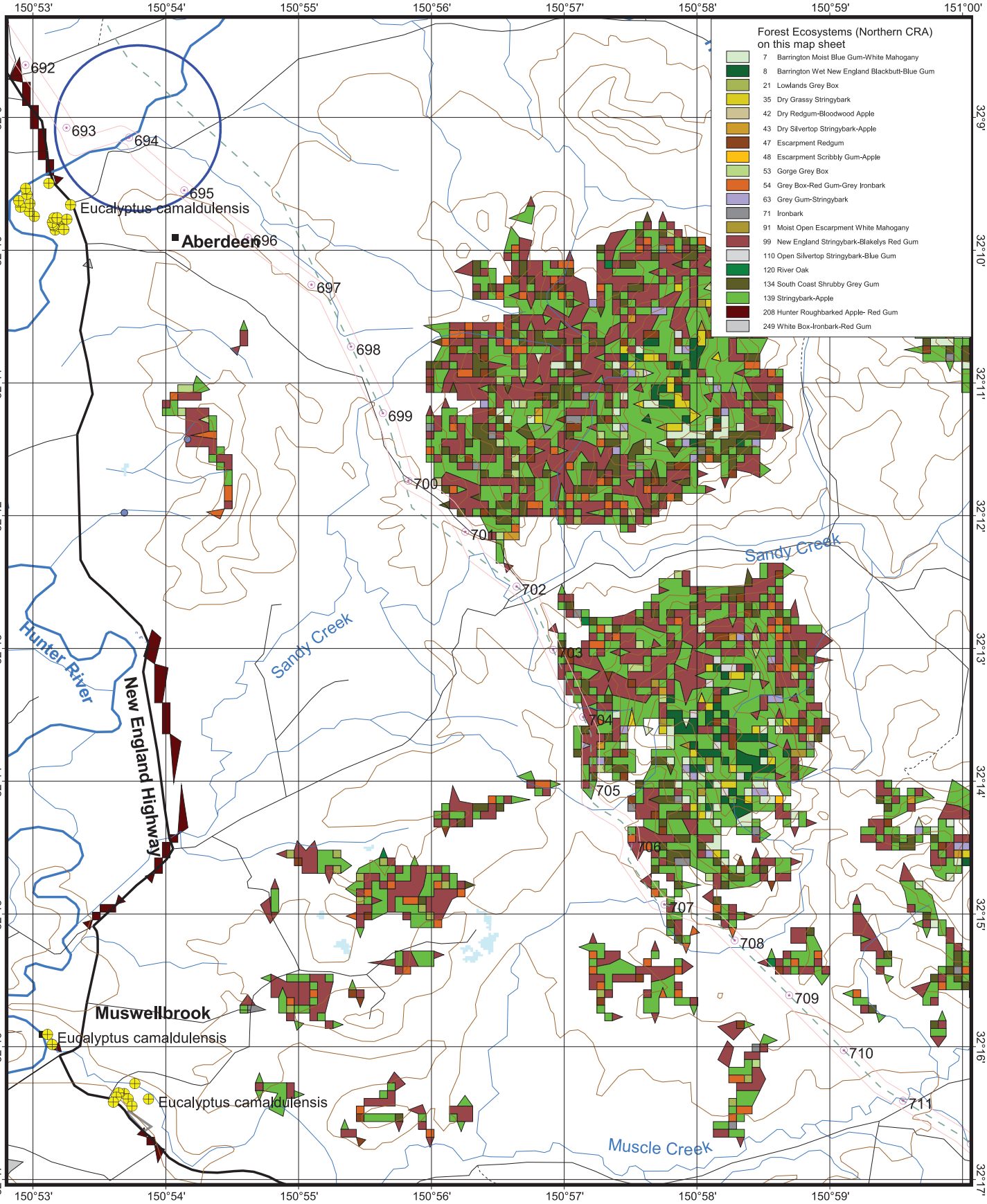
- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H
- QHGP KPs Rev H
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
- Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Forest Ecosystems (Northern CRA) on this map sheet

- 7 Barrington Moist Blue Gum-White Mahogany
- 21 Lowlands Grey Box
- 33 Dry Foothills Spotted Gum
- 34 Dry Grassy Blackbutt-Tallowwood
- 47 Escarpment Redgum
- 53 Gorge Grey Box
- 54 Grey Box-Red Gum-Grey Ironbark
- 55 Foothills Grey Gum-Spotted Gum
- 71 Ironbark
- 89 Moist Foothills Spotted Gum
- 99 New England Stringybark-Blakelys Red Gum
- 109 Open Shrubby Brushbox-Tallowwood
- 110 Open Silvertop Stringybark-Blue Gum
- 134 South Coast Shrubby Grey Gum
- 135 South Coast Tallowwood-Blue Gum
- 139 Stringybark-Apple
- 143 Swamp Oak
- 153 Wet Coastal Tallowwood-Brushbox
- 168 Rainforest

ngh environmental

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 8 - MUSWELLBOOK - ABERDEEN AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

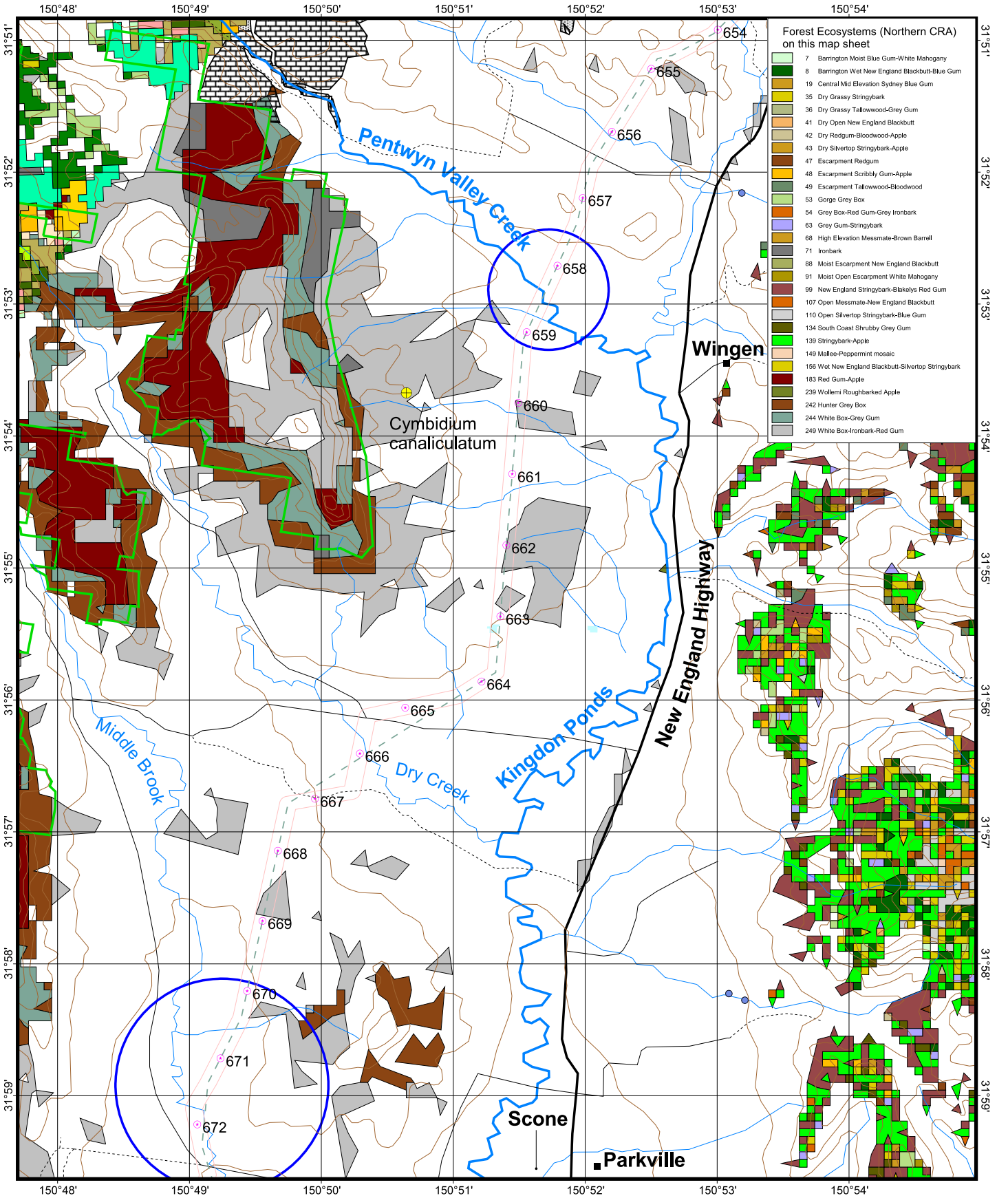
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 10 - PARKVILLE - WINGEN AREA (NORTH OF SCONE)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

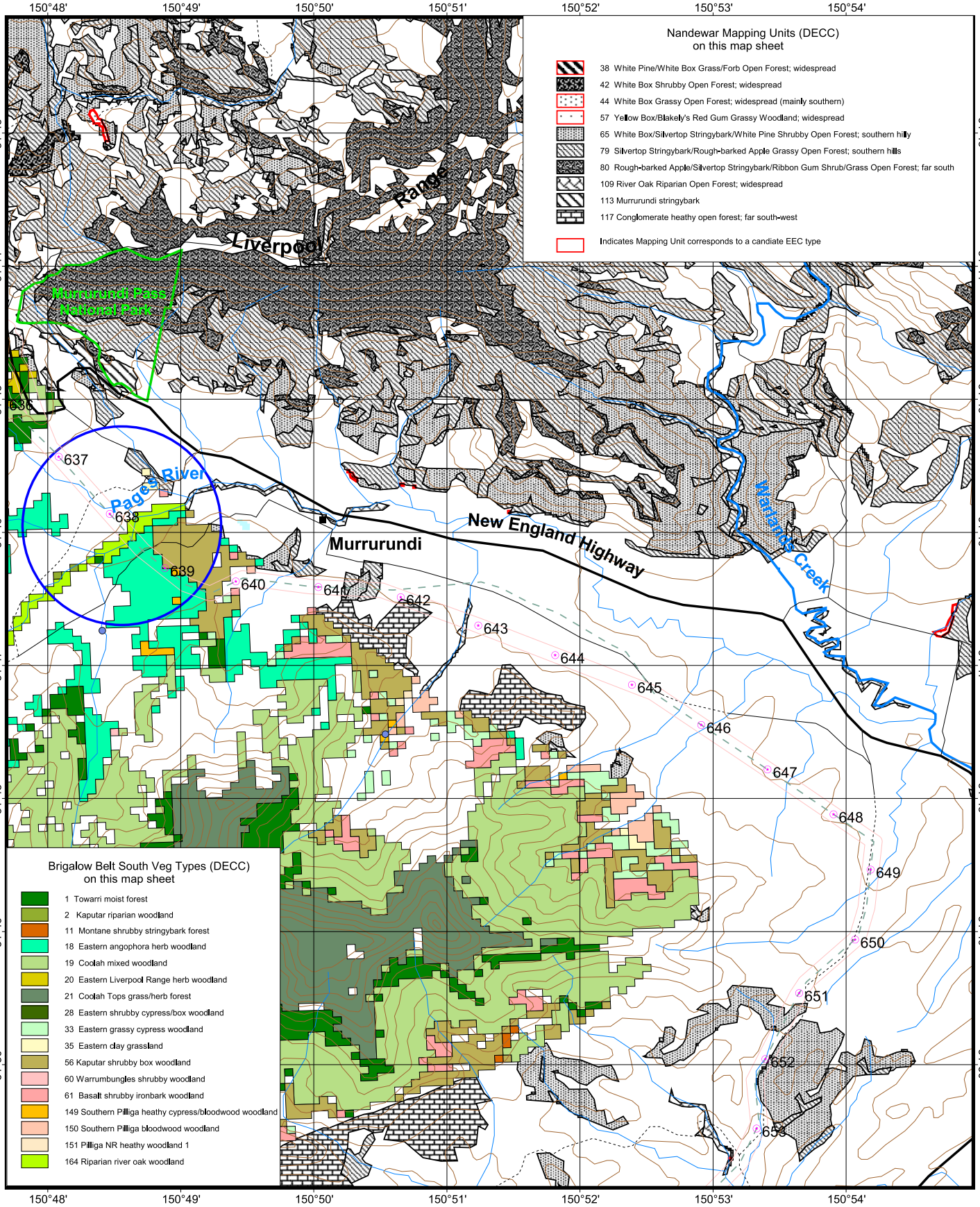
National Parks Estate (DECC)
NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 11 - MURRURUNDI
(Liverpool Range - East)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

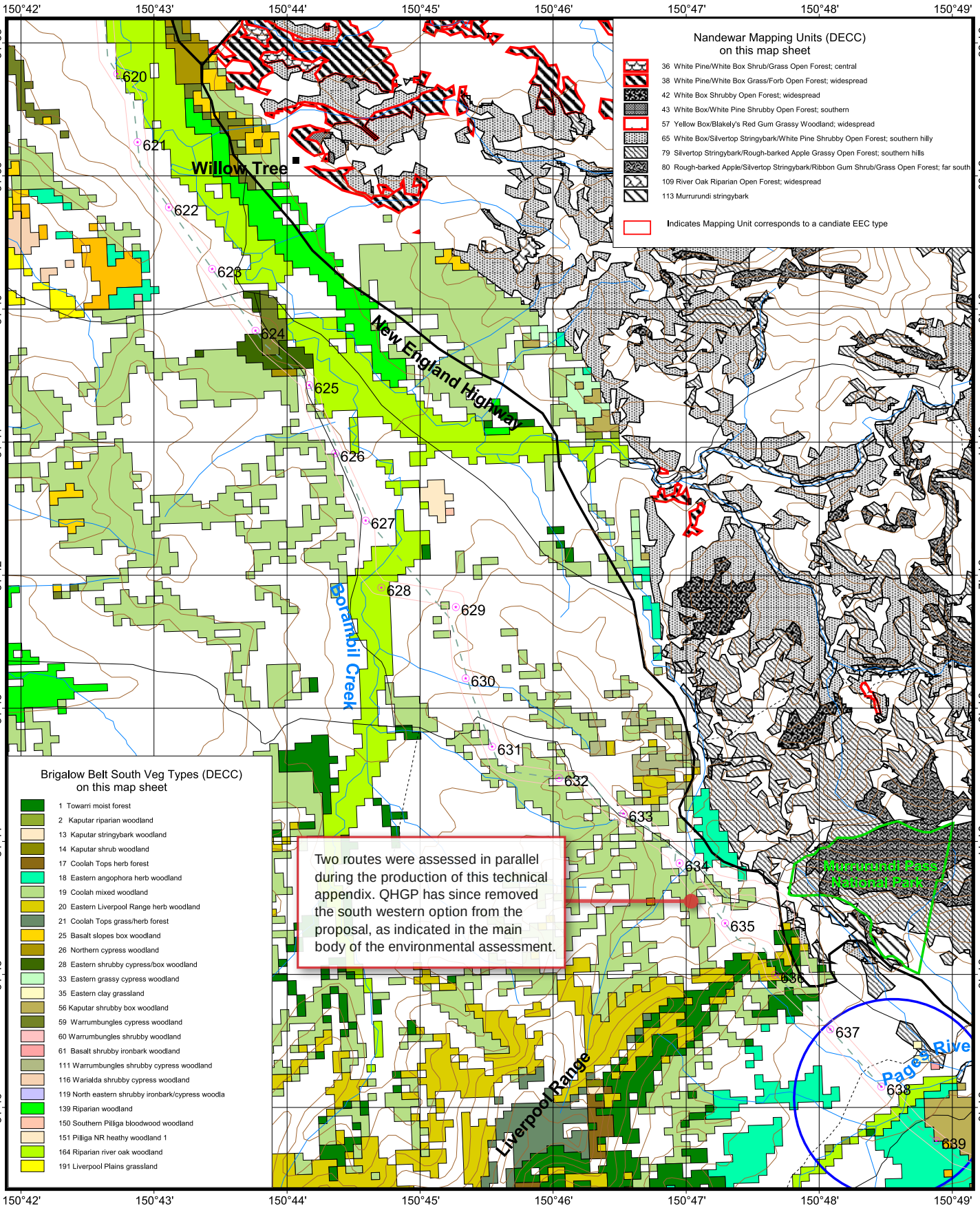
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 12 - WILLOW TREE
(Liverpool Range - West)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

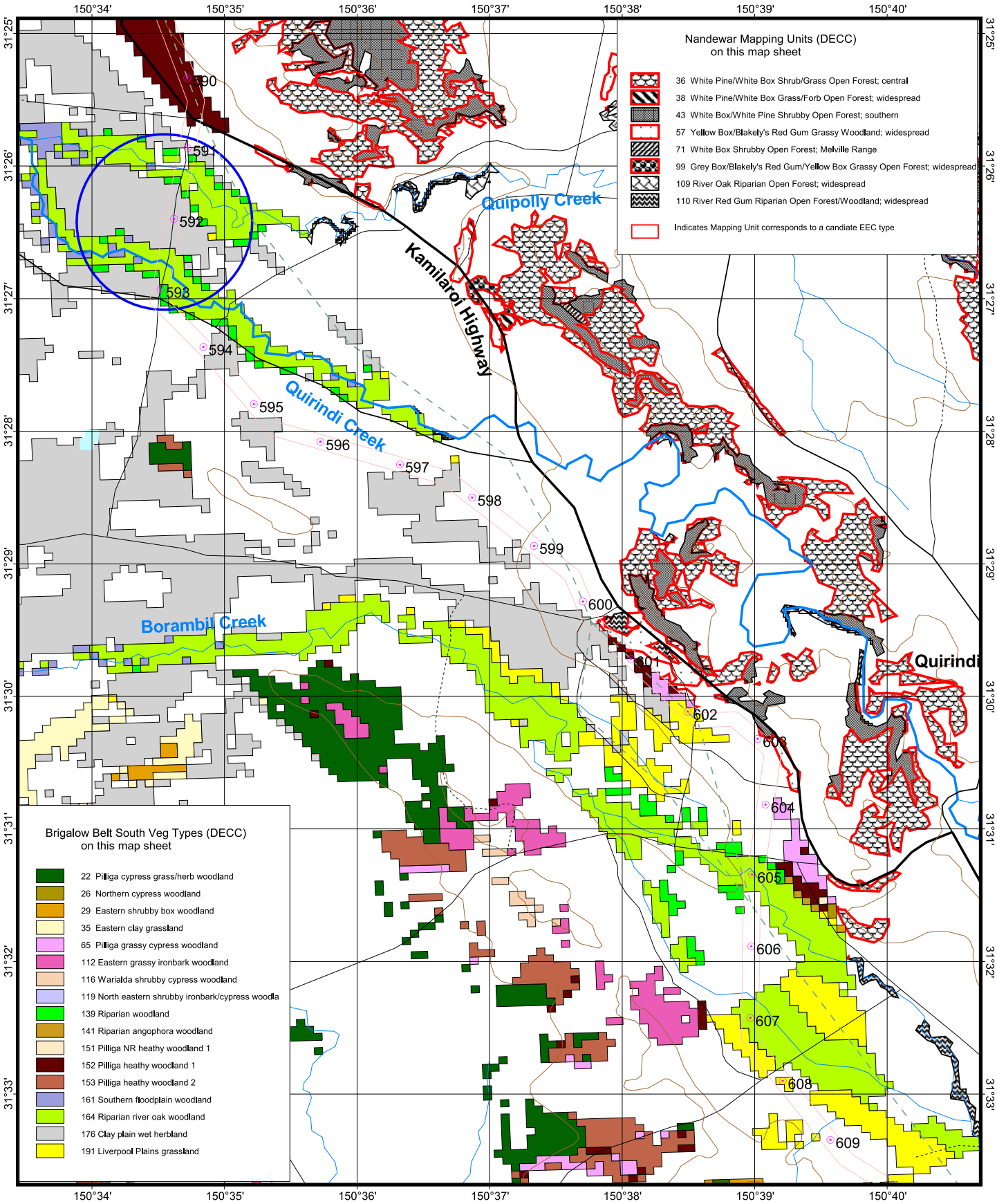
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 14 - QUIRINDI

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

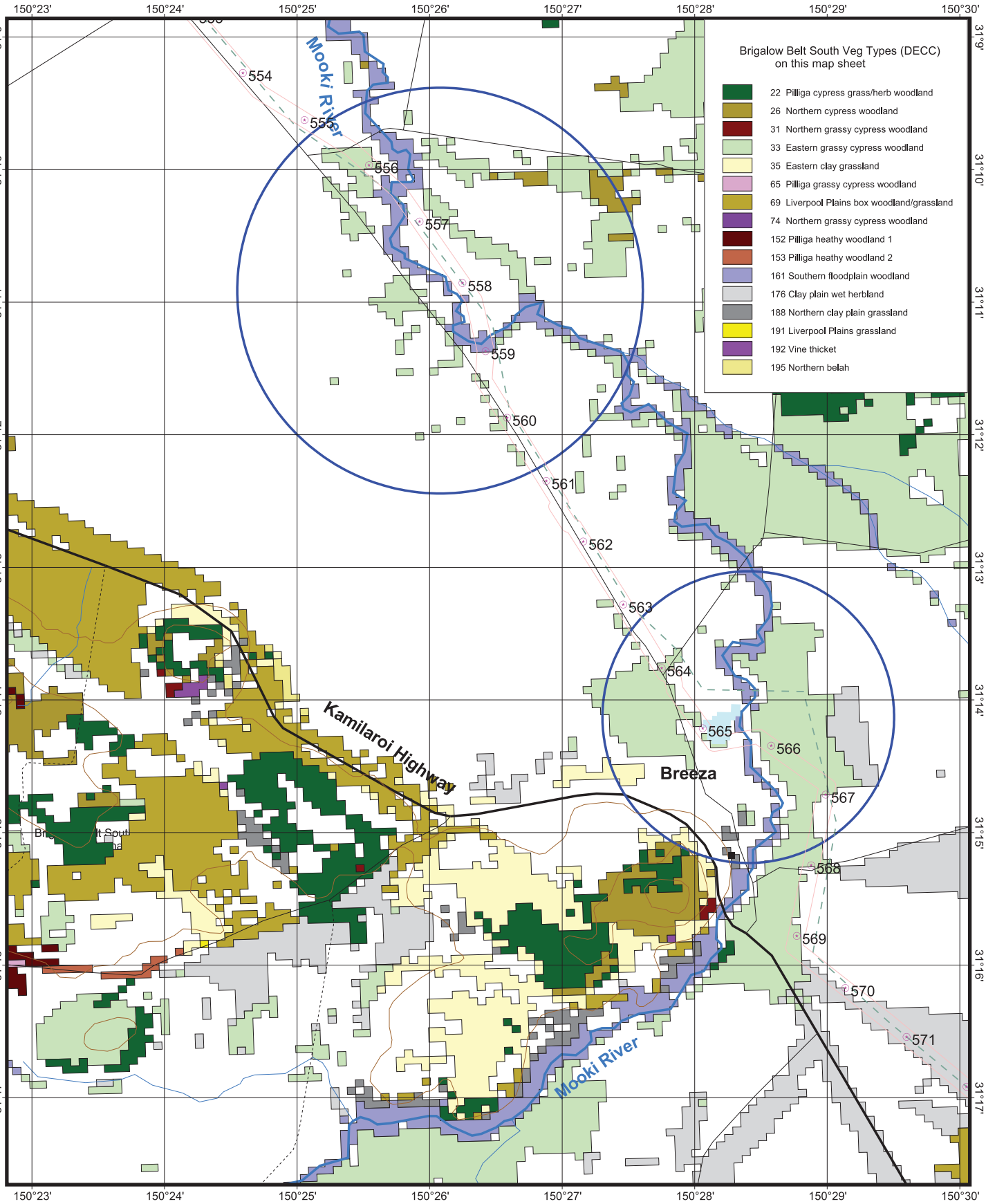
National Parks Estate (DECC)
NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 16 - BREEZA
(South of Gunnedah)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

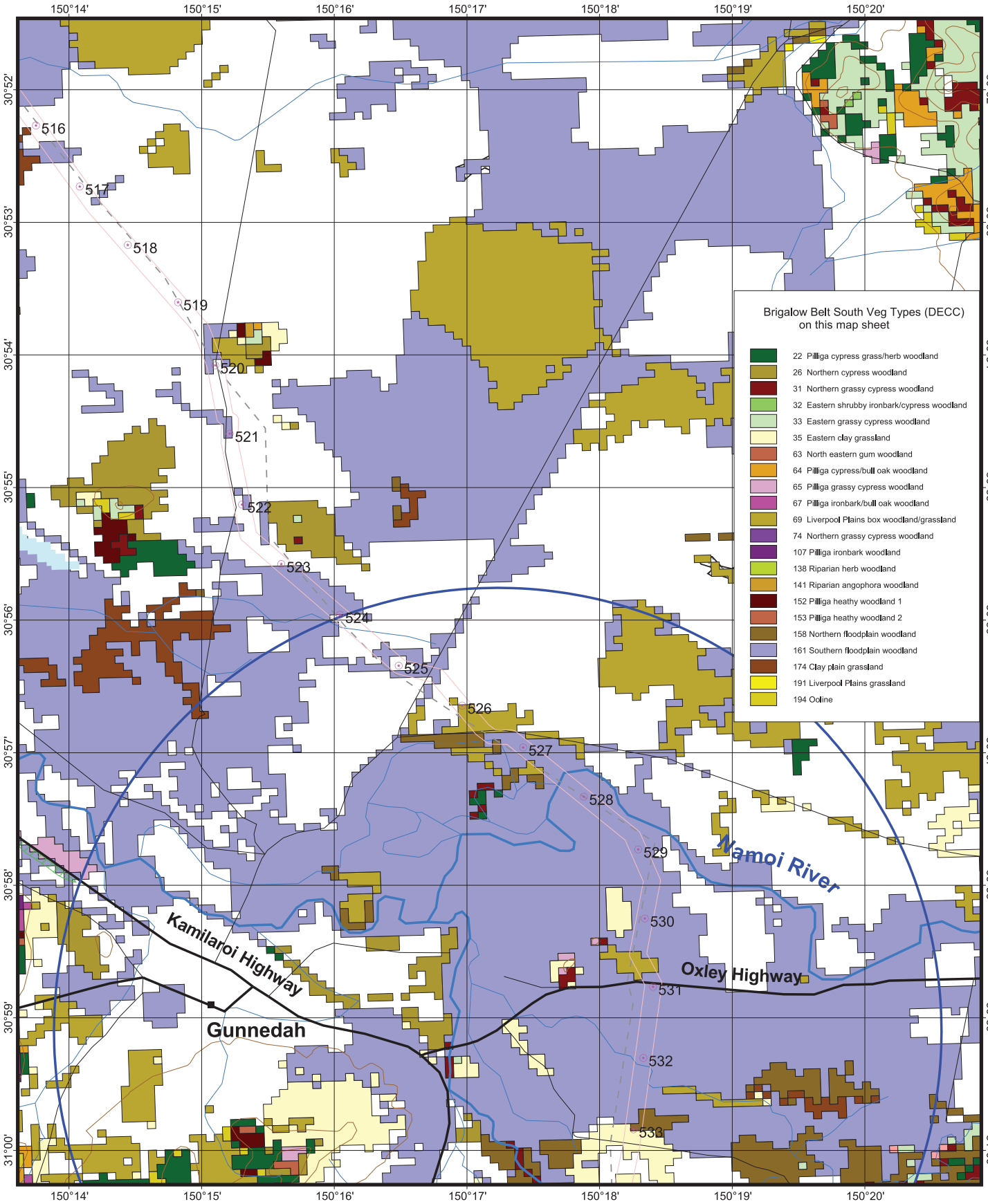
National Parks Estate (DECC)
NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 18 - GUNNEDAH

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

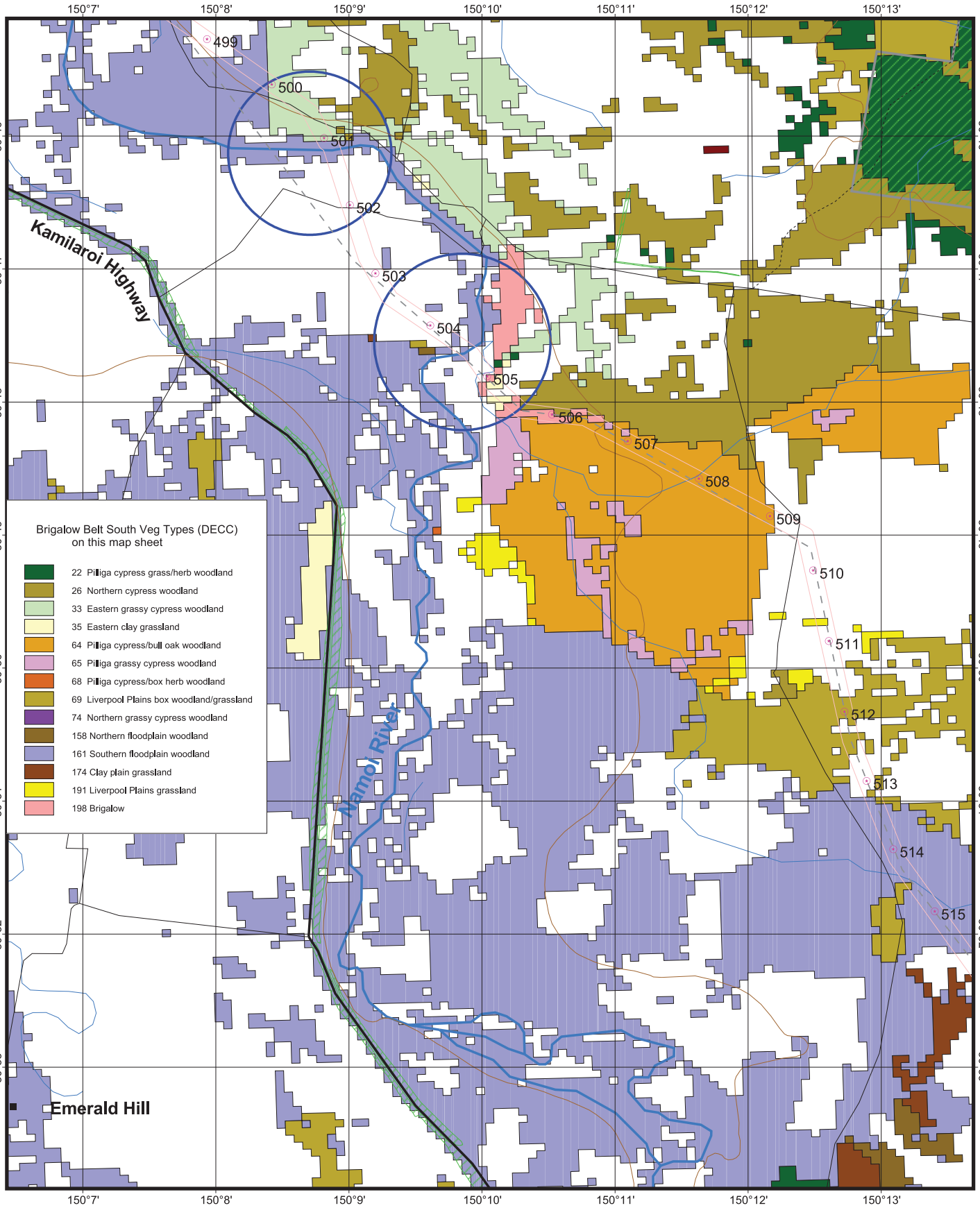
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 19 - EMERALD HILL
(North of Gunnedah)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

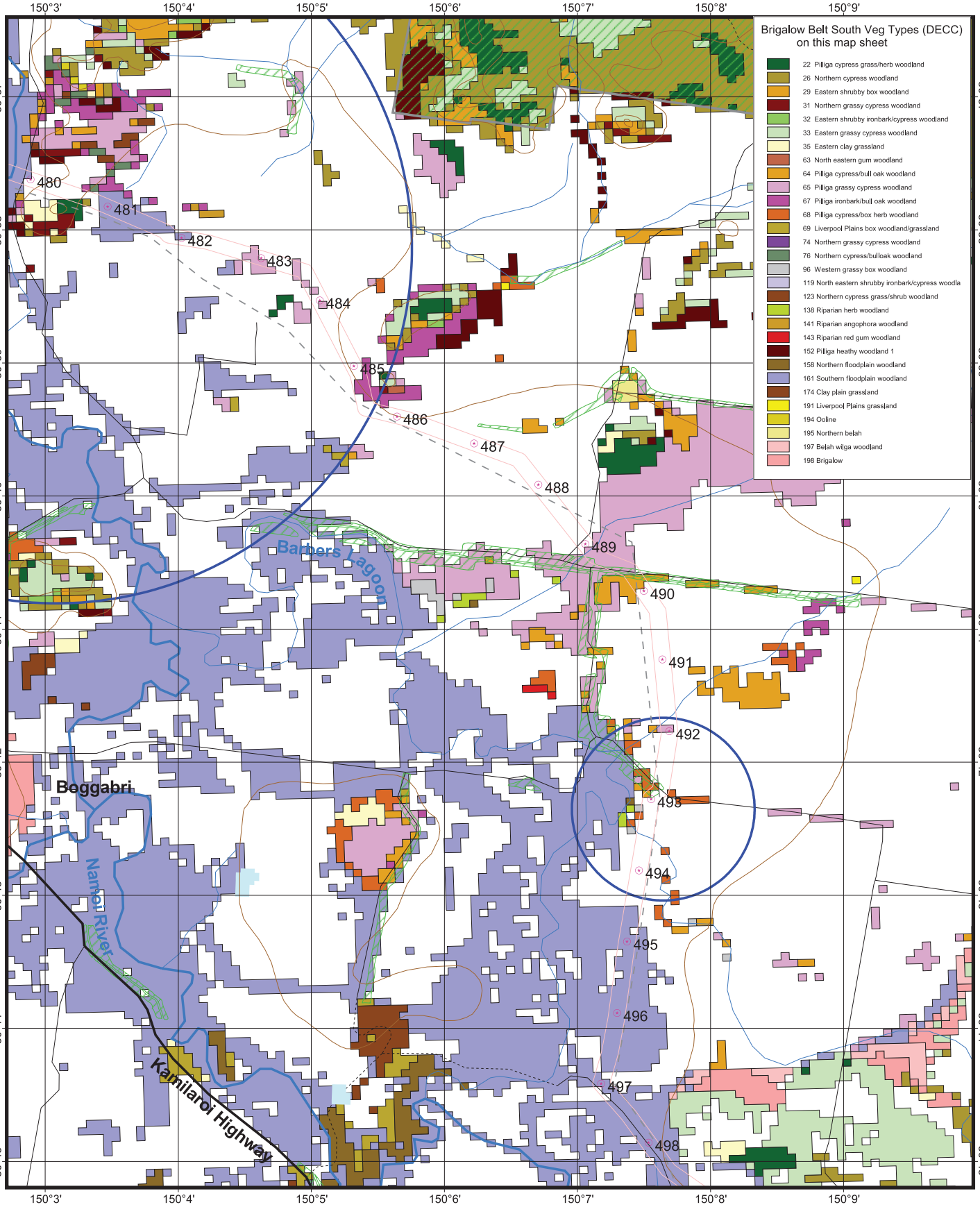
National Parks Estate (DECC)
NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 20 - BOGGABRI

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

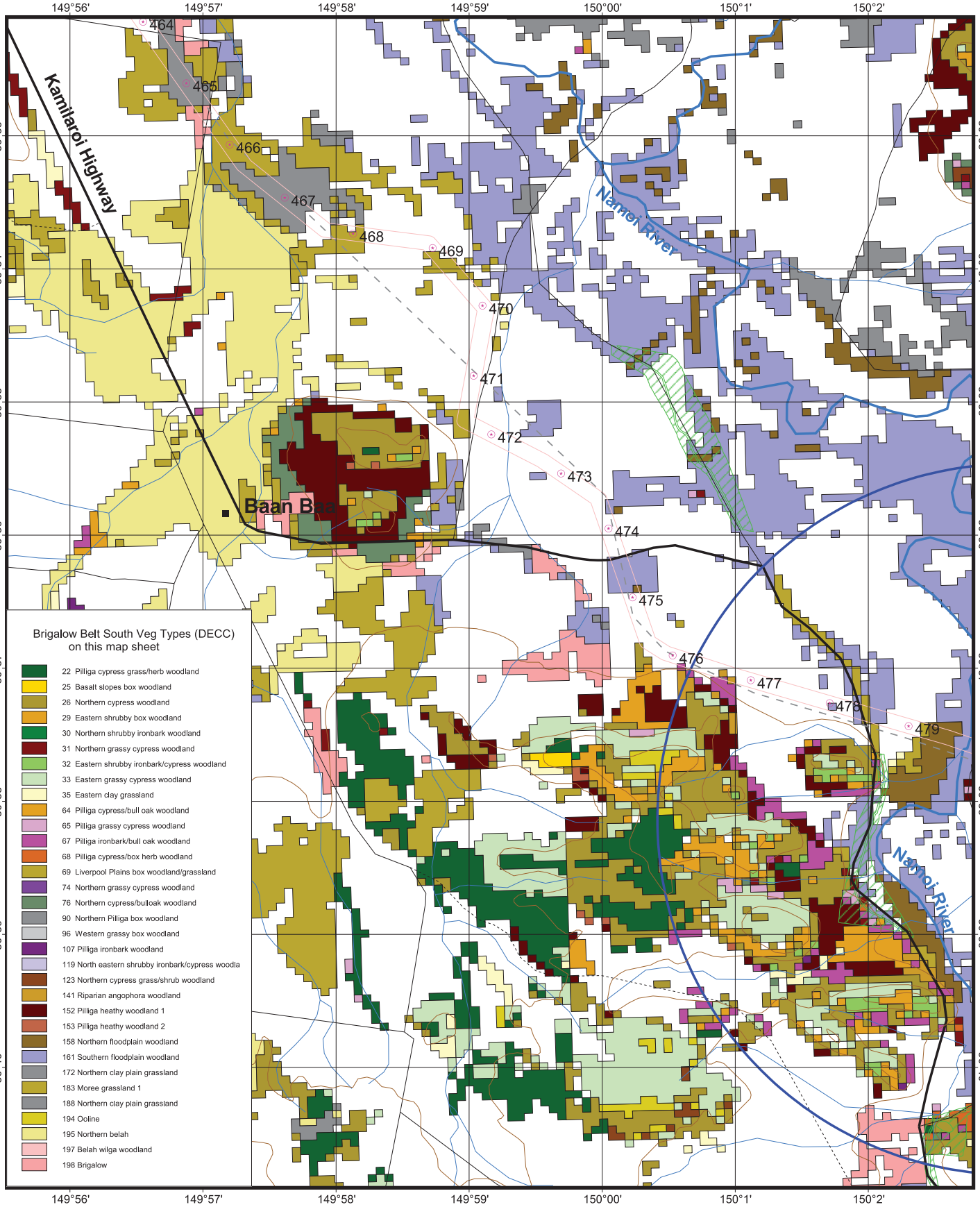
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 21 - BAAN BAA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

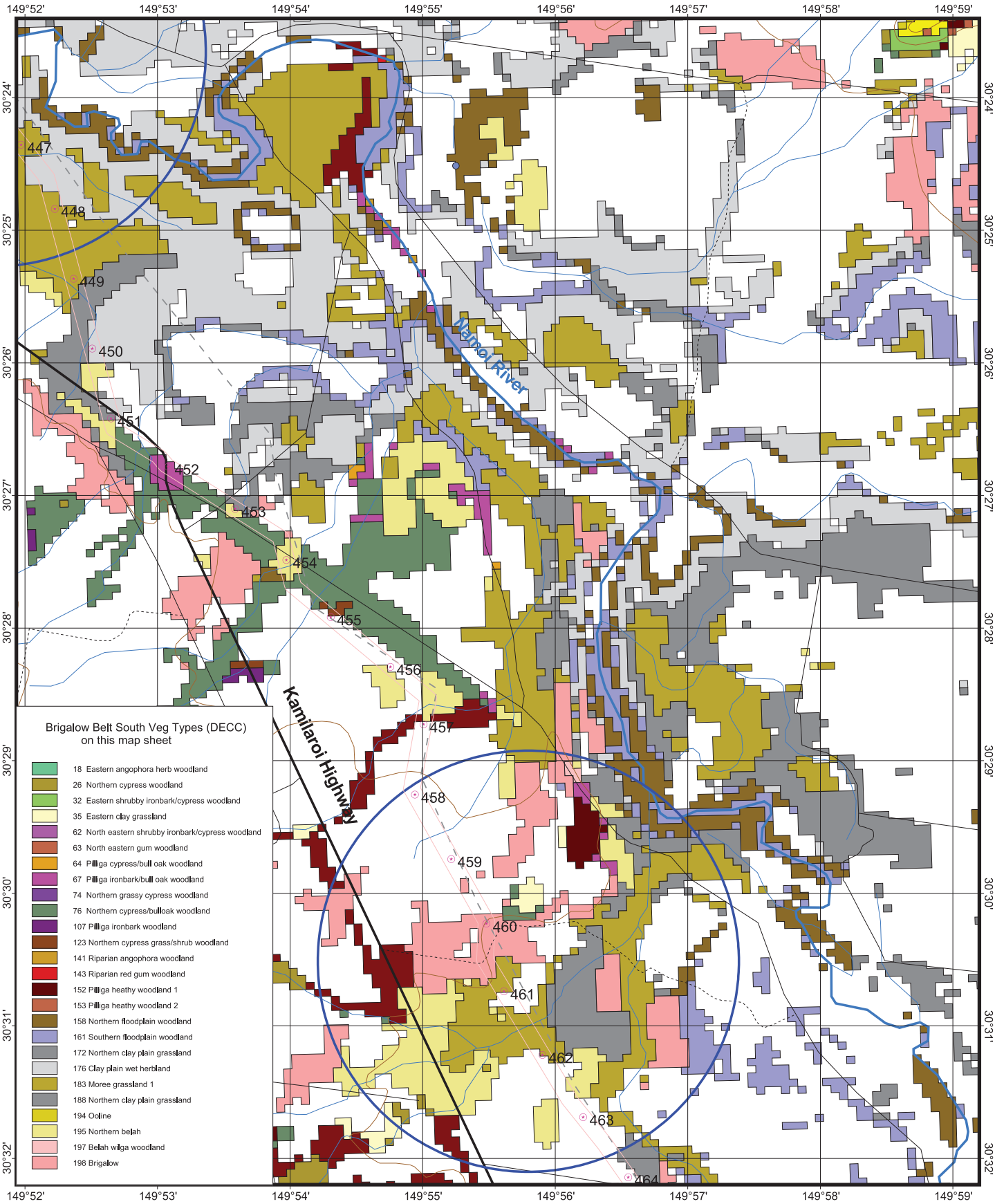
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 22 - NAMOI VALLEY
(South East of Narrabri)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

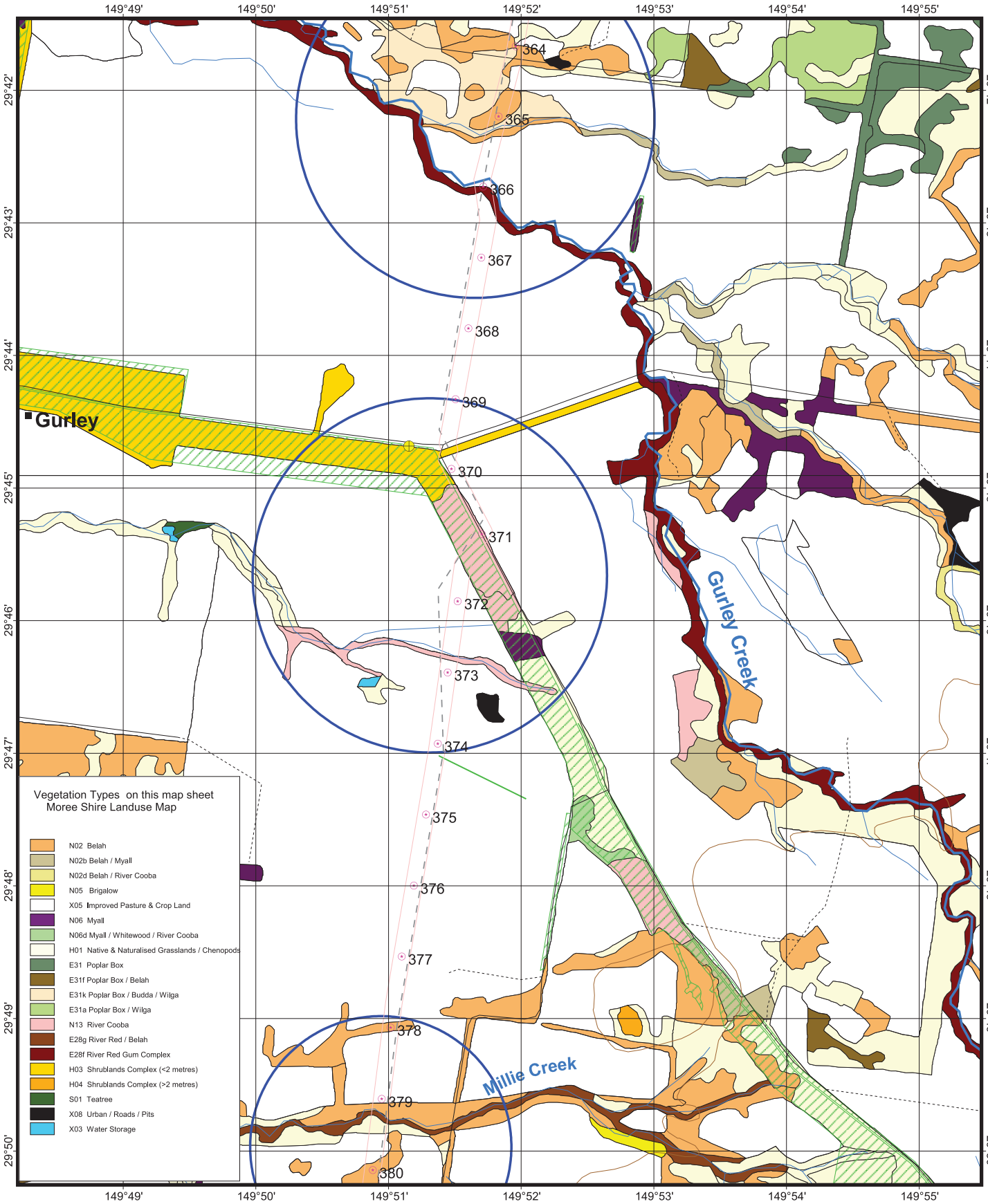
QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 27 - GURLEY AREA
(South of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

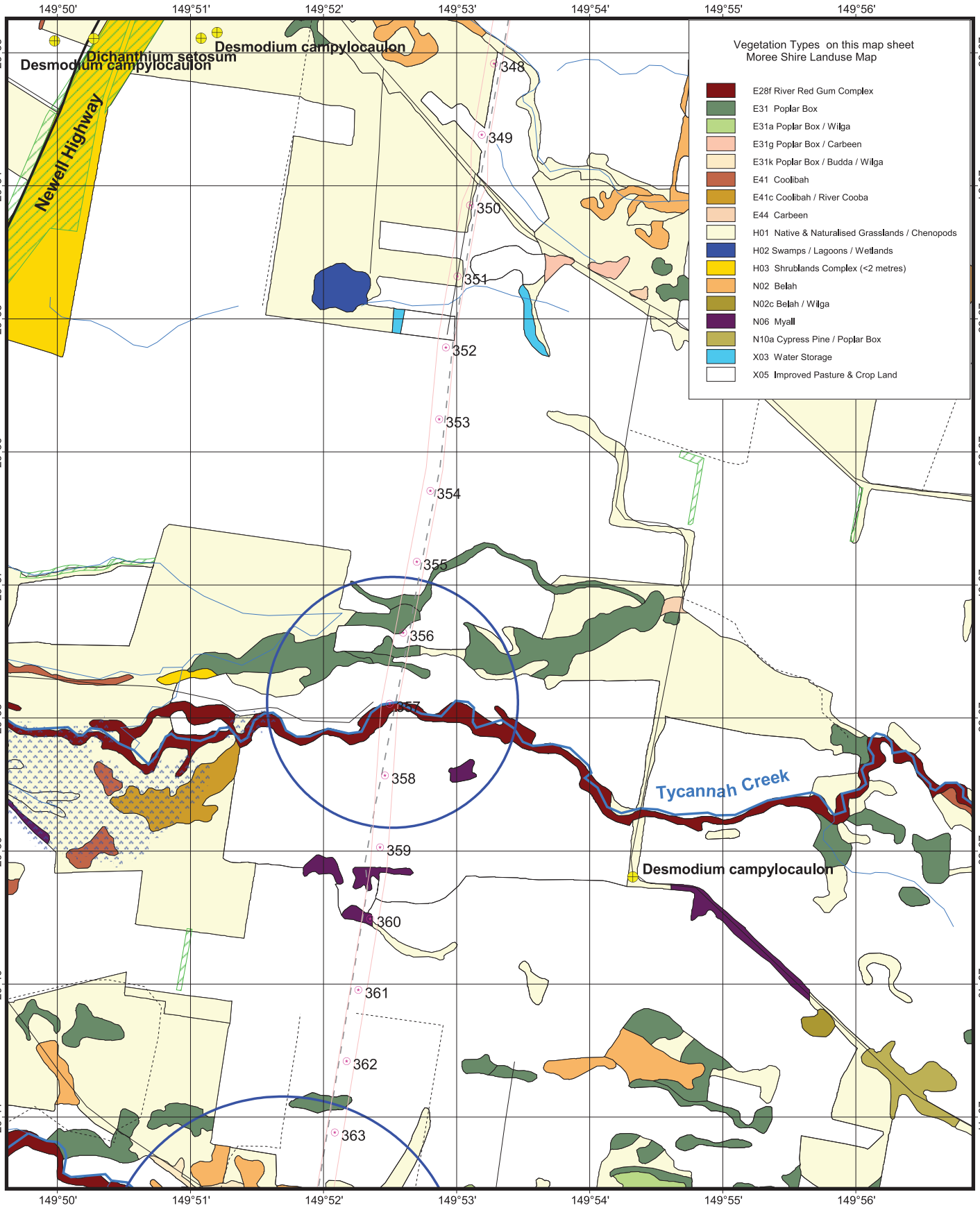
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 28 - TYCANNAH CREEK
(South of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

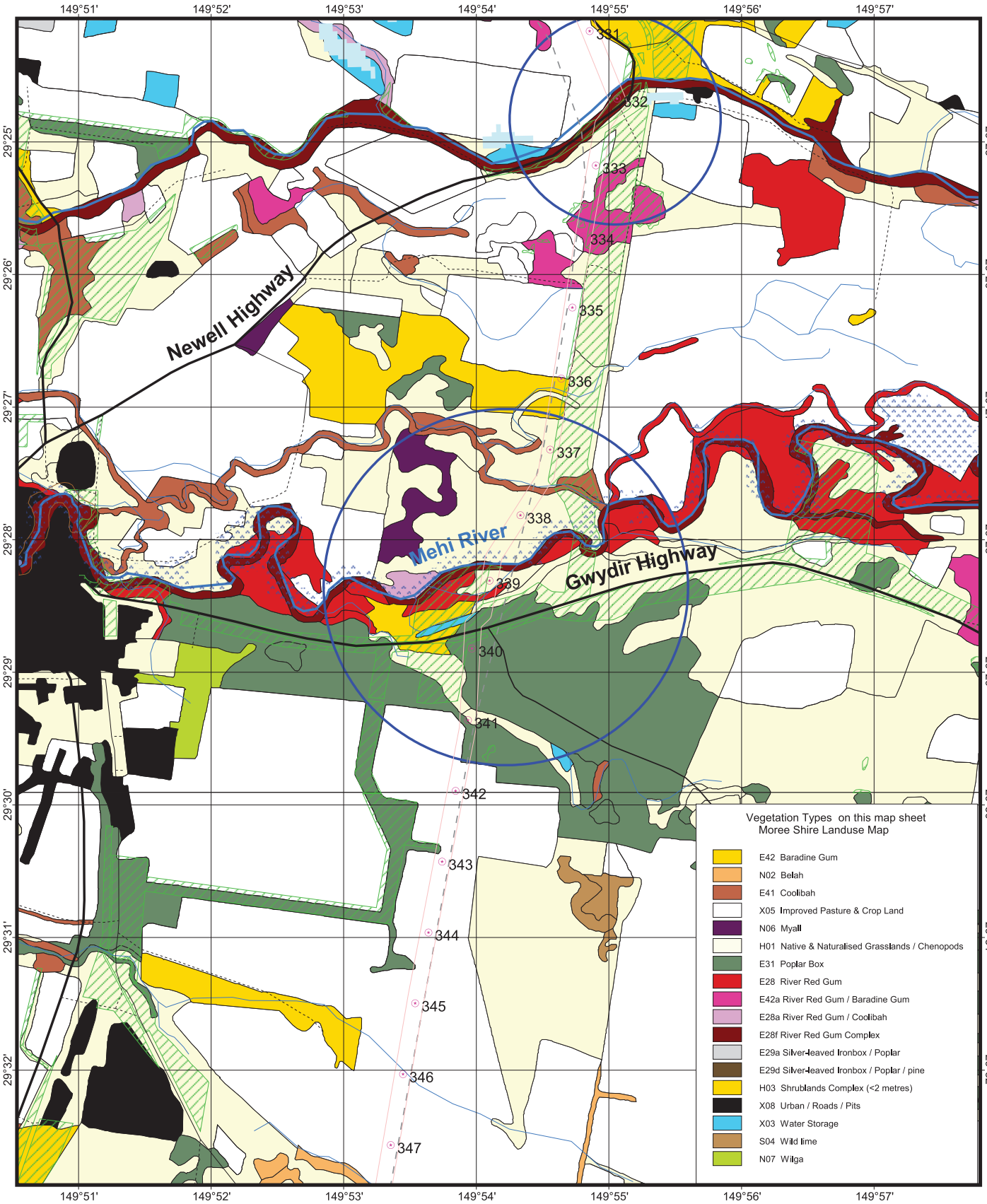
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 29 - MEEHI RIVER
(East of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

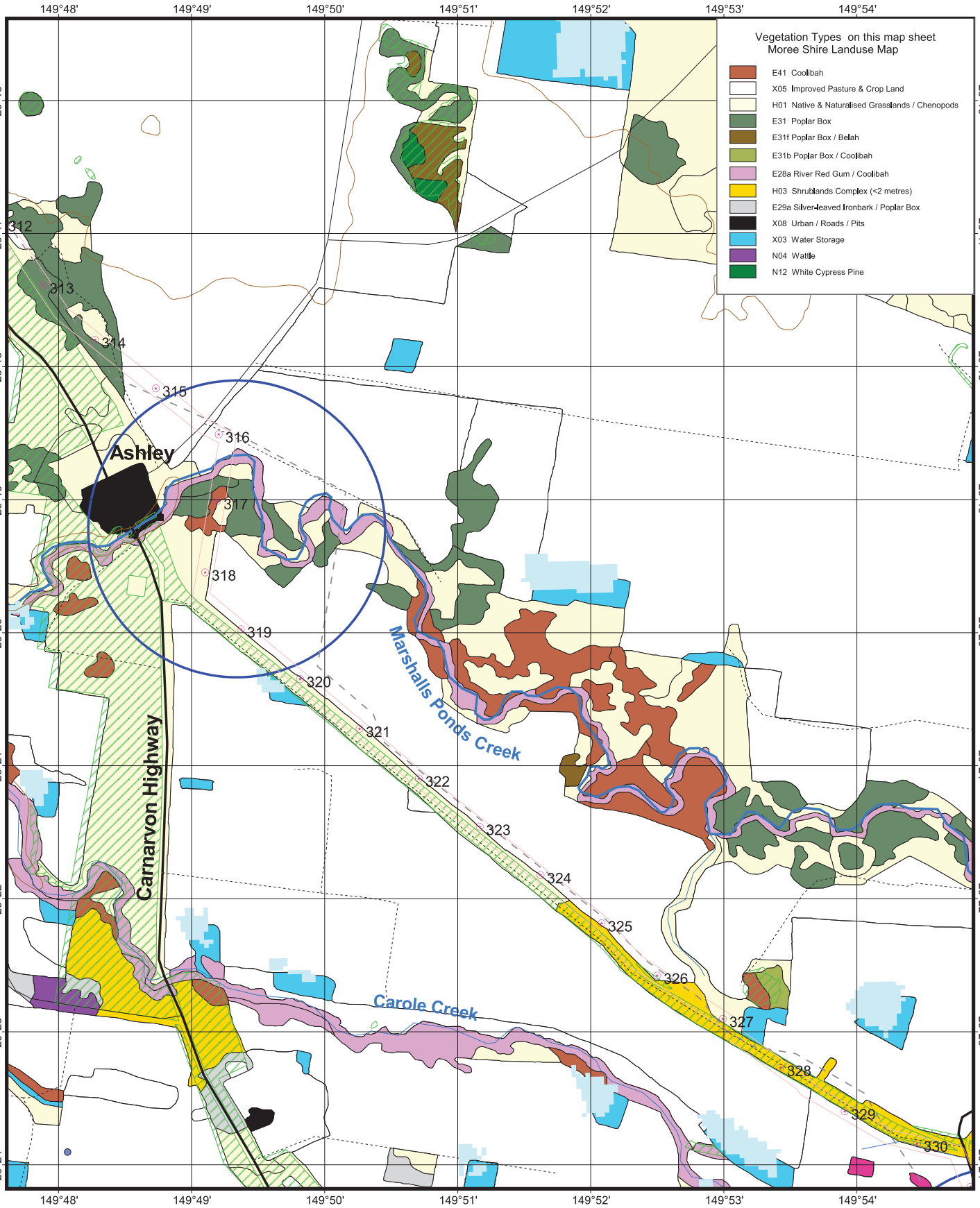
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 30 - ASHLEY AREA
(North of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

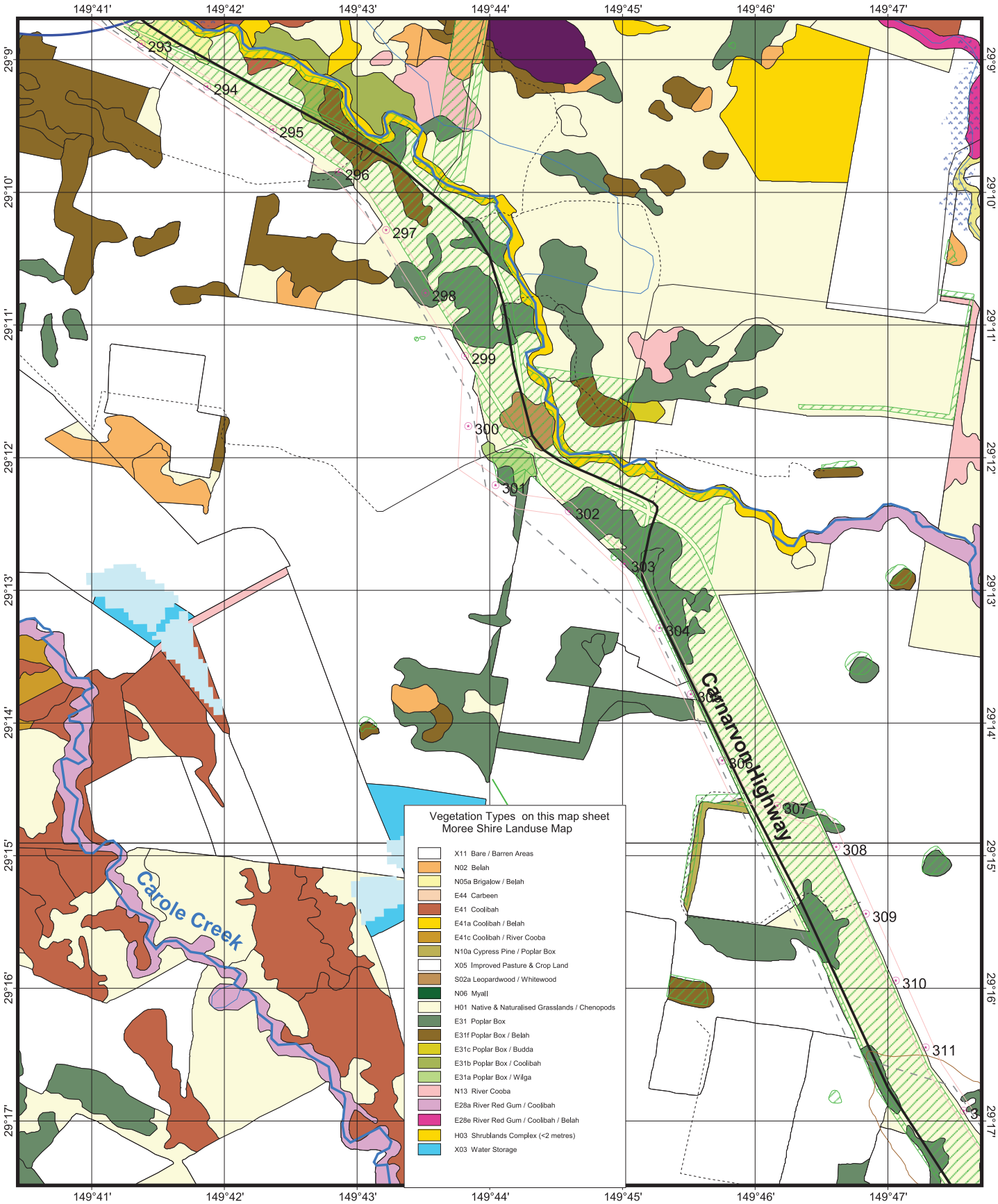
National Parks Estate (DECC)
NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna
Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)
Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 31 - CAROLE CREEK AREA
(North of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

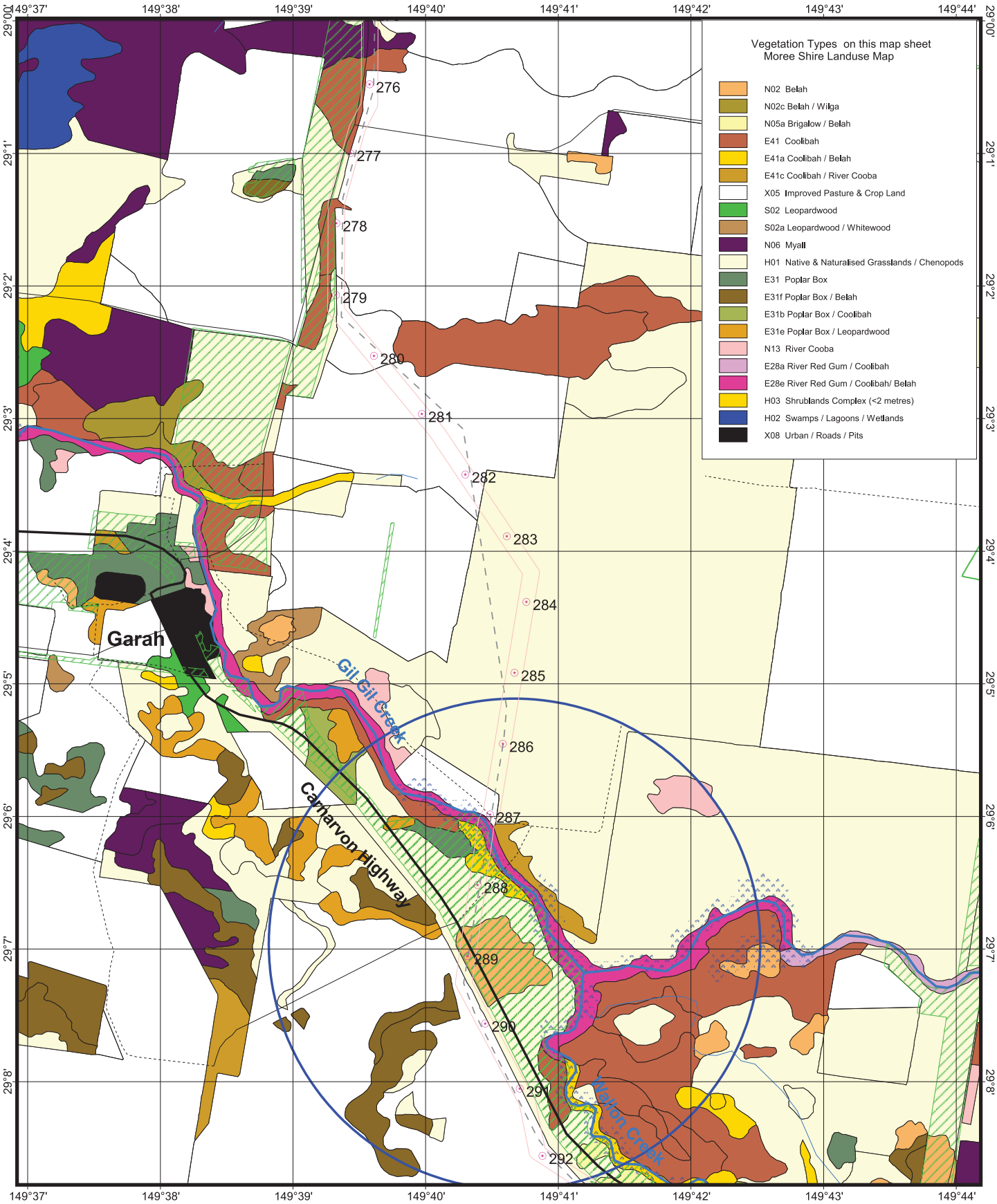
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 32 - GARAH AREA
(North of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

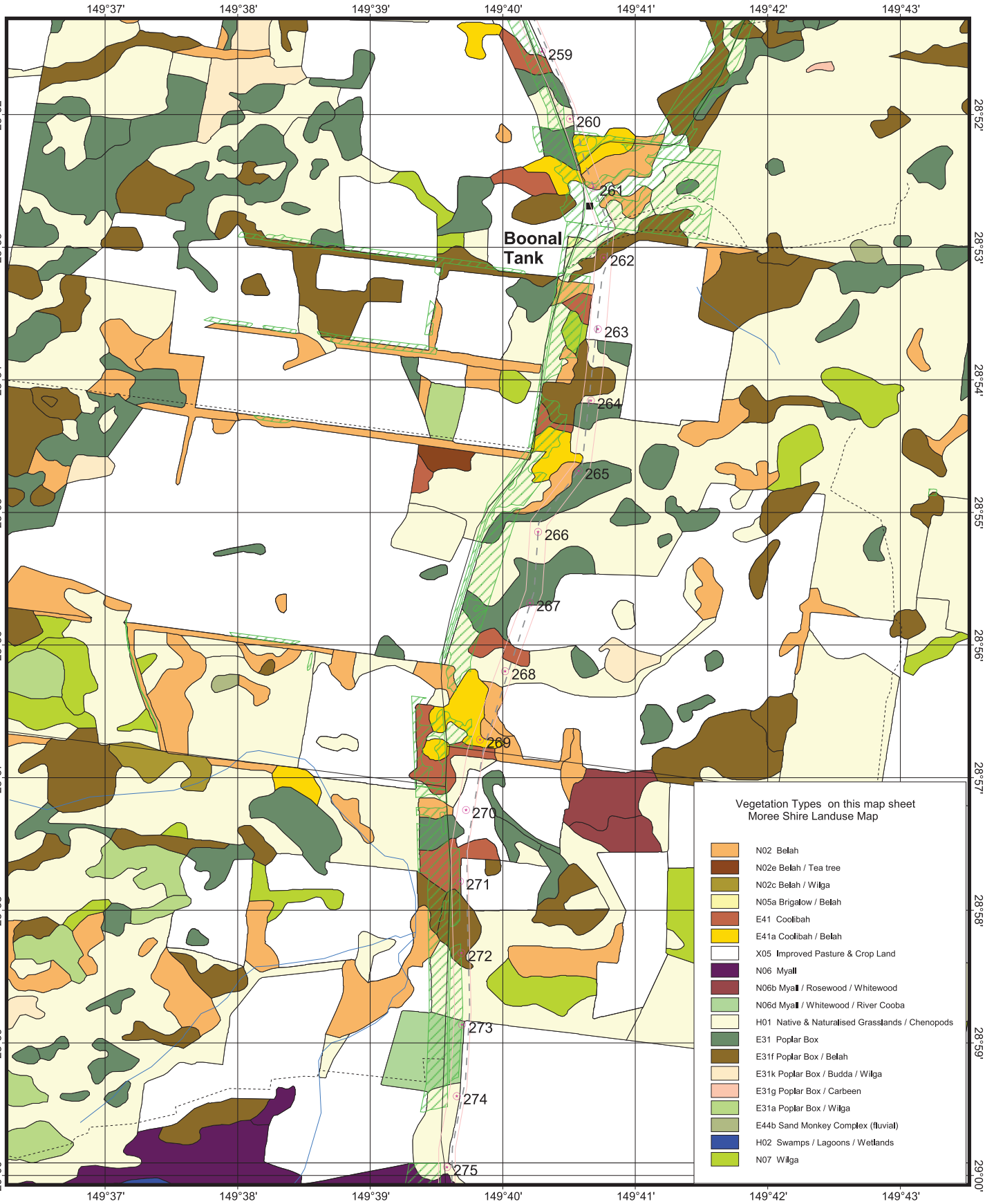
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 33 - BOONAL TANK AREA
(South of Boomi)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

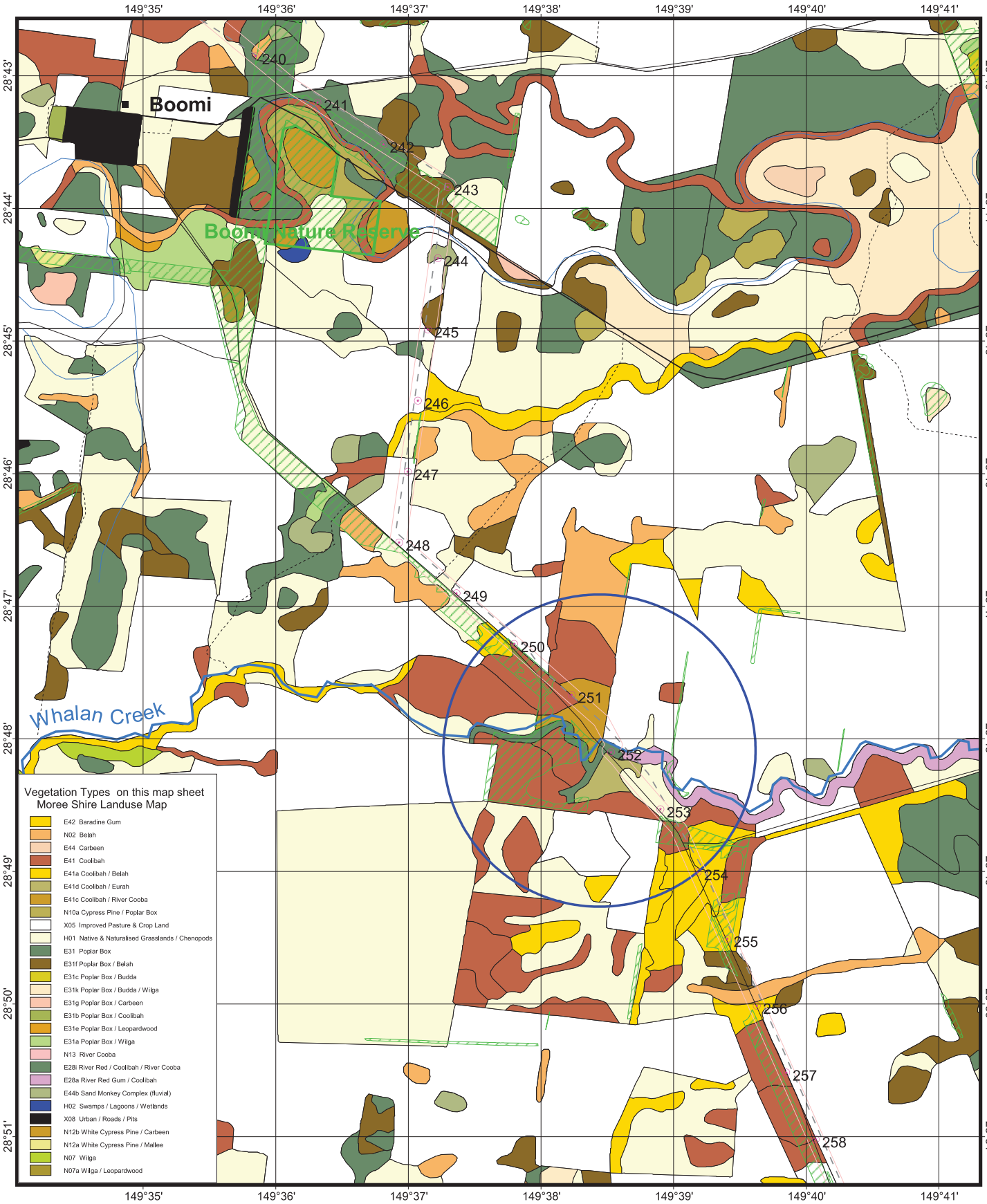
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N E S W

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 34- BOOMI SOUTH

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

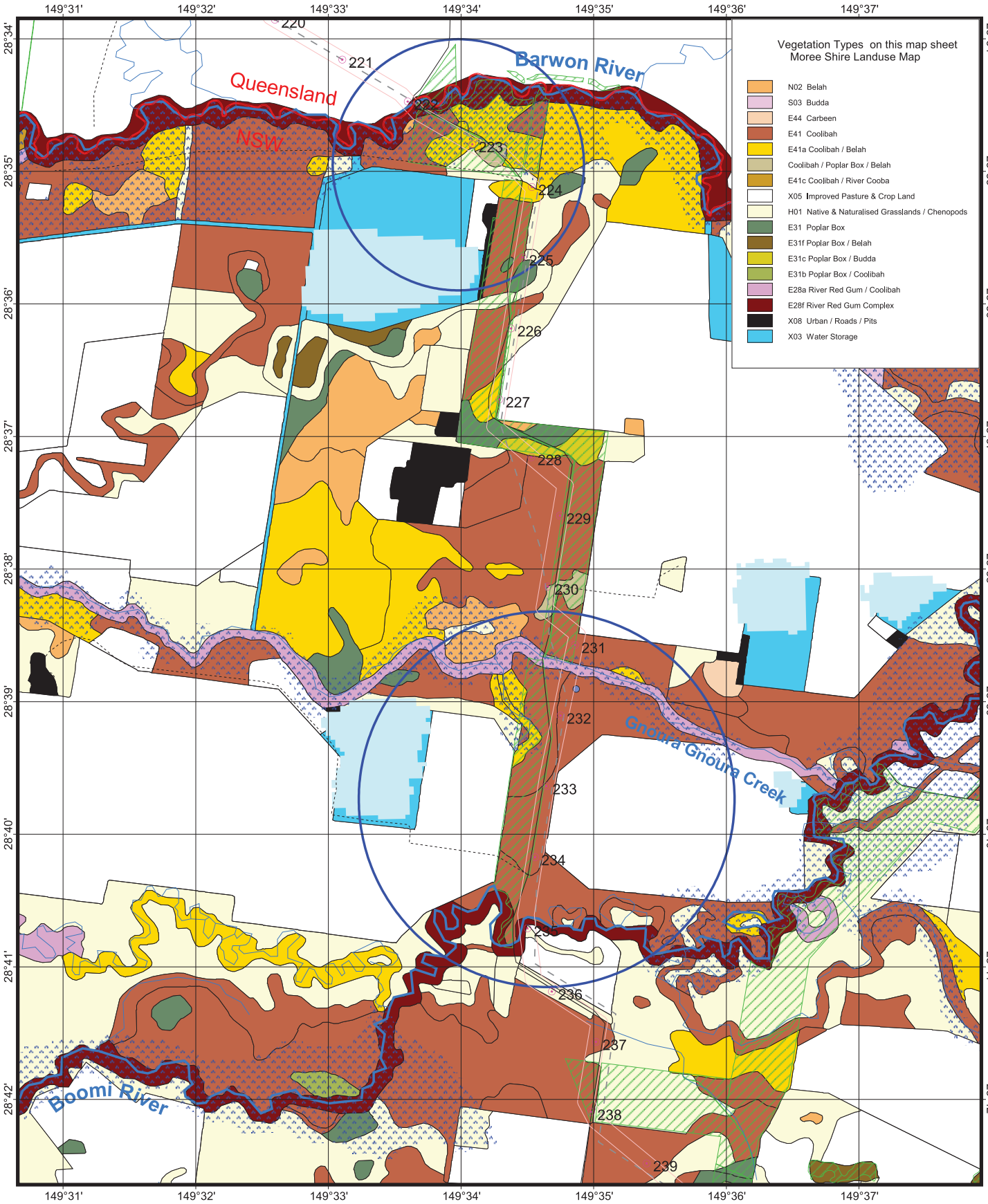
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

VEGETATION MAP 35 - BOOMI NORTH

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

Watercourses (250,000)
- Major
- Minor

NSW wetlands (DECC)
- Coastal or freshwater wetland
- Reservoir or water body
- Major Dams or Weirs

National Parks Estate (DECC)

NSW State Forests

Roads (250,000)
- Dual Carriageway
- Principal Road
- Secondary Road
- Minor Road
- Track

Previously assessed QHGP centreline Rev D

QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

Atlas of NSW Wildlife - Threatened Flora January 2008 (DECC)

Conservation areas shown on Land Use maps

N W E S

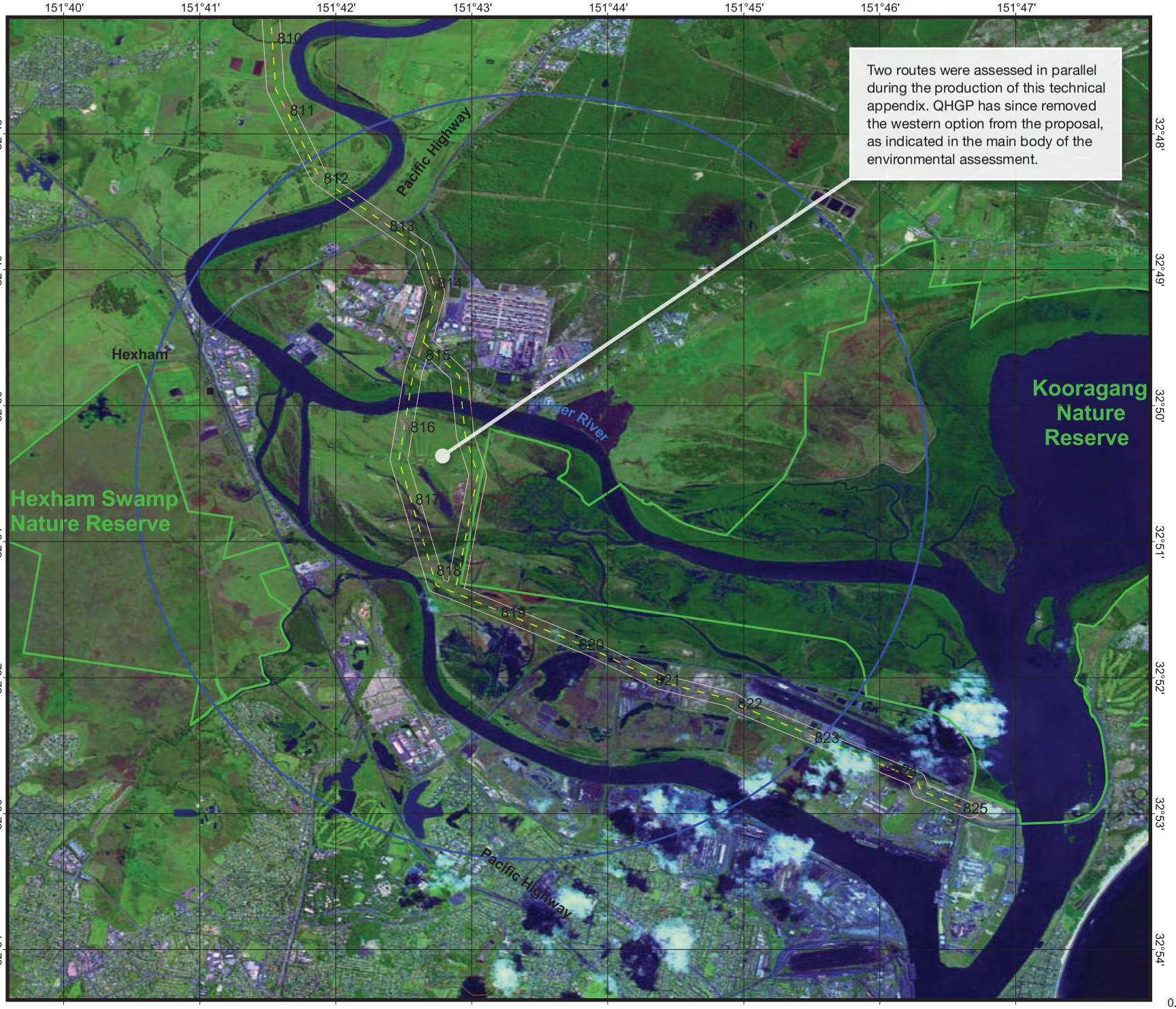
0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 1 - LOWER HUNTER VALLEY

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.



50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

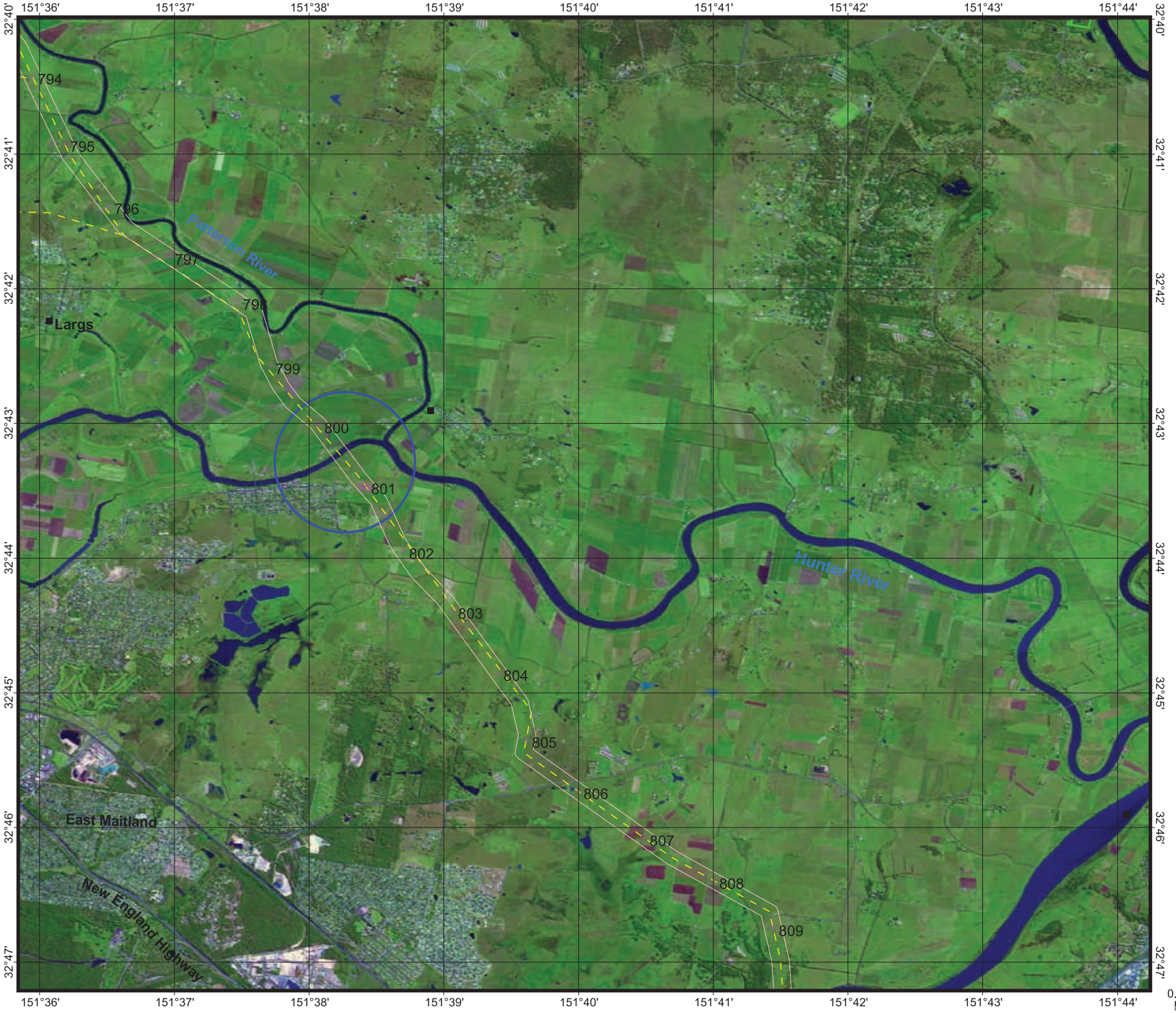
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 2 - LOWER HUNTER VALLEY - EAST MAITLAND - LARGS

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

- 50m contours
- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H
- QHGP KPs Rev H
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N W E S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

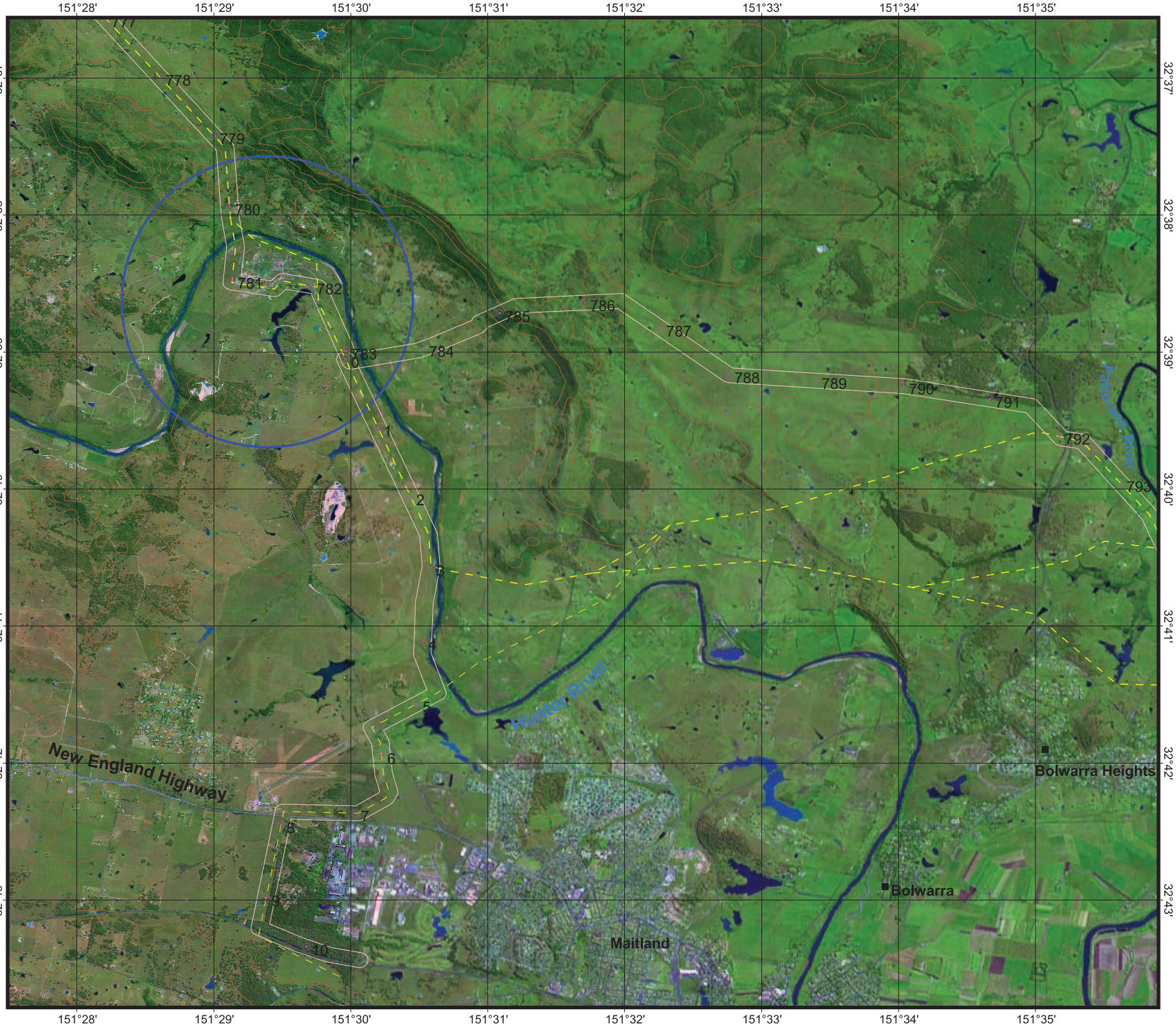
QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 3 - BOLWARA AREA
(North of Maitland)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental



50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D and Tile Factory Lateral Rev C

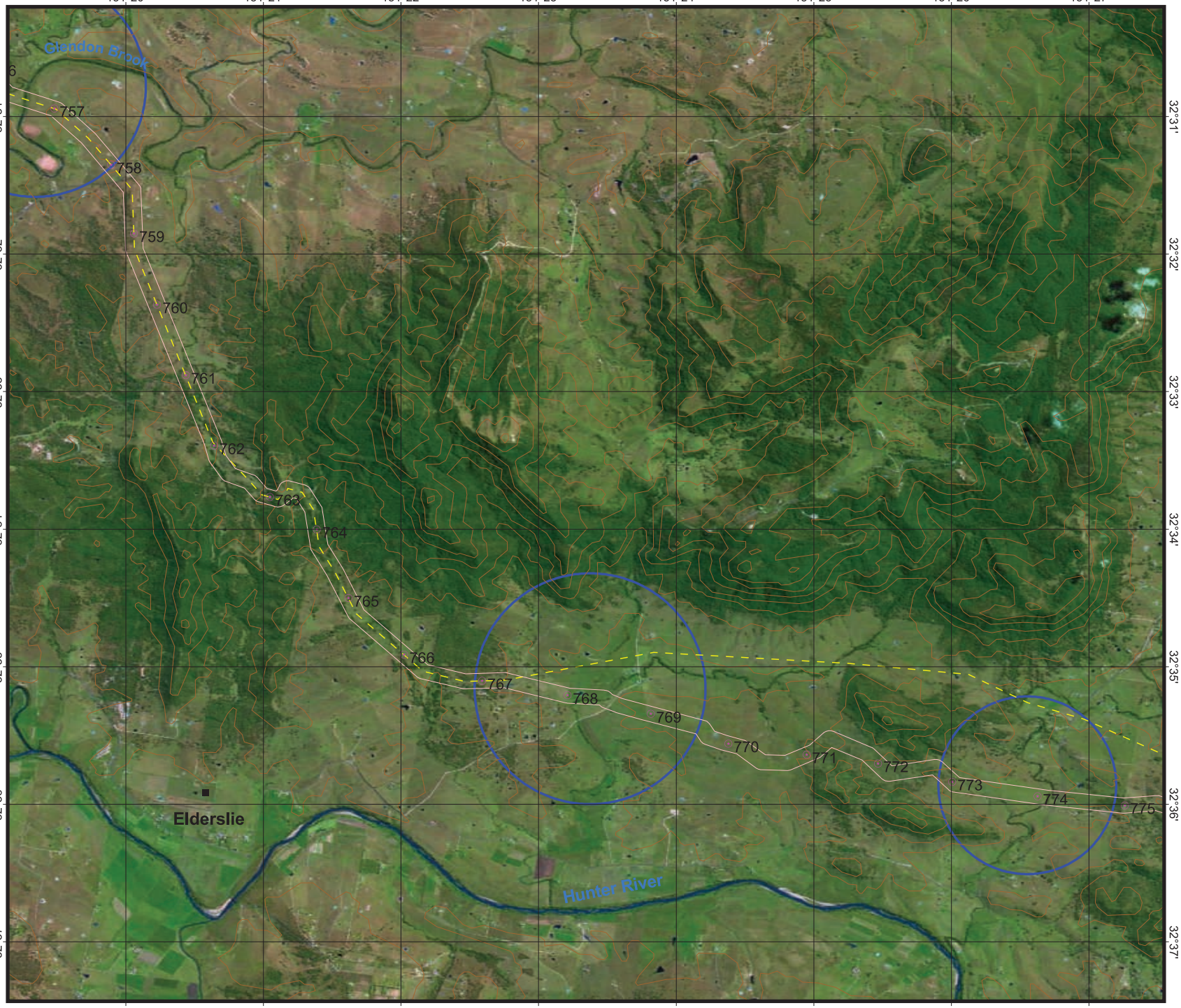
QHGP mainline corridor (200m) Rev H and Tile Factory Lateral Rev D

QHGP KPs Rev H and Tile Factory KPs Rev D

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 4 - ELDERSLIE AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

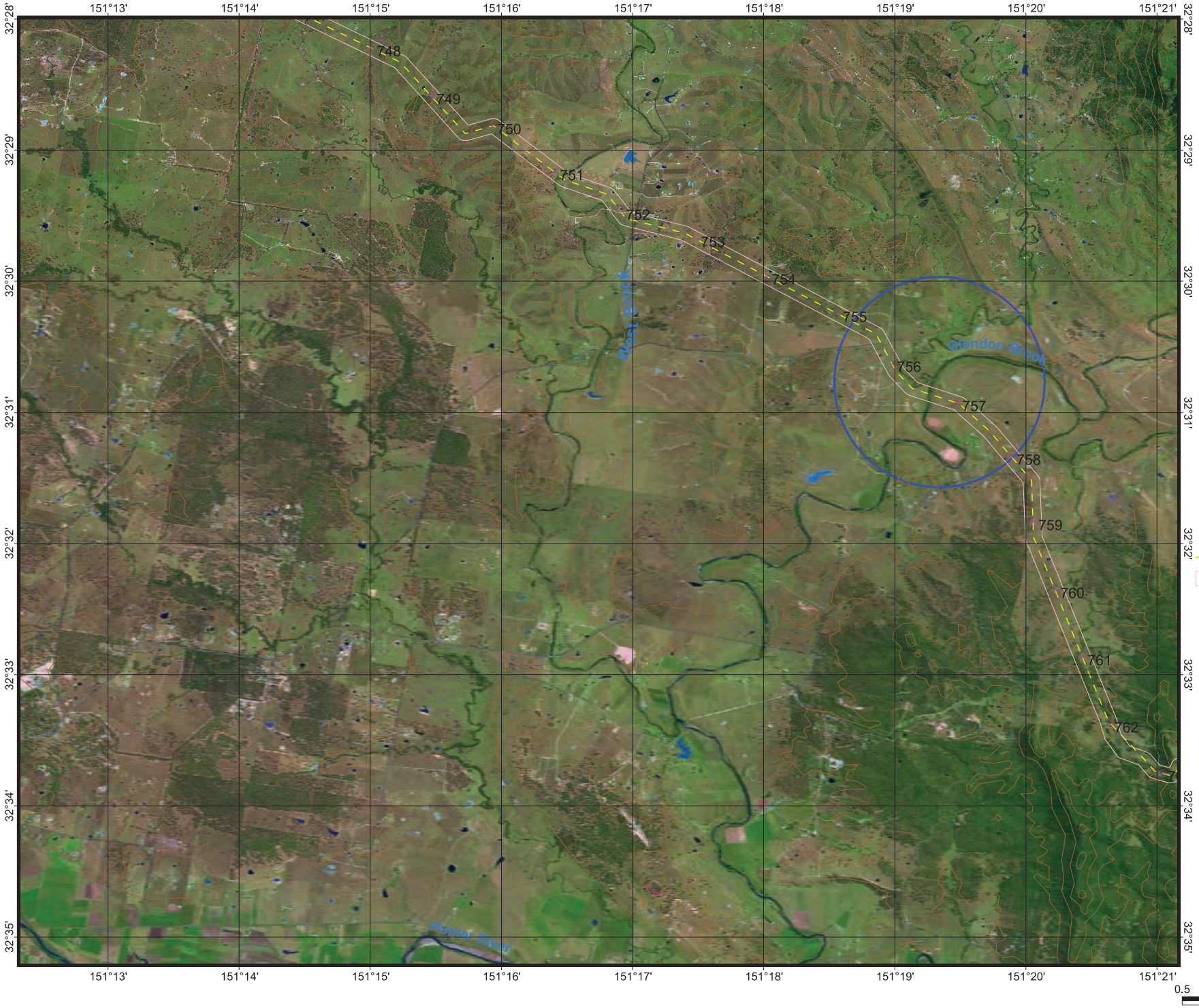
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

- 50m contours
- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H
- QHGP KPs Rev H
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 5 - GLENDON BROOK
(North East of Singleton)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

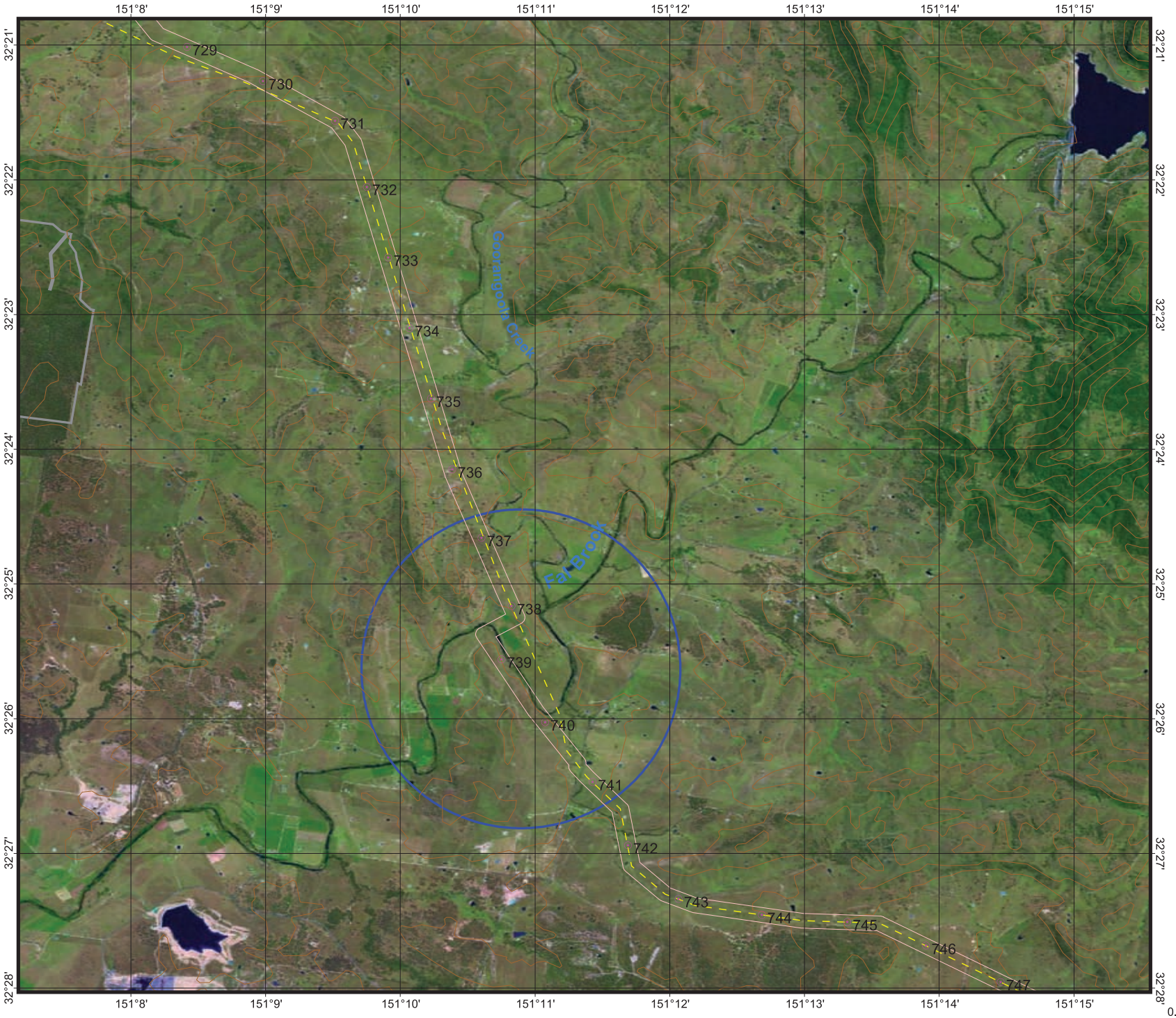
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 6 - FAL BROOK

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

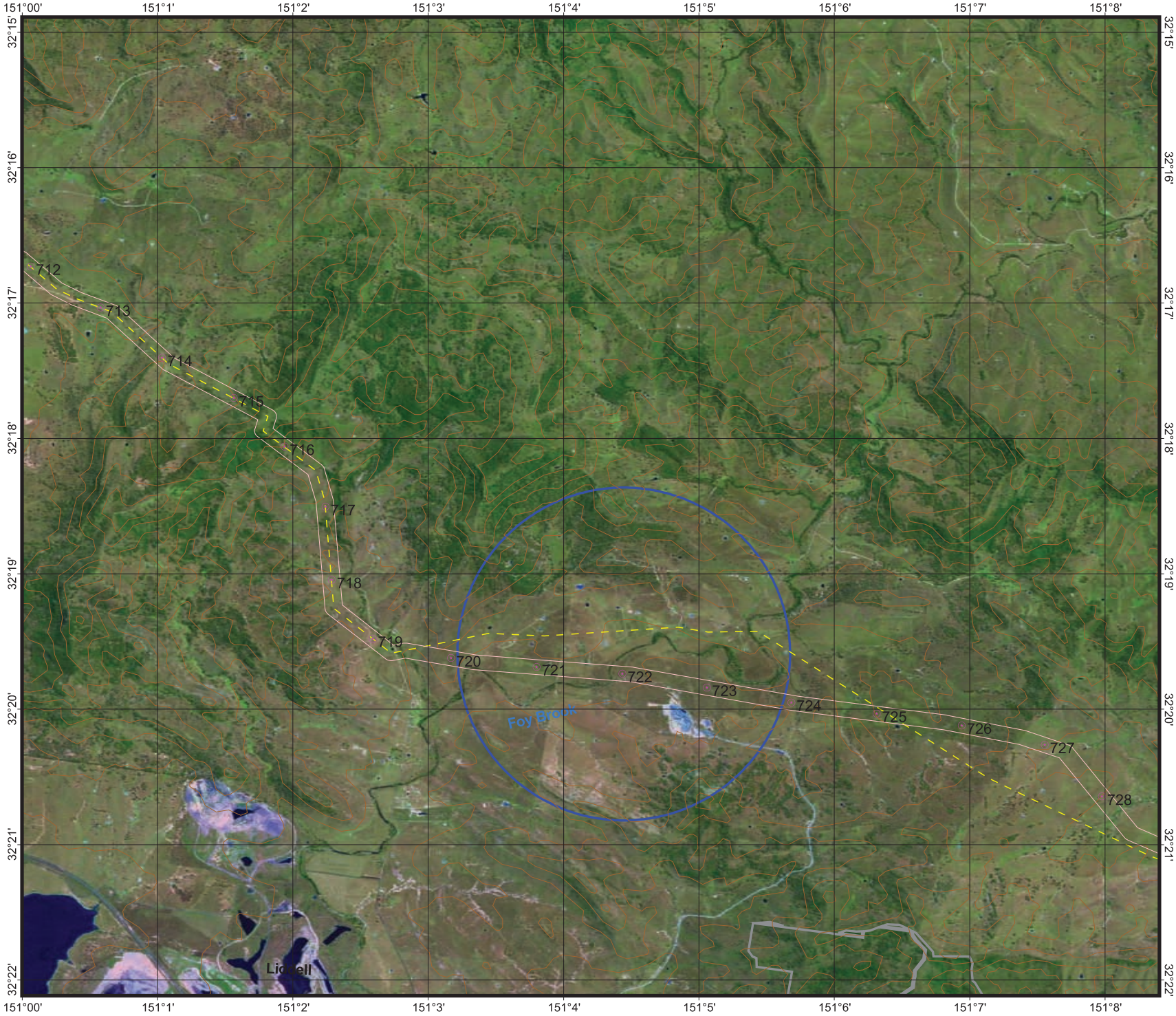
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

- 50m contours
- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H
- QHGP KPs Rev H
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 7 - LIDDELL AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

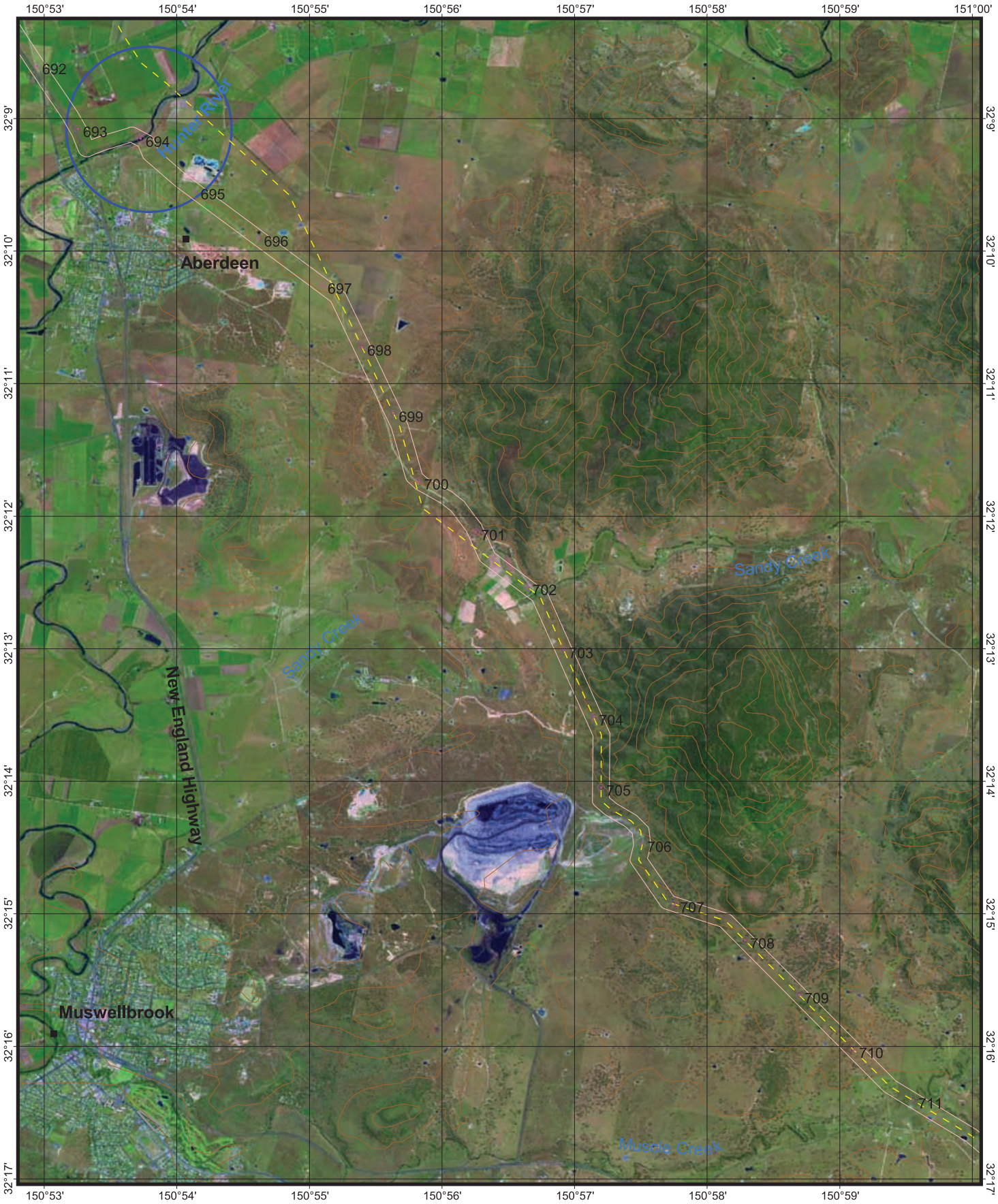
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

- 50m contours
- National Parks Estate (DECC)
- NSW State Forests
- Previously assessed QHGP centreline Rev D
- QHGP mainline corridor (200m) Rev H
- QHGP KPs Rev H
- Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 8 - MUSWELLBROOK - ABERDEEN AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

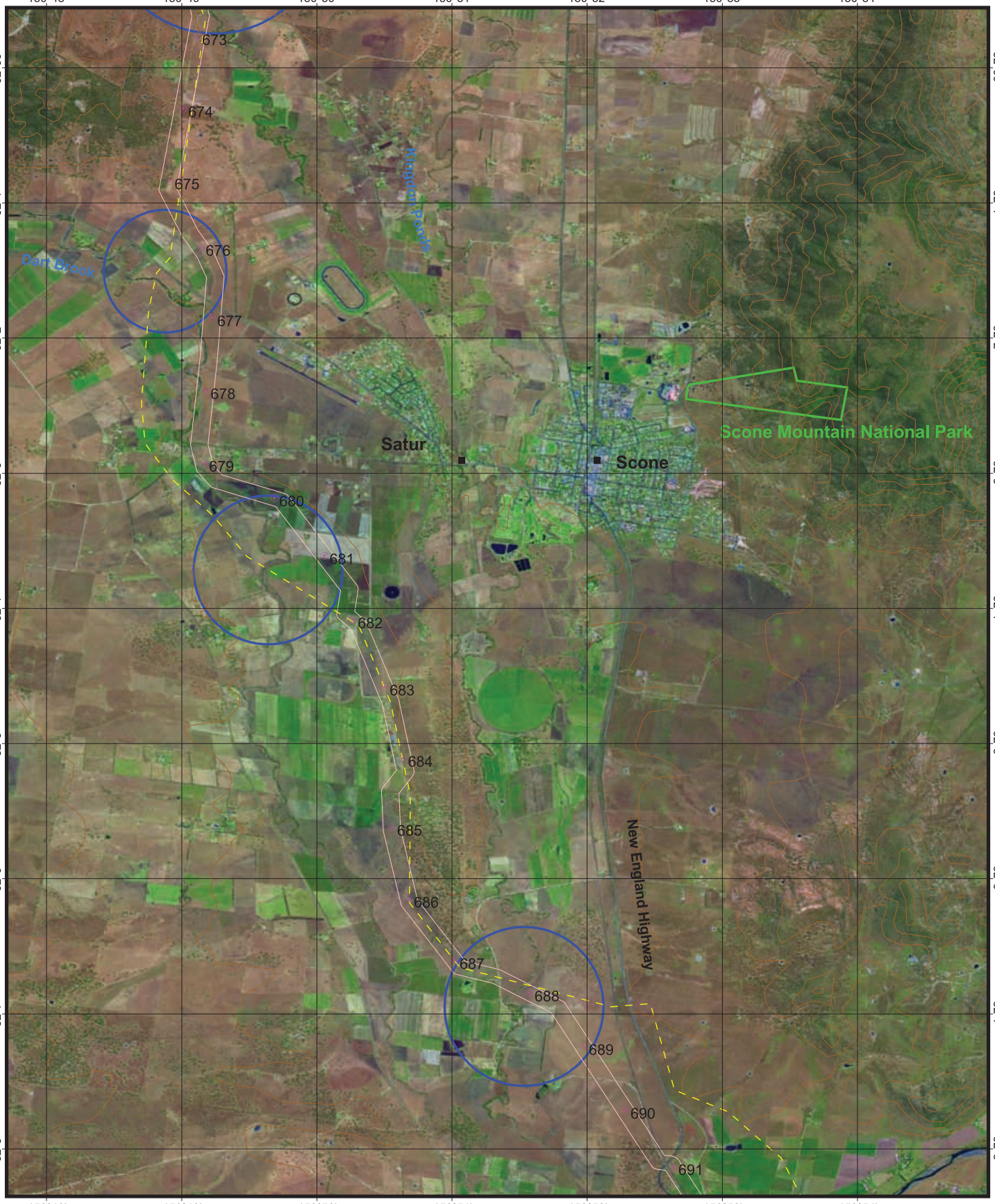
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 9 - SCONE AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

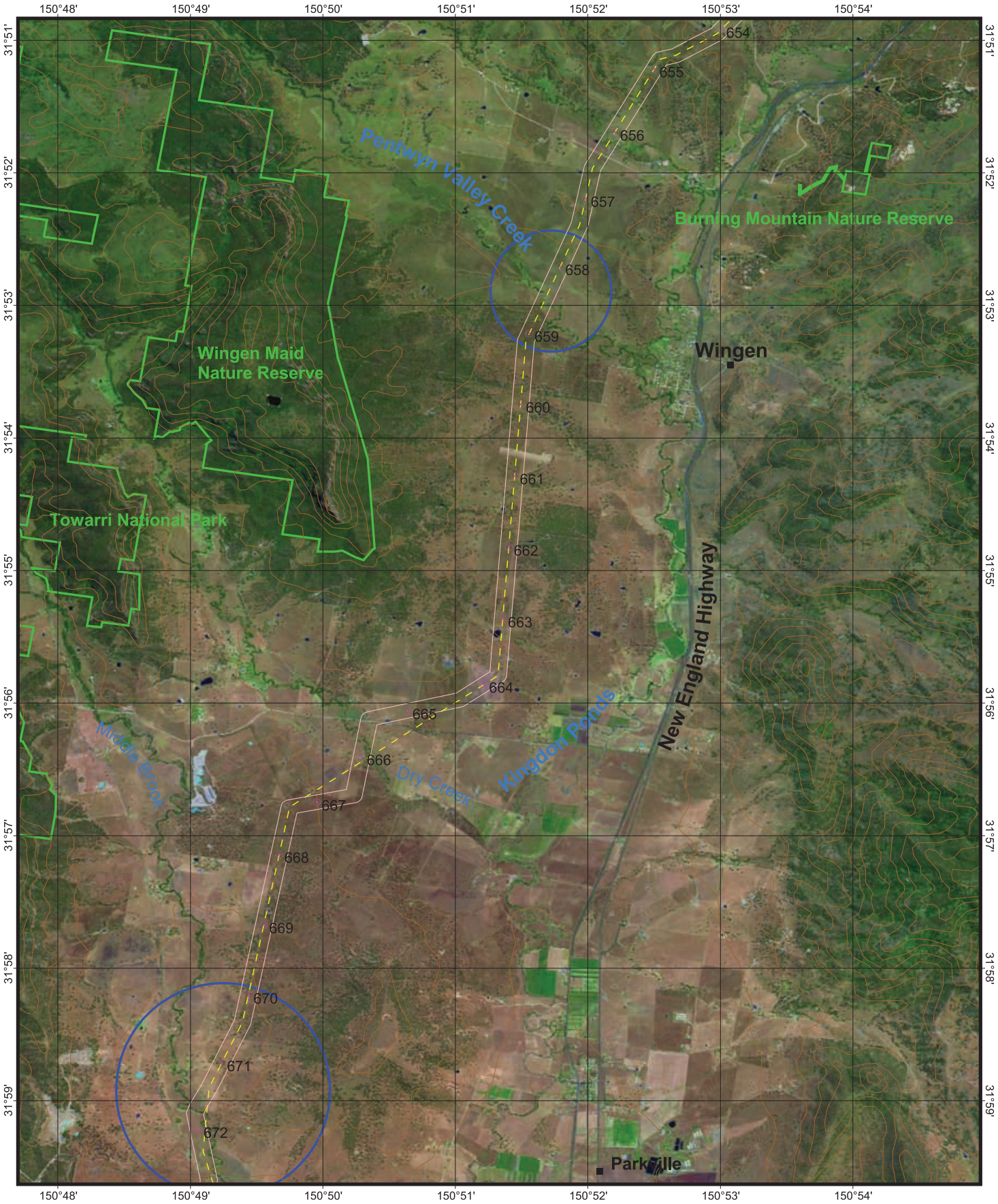
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 10- PARKVILLE - WINGEN AREA (NORTH OF SCONE)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

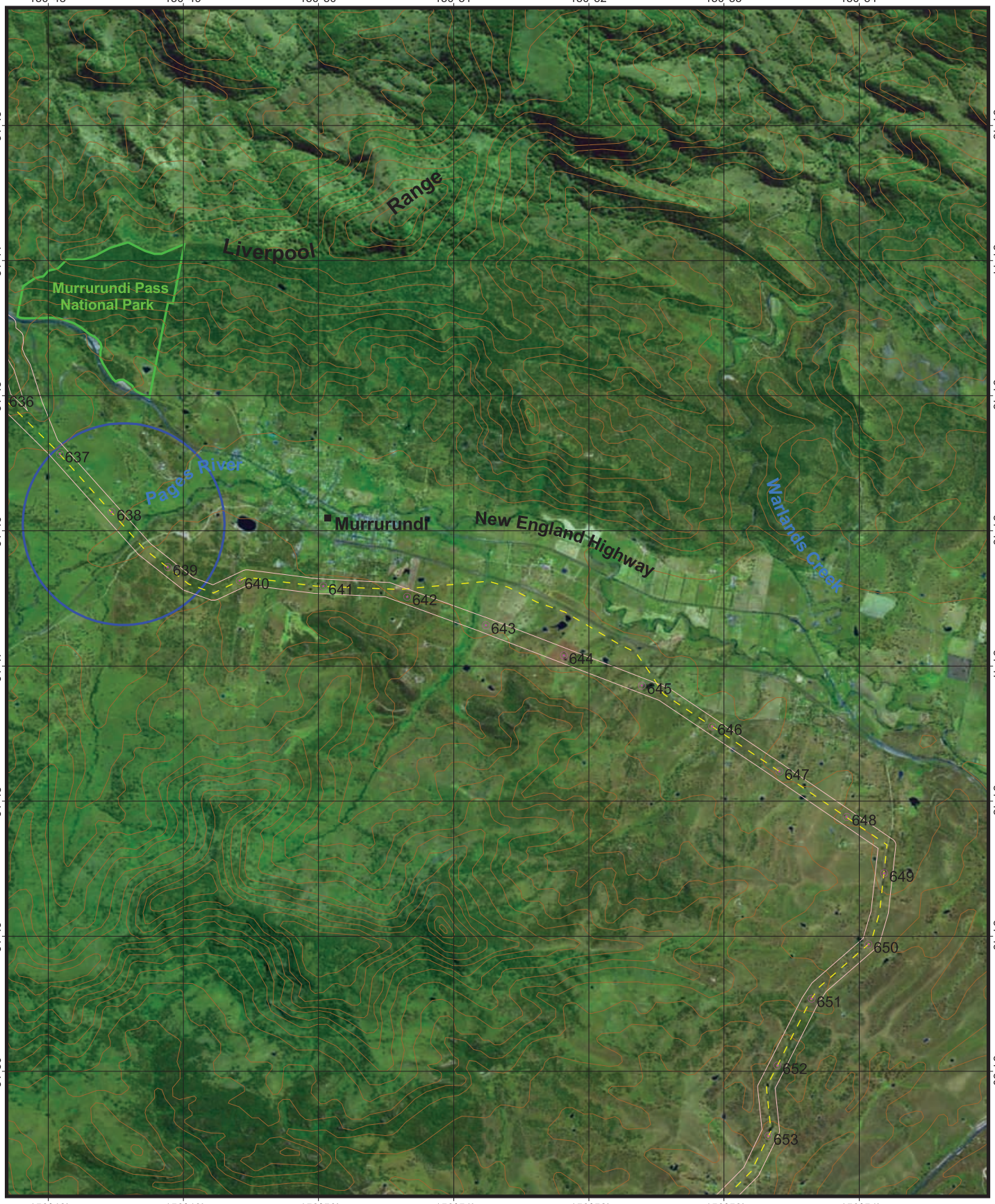
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 11 - MURRUNDI
(Liverpool Range - East)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

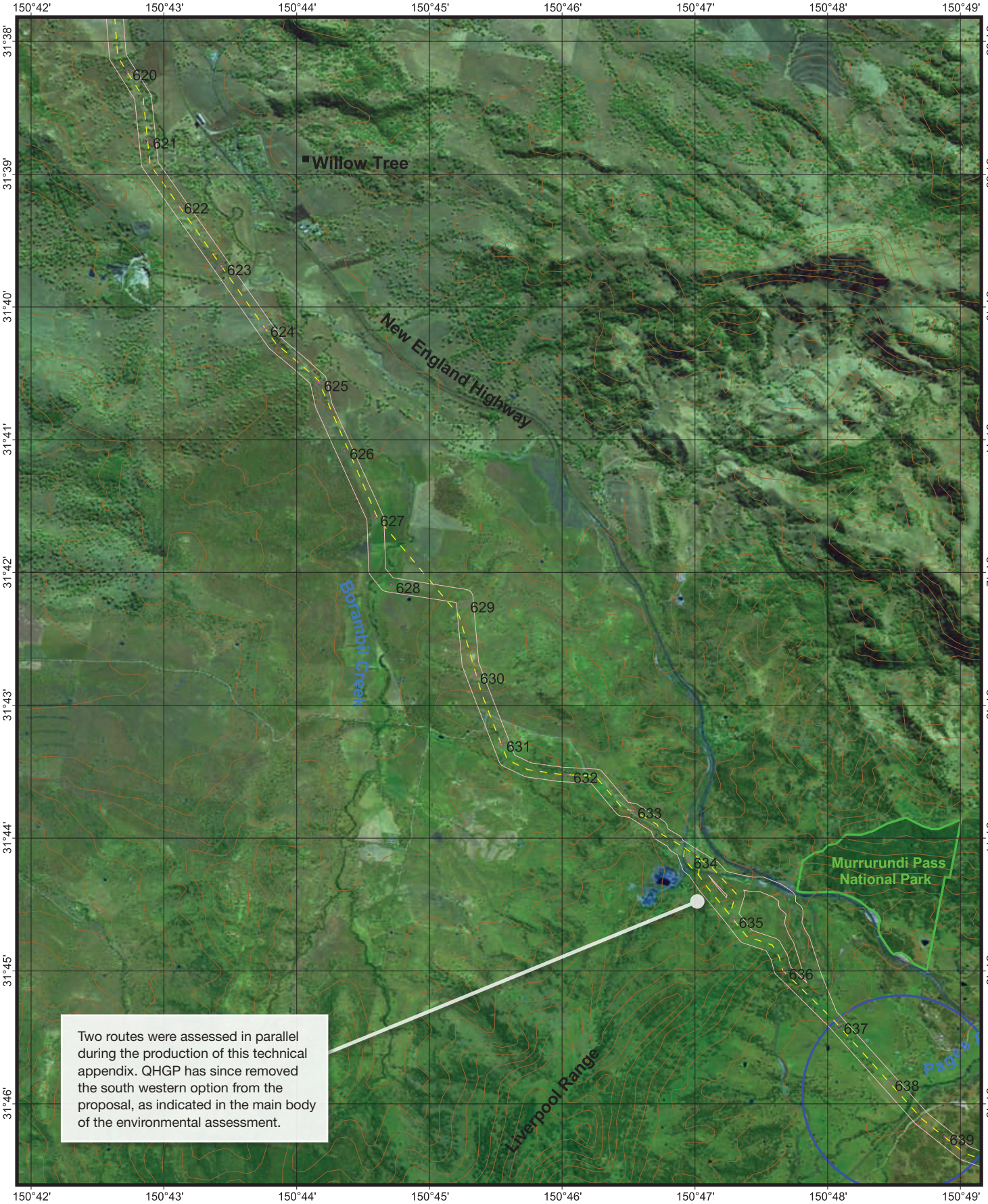
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 12 - WILLOW TREE
(Liverpool Range - West)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

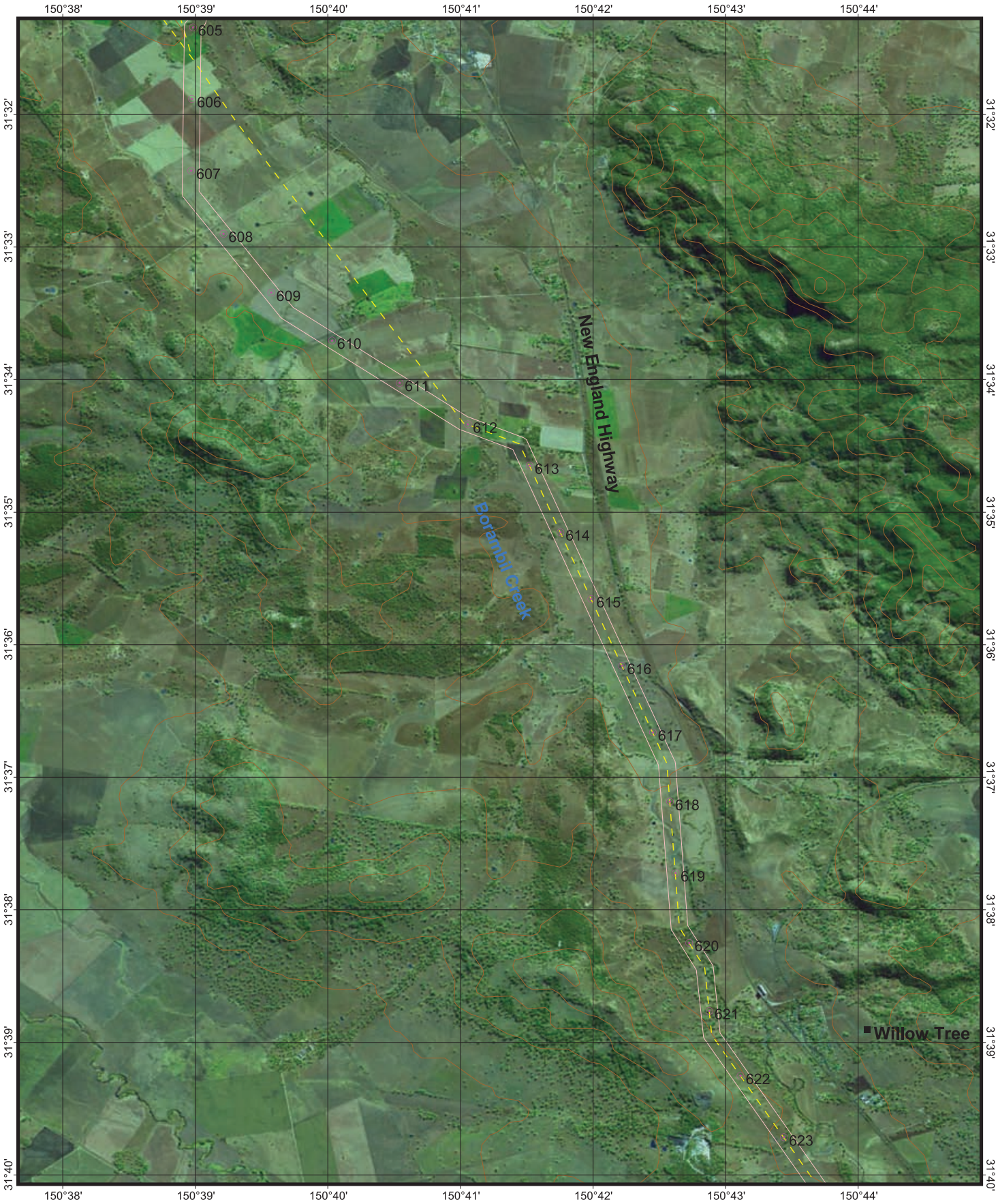
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 13- BORAMBIL CREEK
(South of Quirindi)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

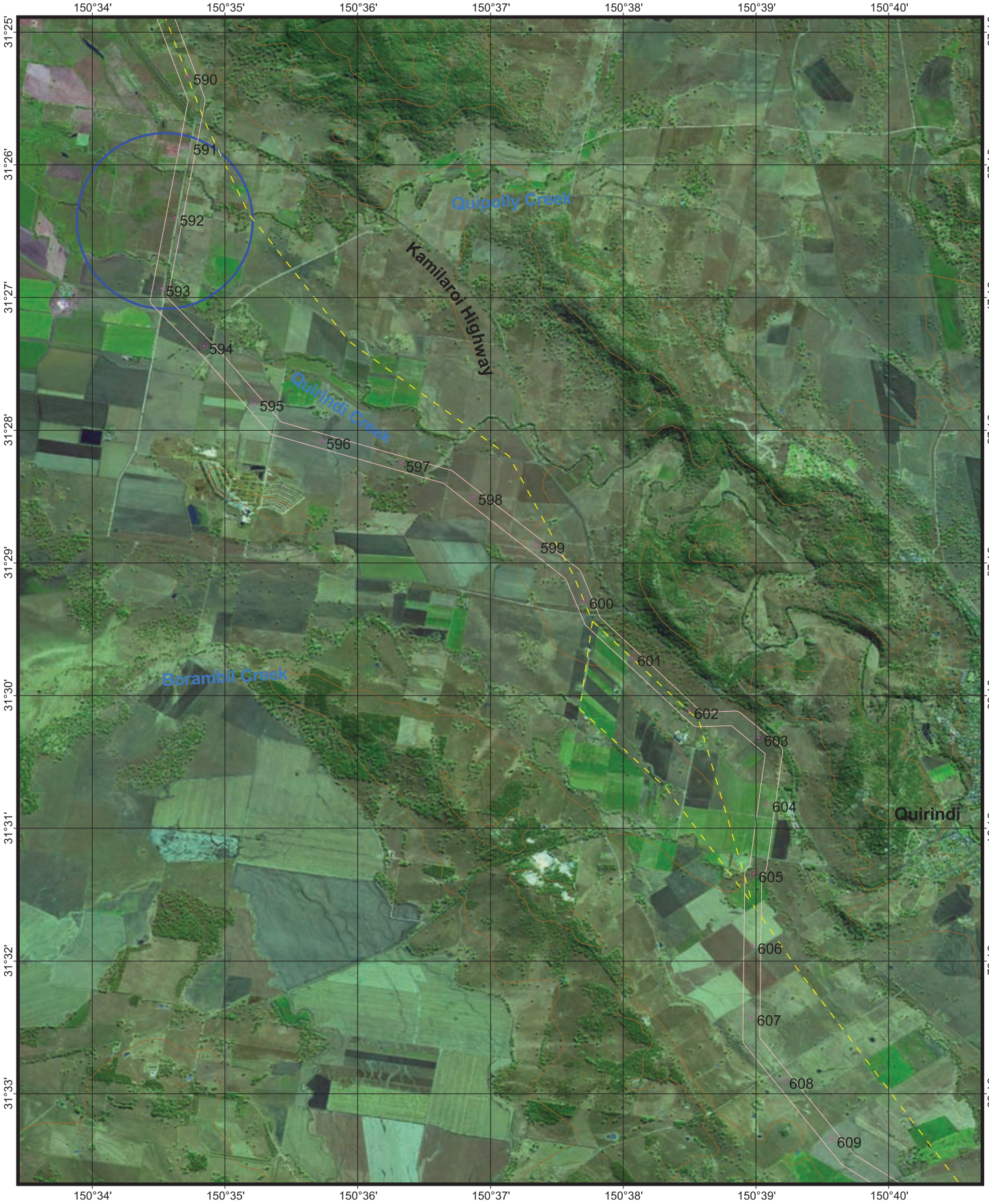
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 14 - QUIRINDI

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

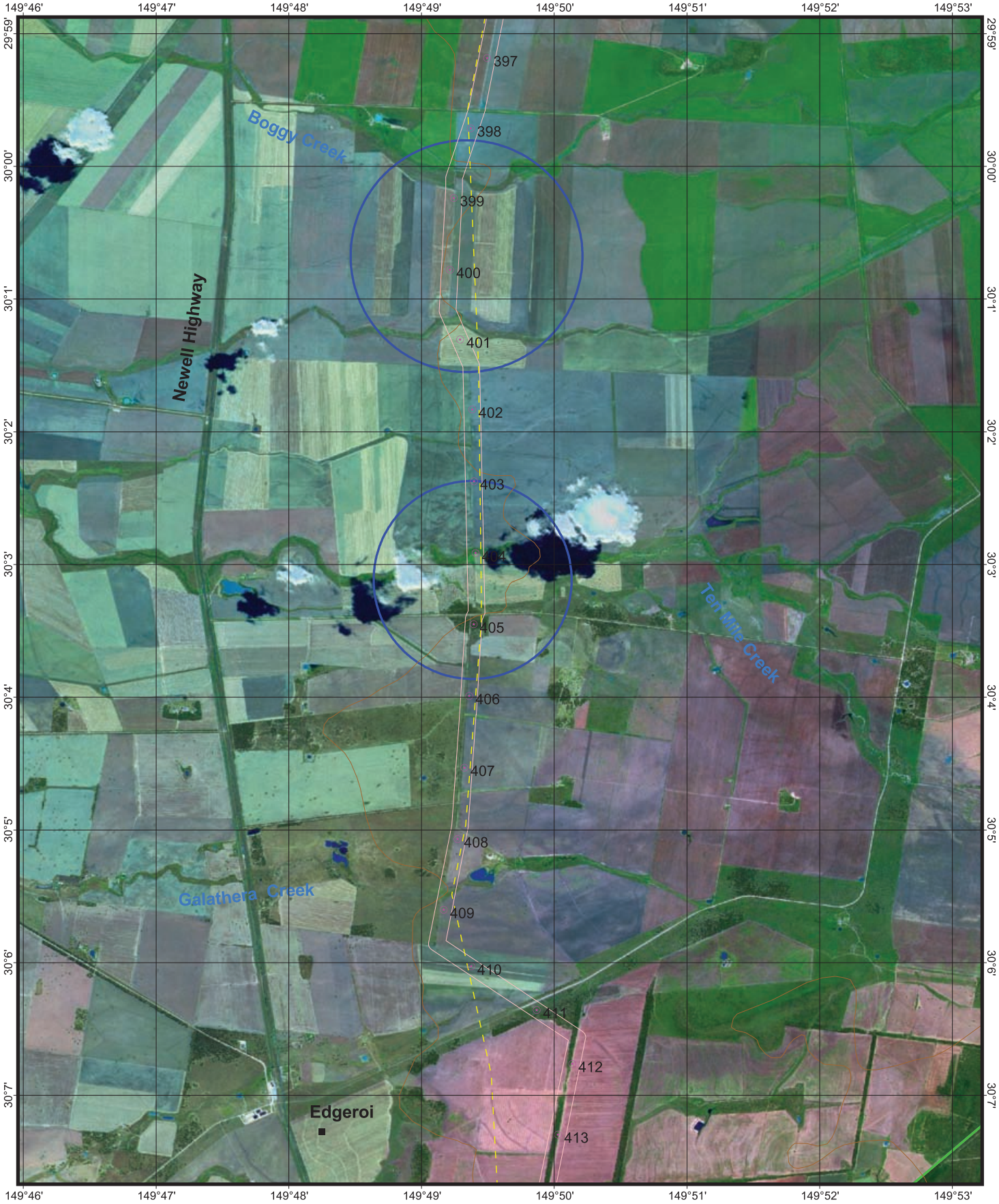
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 15 - EDGEROI - TEN MILE CREEK

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

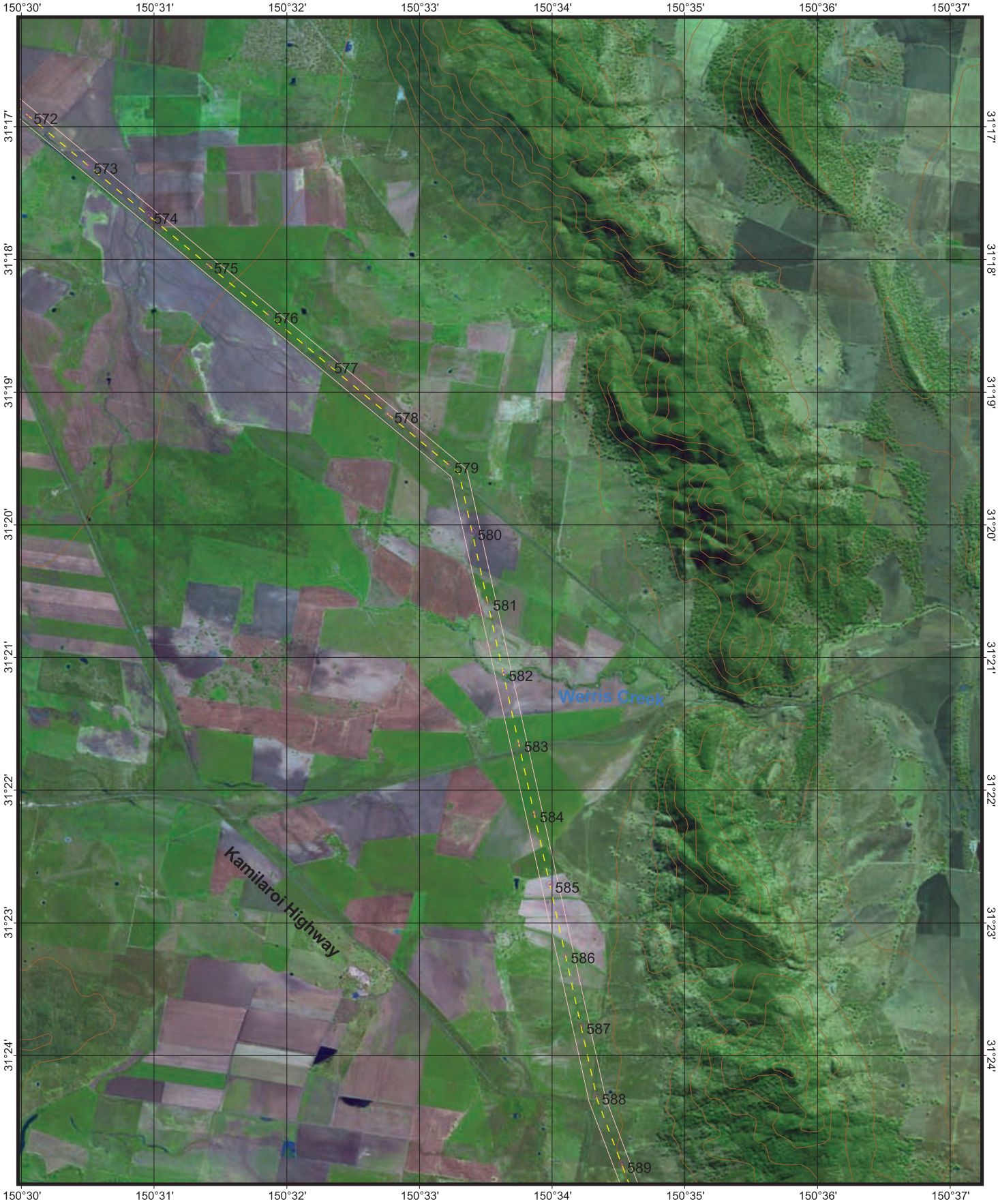
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 15 - WERRIS CREEK

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 16 - BREEZA
(South of Gunnedah)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

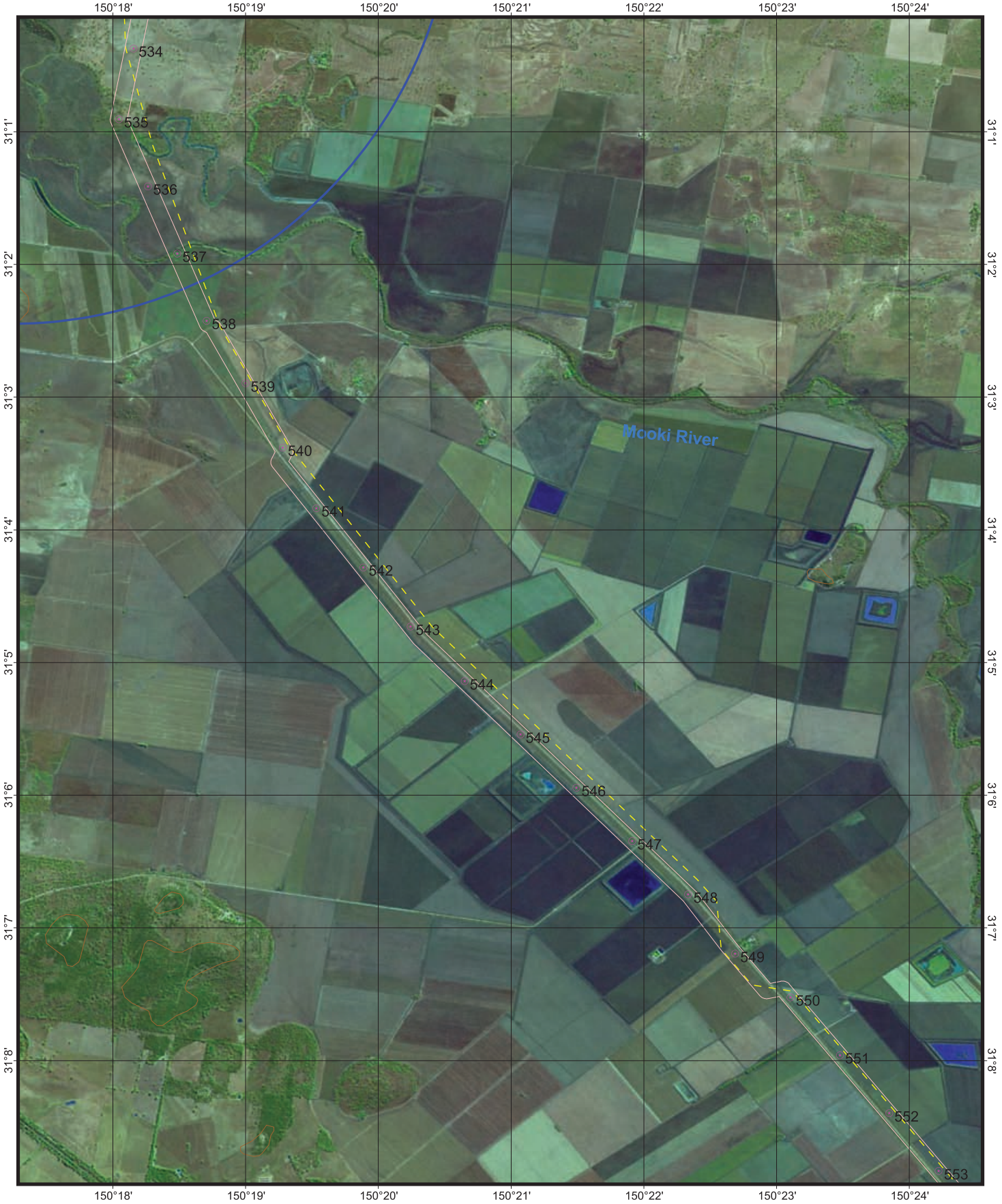
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 17 - MOOKI RIVER
(South of Gunnedah)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 18 - GUNNEDAH

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

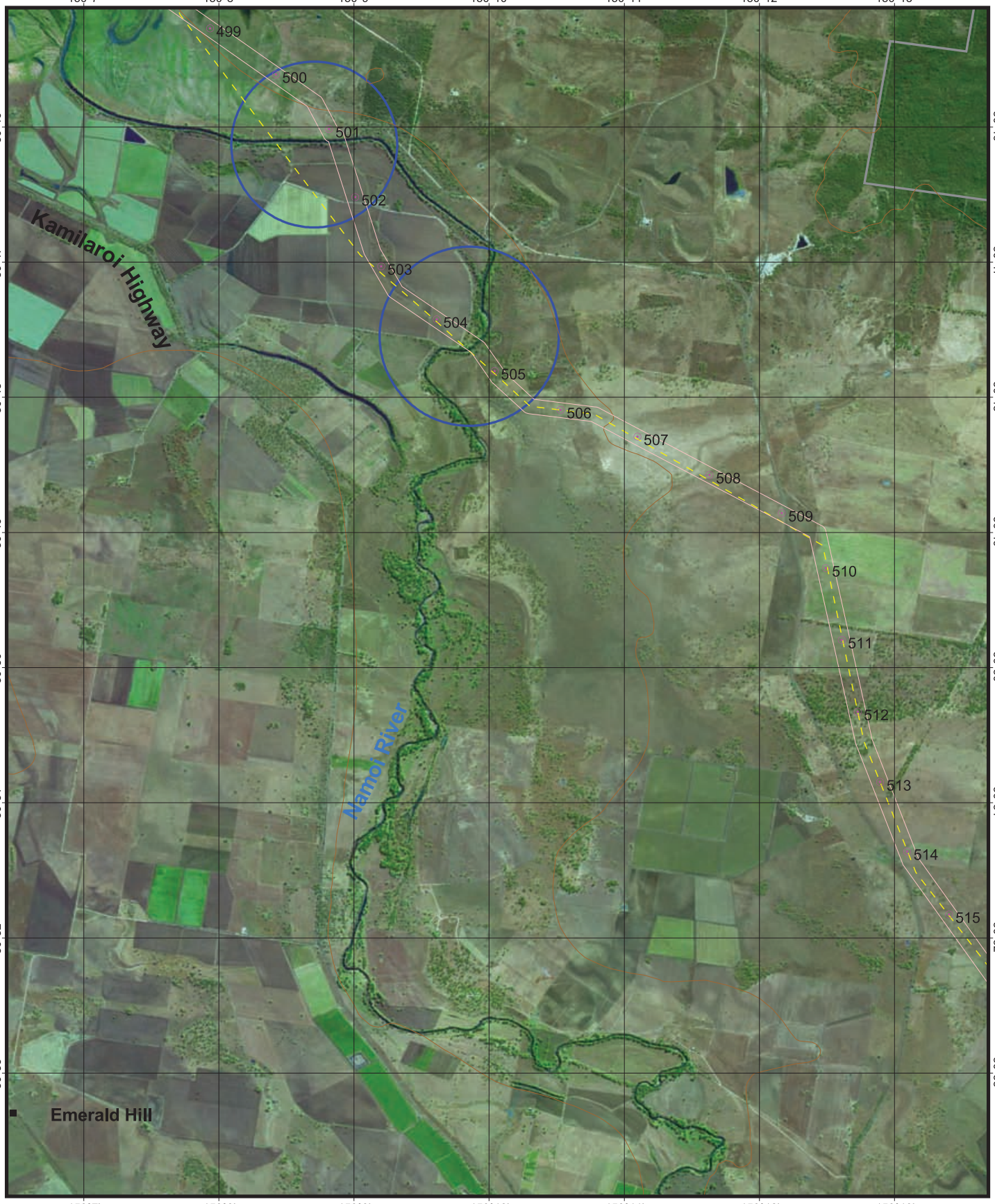
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 19 - EMERALD HILL
(North of Gunnedah)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

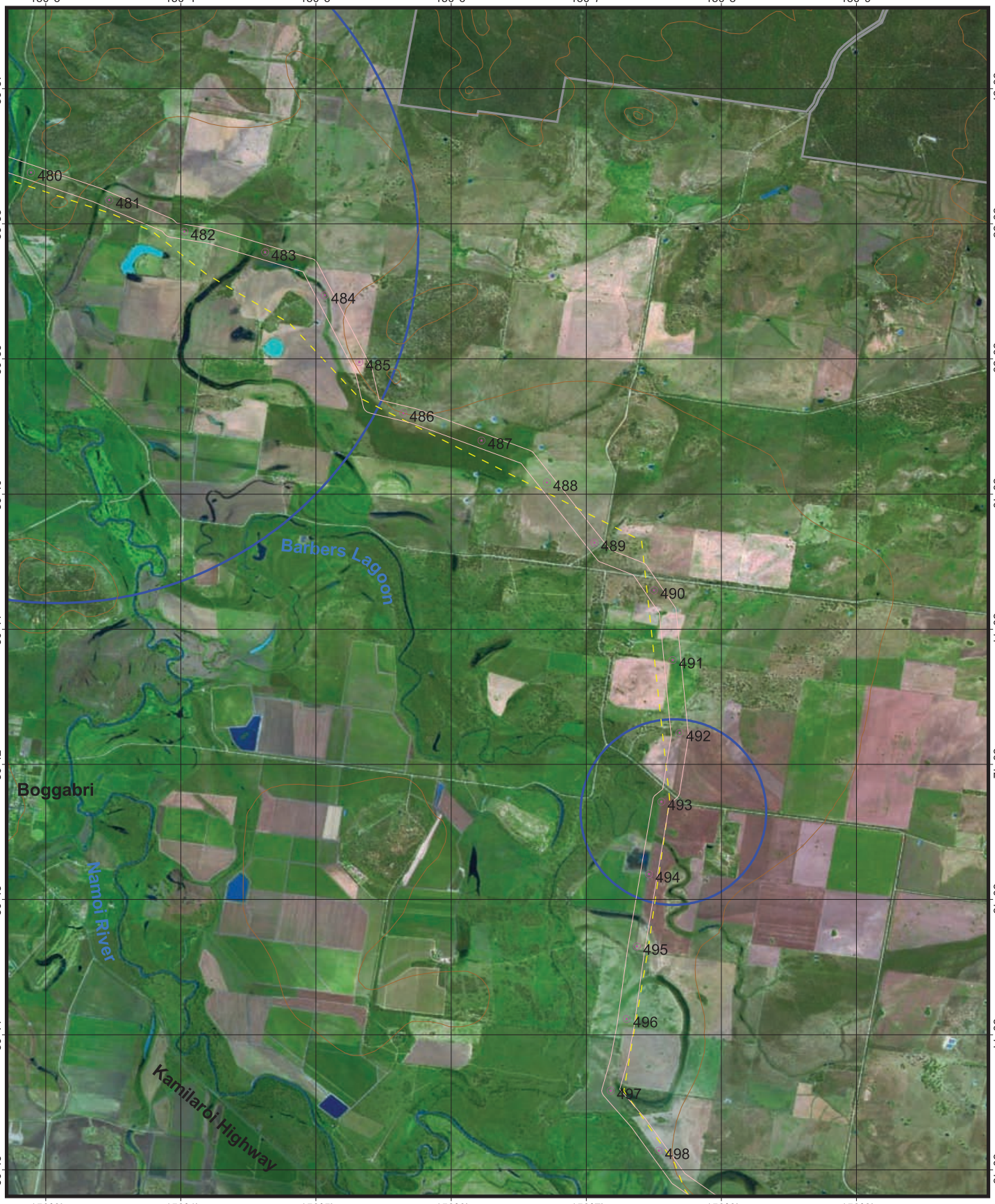
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 20 - NAMOI VALLEY
(East of Boggabri)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

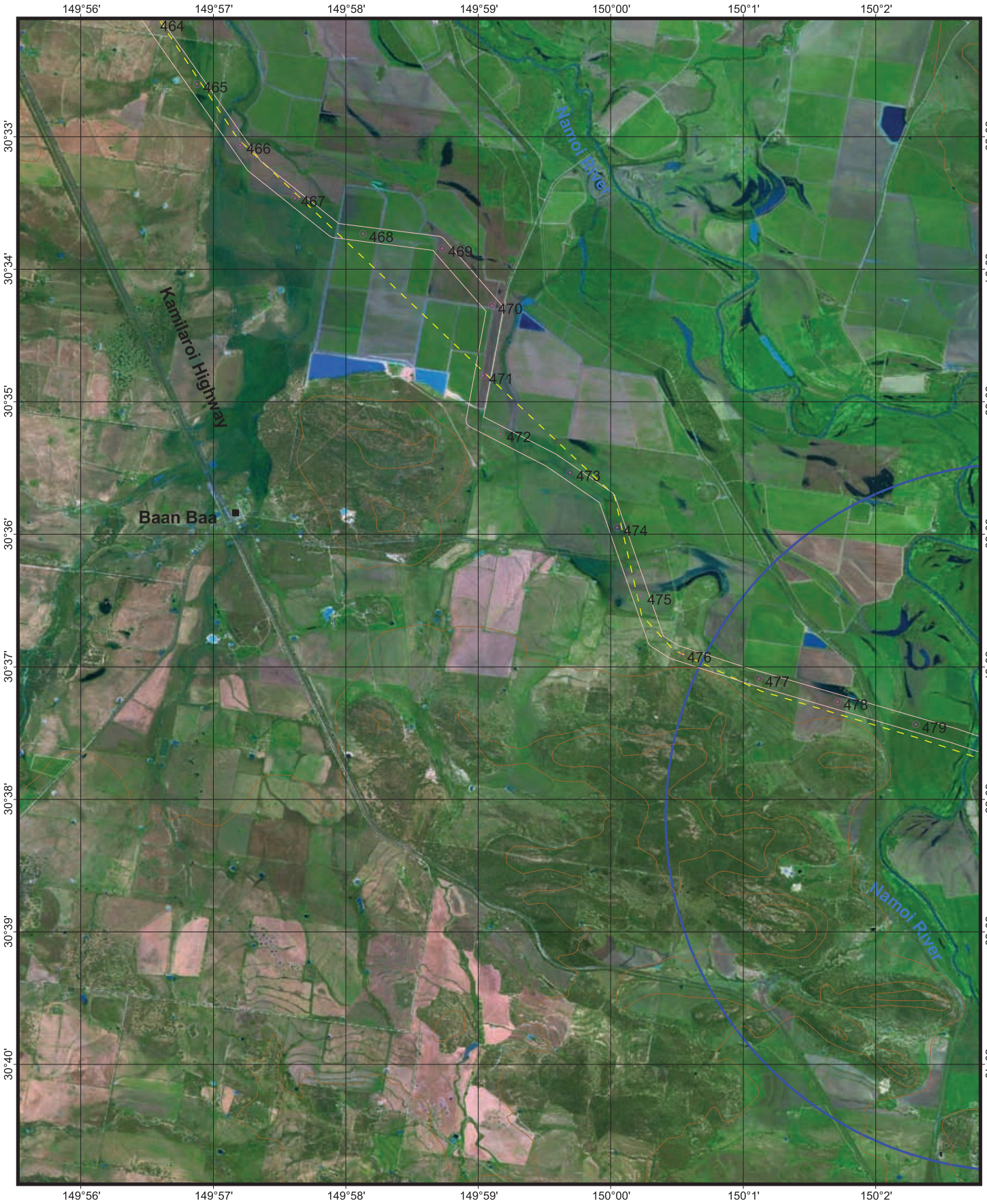
This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 21 - BAAN BAA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

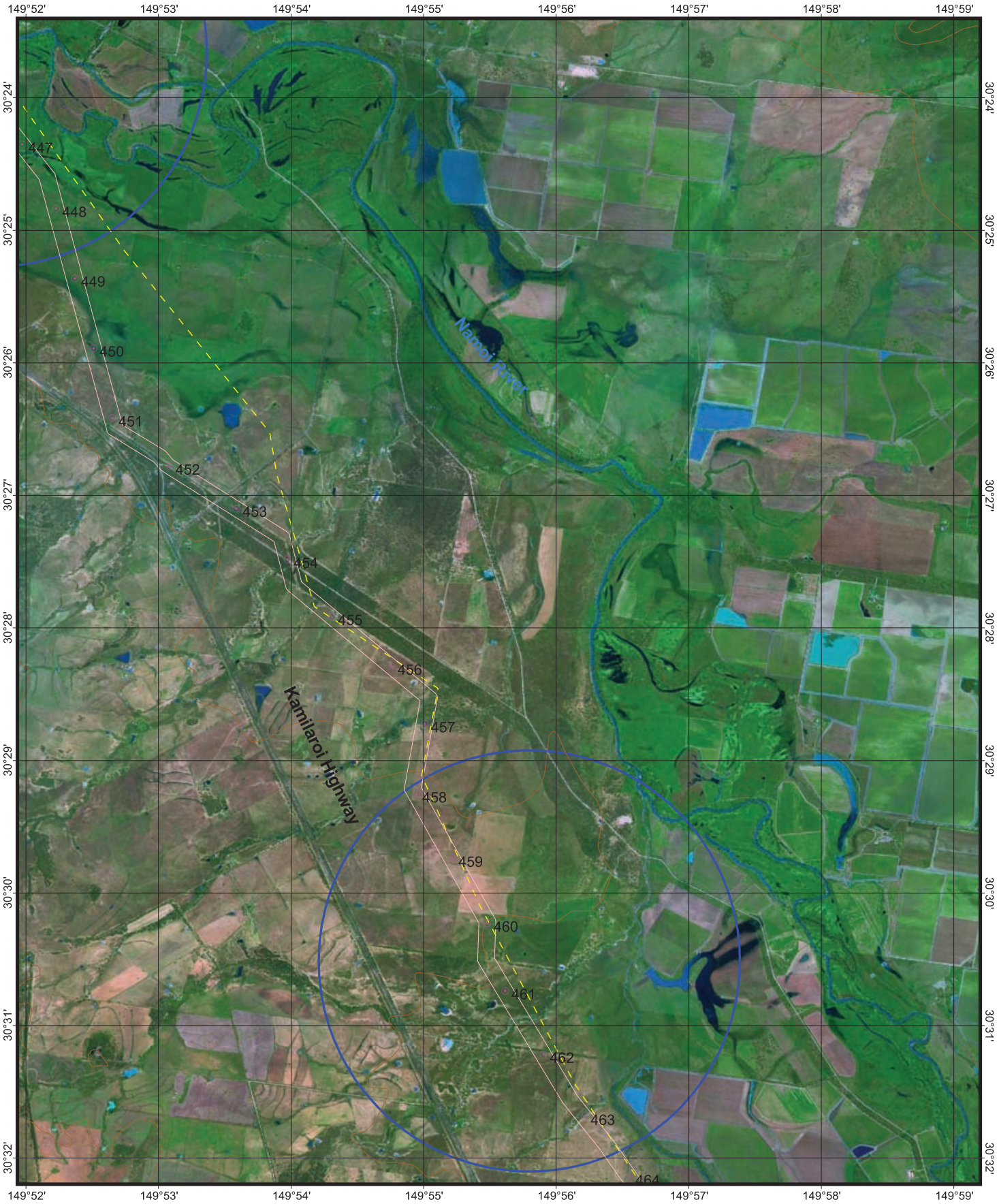
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 22 - NAMOI VALLEY
(South East of Narrabri)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

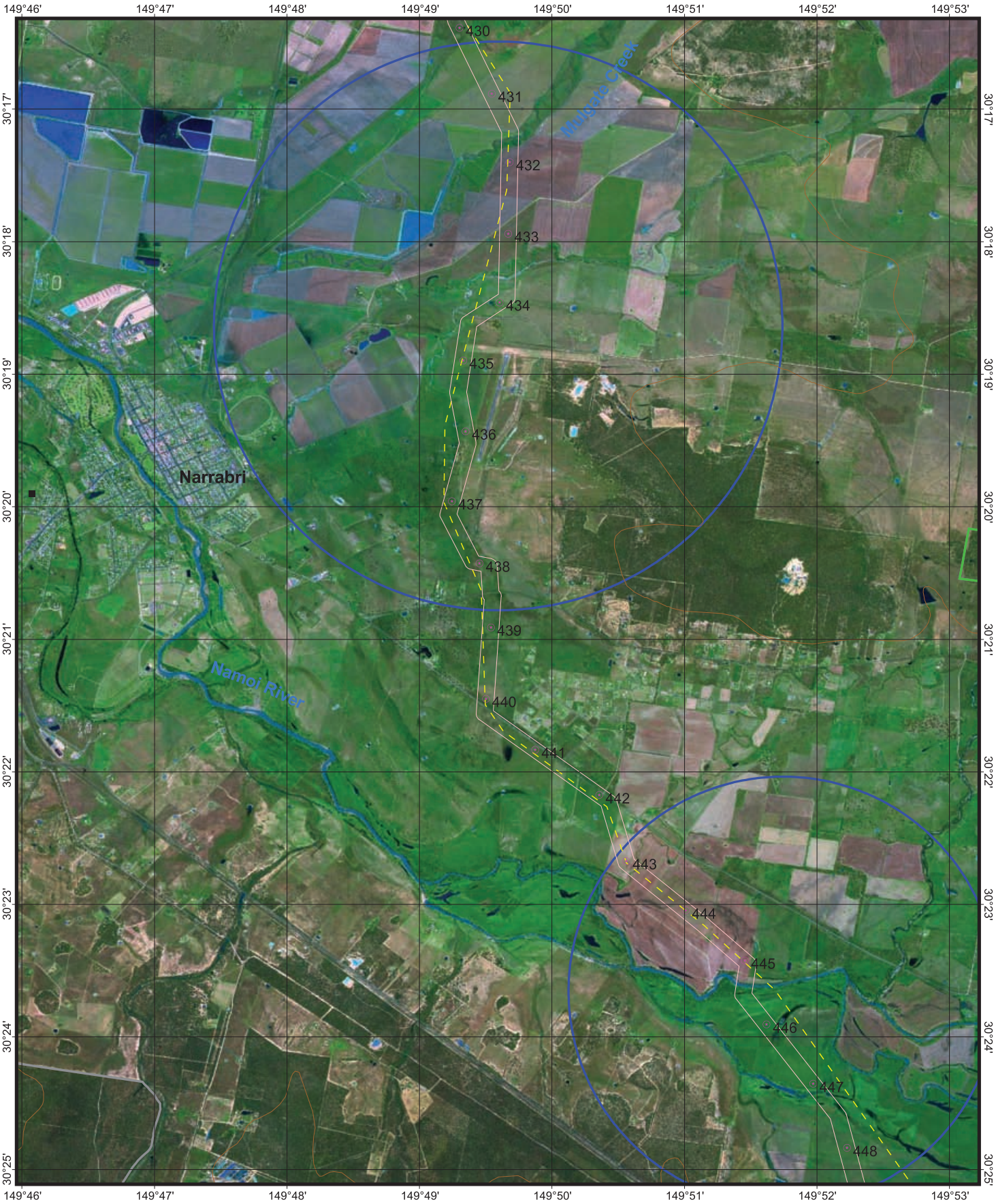
ngh environmental

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 23 - NARRABRI

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

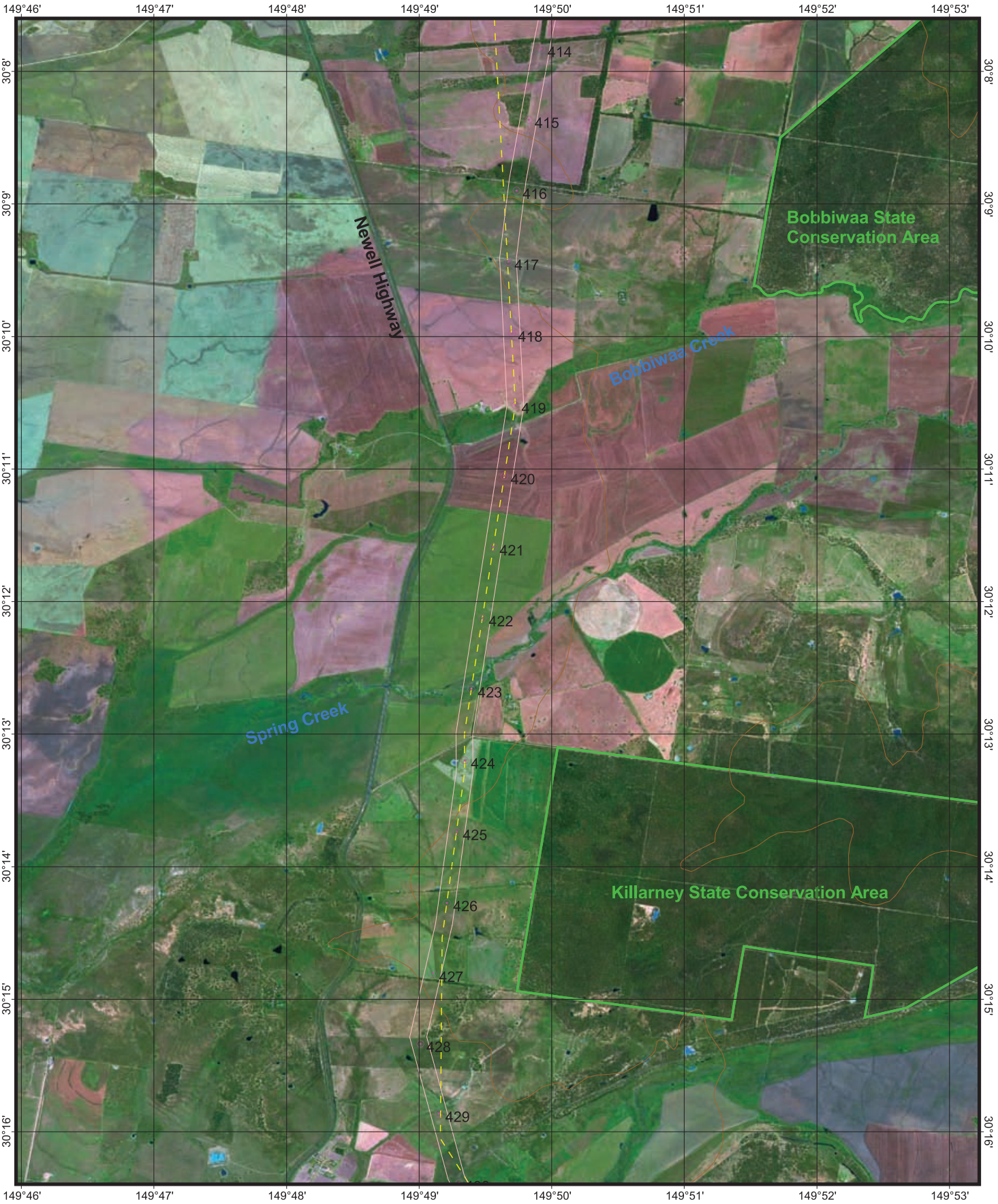
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 24 - SPRING CREEK
(South of Edgeroi)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 26 - BELLATA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

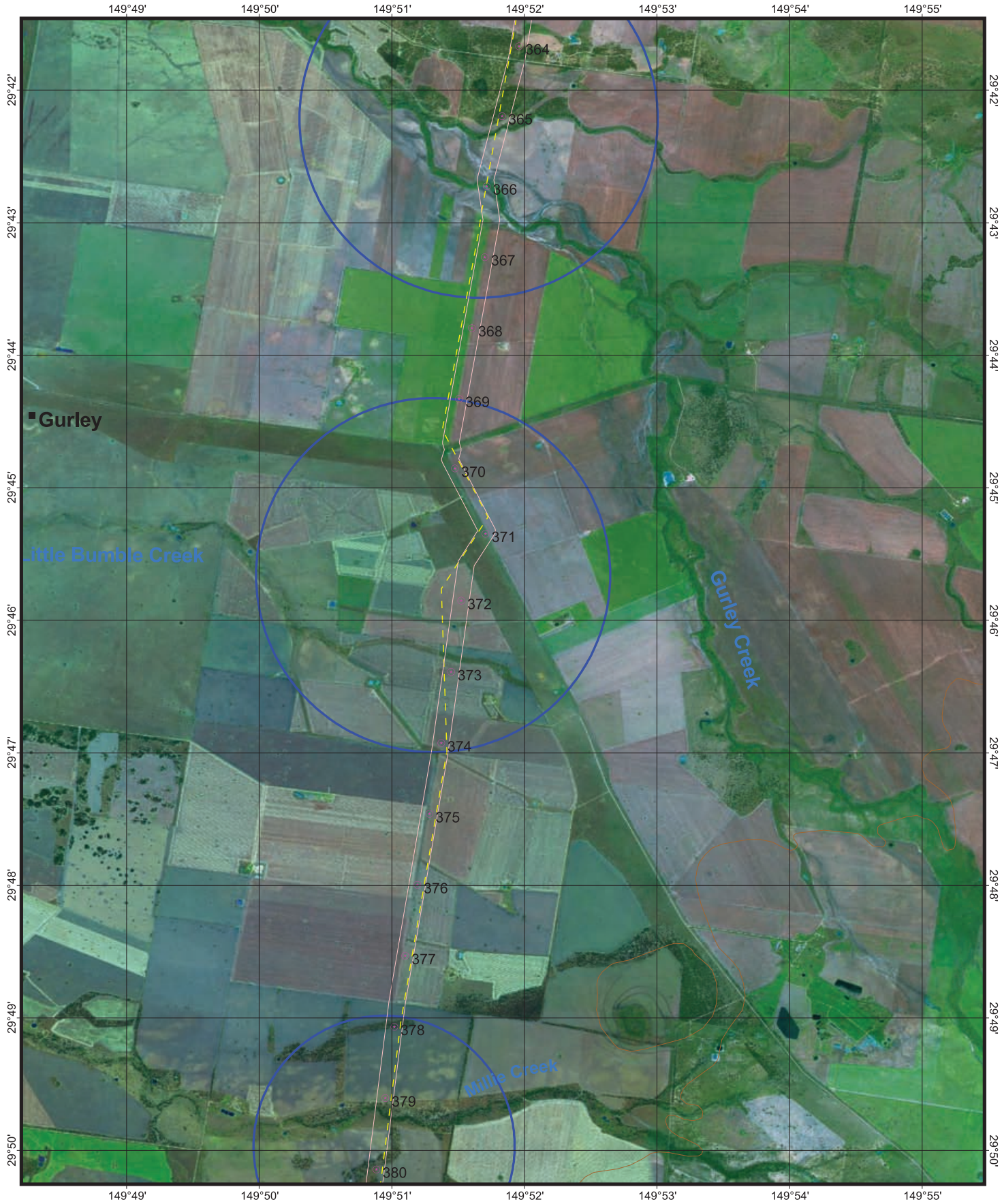
ngh environmental

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 27 - GURLEY AREA

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 28 - TYCANNAH CREEK
(South of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 29 - MEEHI RIVER
(East of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 30 - ASHLEY AREA
(North of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours

National Parks Estate (DECC)

NSW State Forests

Previously assessed QHGP centreline Rev D

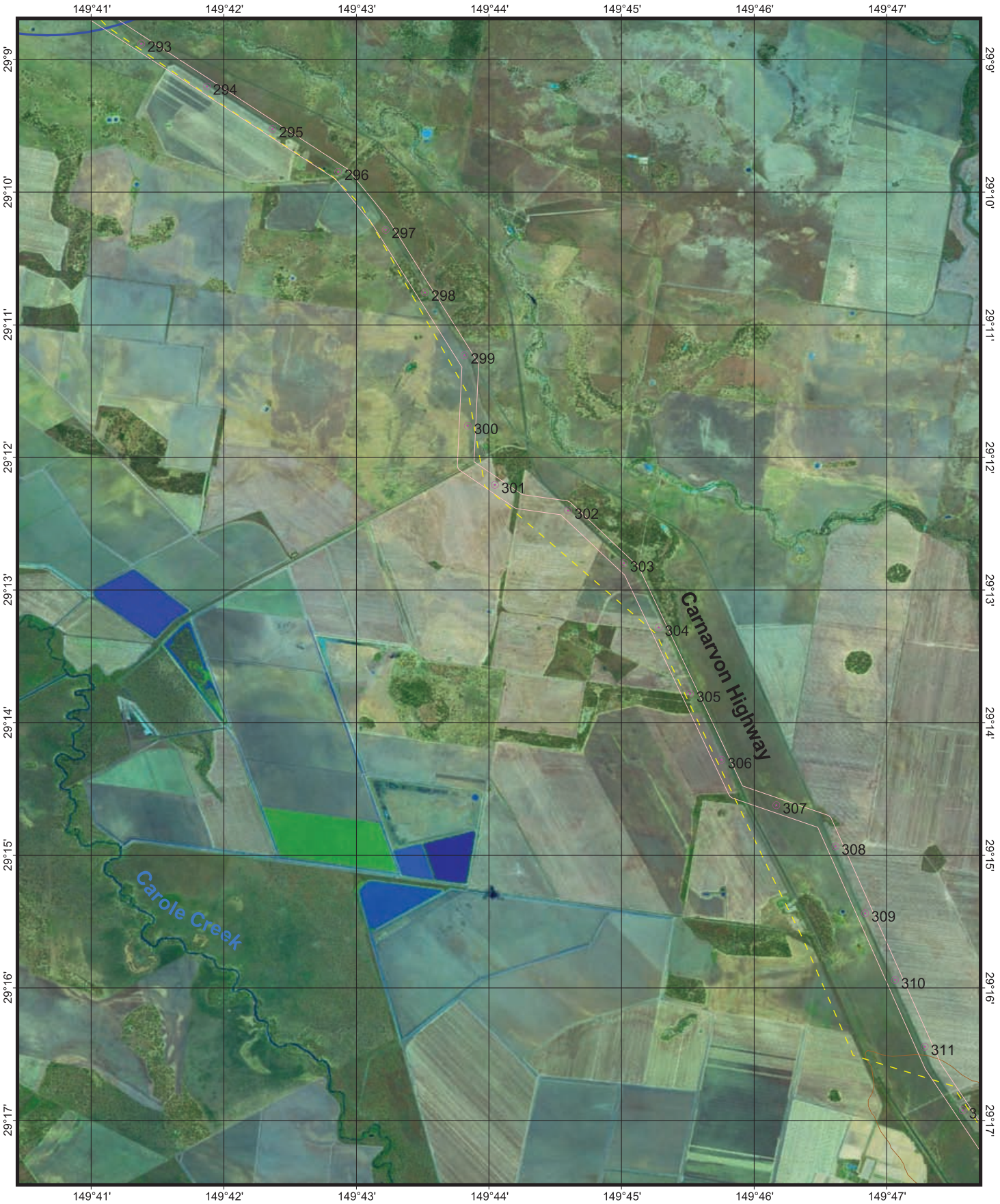
QHGP mainline corridor (200m) Rev H

QHGP KPs Rev H

Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 31 - CAROLE CREEK AREA
(North of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

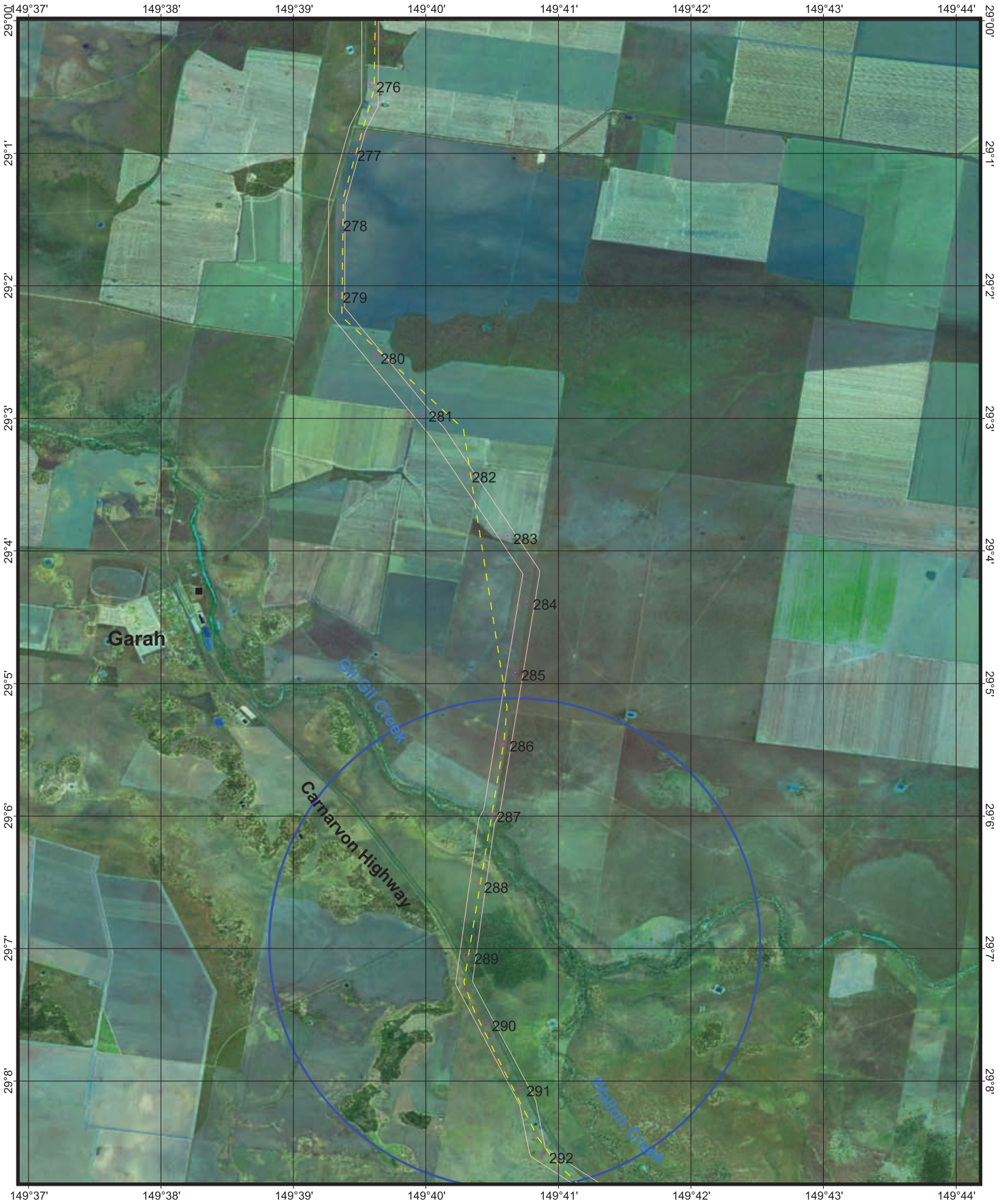
ngh environmental

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers



QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 32 - GARAH AREA
(North of Moree)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 33 - BOONAL TANK AREA
(South of Boomi)

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 34- BOOMI SOUTH

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUEENSLAND TO HUNTER GAS PIPELINE PRELIMINARY ENVIRONMENTAL ASSESSMENT

ORTHOPHOTO MAP 35 - BOOMI NORTH

Map Scale 1:50,000
GDA1994 Datum
Geogrphic Coordinates

This map has been prepared for the analysis of vegetation and environmental constaints. Maps prepared March 2008 by Phil Kendall for NGH Environmental Pty Ltd contract work as part of the Hunter Gas Pipeline project.

ngh environmental

50m contours
National Parks Estate (DECC)
NSW State Forests

Previously assessed QHGP centreline Rev D
QHGP mainline corridor (200m) Rev H
QHGP KPs Rev H
Key areas to be investigated for environmental constraints related to waterways and associated riparian flora and fauna

N
W
E
S

0.5 0 0.5 1 1.5 2 2.5 Kilometers