

4 Additional biodiversity studies

4.1 Introduction

The careful process of route development has already avoided the majority of constraints identified in the EA. This is supported by the fact that of the 833km of the proposed pipeline, specific management measures have only needed to be developed for 54km; a total of 8.8% of the NSW portion. A further 14.3km of the pipeline will be subject to additional fieldwork to be completed prior to construction due to limitations in access during surveying. Issue specific mitigation and management measures have been developed where constraints could not be explicitly avoided.

The EA identified biodiversity constraints on a desktop level and sought to avoid them in the Study Area. Additional fieldwork recently completed as part of adaptive management has further delineated those constraints in order to refine the Study Area and avoid specific impacts within the ROW. As a result, the proposal has been refined to avoid all significant impacts.

Following completion of the fieldwork the proposal has been refined to avoid all significant impacts. It is important to note that the maps and management areas presented in this chapter have been developed based on impacts which had not been avoided by the Study Area exhibited in the EA.

The additional biodiversity fieldwork was undertaken following the public display of the EA. This fieldwork was scheduled to take advantage of the 2008 spring; the season when the most complete biodiversity data could be gathered. An overview of the scope of the fieldwork and results is provided below. The complete technical report is attached as Appendix D. Location specific commitments relating to biodiversity have been included in the revised SoCs in Chapter 6 of this report. These are also shown in Section 4.3.

4.2 Scope of the fieldwork

Site fieldwork was carried out from 6–26 October 2008, with a focus on the biodiversity constraint areas shown on Figures 18.2–18.8 of the EA. The biodiversity constraint areas (species, populations and EECs) were determined as a result of the desktop and screening process described in the EA. Due to a combination of minor alignment changes made in response to issues raised in submissions and the availability of higher resolution data, some areas that were not identified in the EA have since been identified as potential constraints. QHGP has followed the same management hierarchy of avoidance and mitigation in these areas to reduce potential impacts to an acceptable level.

The fieldwork sought to measure and describe biodiversity attributes and assess the presence and condition of key features. The fieldwork also sought to determine the nature and extent of potential impacts likely to result from the proposal and, as necessary, provide input into the refinement of the alignment for avoidance of significant impacts and also to support the development of specific, geographically focused mitigation measures. Field activities included broad scale and targeted surveys and habitat assessment for threatened species and known EECs. Surveys also verified potential threatened species habitat and EECs. Further details on the scope and methodology of the additional biodiversity fieldwork are outlined in Appendix D of this report.

There were limitations to the fieldwork where some properties could not be accessed for surveying. Commitment B18 in the revised SoCs provides to complete surveying of these areas prior to construction. The results of this surveying will inform the future avoidance of constraints, or the development of management and mitigation measures as per the process described in this chapter.

4.3 Results

The ongoing refinement of the Study Area and ROW has avoided significant impacts, prior to biodiversity surveying. The nature, scale and duration of the residual impacts can be demonstrated to be both minimal and reversible.

The results of the fieldwork have shown that where constraints cannot be explicitly avoided, impacts can be mitigated to an acceptable level such that the biodiversity value of specific locations will be maintained.

It is expected that there would be minimal unavoidable habitat loss as a result of the construction of the pipeline, however the effects of this loss will be temporary. QHGP has committed to the reinstatement of habitat features and rehabilitation of the easement to as close as possible to its previous state. The result of this commitment is that in the medium to long term location specific habitat loss will be negligible.

The development of the pipeline has the potential to improve overall biodiversity outcomes. This would be achieved through the management of weeds for a period of at least two years following construction, the ongoing conservation and avoidance of TSRs as well as the provision from the biodiversity surveying of an invaluable resource of diverse and wide ranging habitat and species data. The publicly available surveying results will contribute to the scientific awareness and ecological understanding of a variety of sensitive communities across NSW.

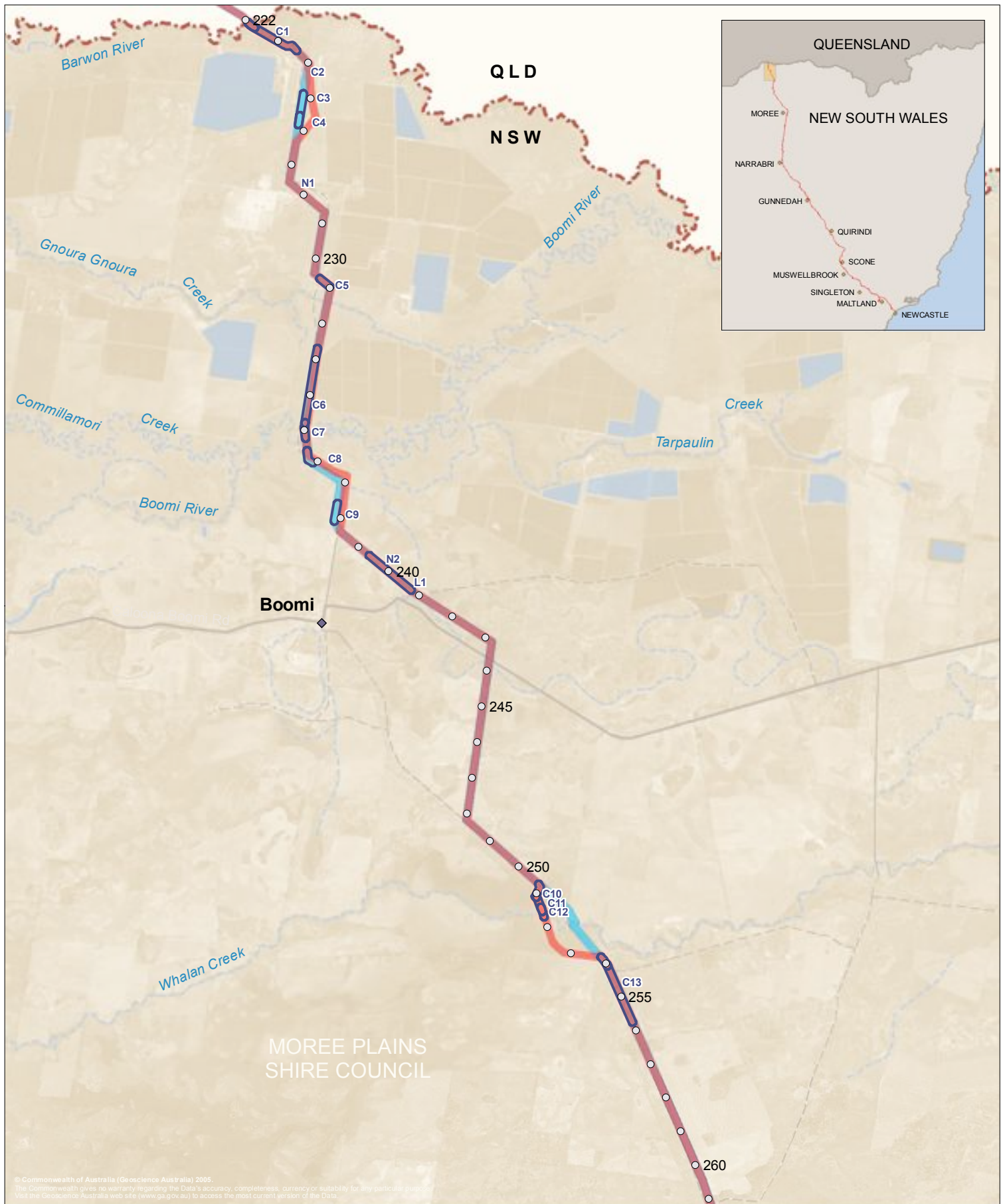
Ongoing maintenance of the pipeline, as described in Section 5.8.4 and Table 5.8 of the EA, provides to monitor the easement for the encroachment of weeds, the rate of revegetation, hazardous regrowth and unauthorised access.

Figures 4.1 to 4.17 below show the areas along the pipeline route, with biodiversity management zones highlighted. Tables 4.1 to 4.17 correspond to each map, showing a summary of the biodiversity issues and management measures that will be implemented in each zone. The tables also specify where the SoCs in Chapter 6 will be applied. A reference code is provided correlating the biodiversity technical report in Appendix D, with prefixes that denote the following:

- “C” – A constraint identified in the EA which has been investigated and can be avoided or managed.
- “N” – A new constraint, not previously identified, which can be avoided or managed.
- “P” – A previously identified constraint, which through the additional biodiversity fieldwork has been determined to no longer represent a biodiversity constraint.
- “L” – A limitation of the additional biodiversity fieldwork, where physical access was precluded by lack of access permissions.

A number of the biodiversity constraints identified in Chapter 18 of the EA were already avoided by interim route refinements prior to fieldwork going ahead. Previously identified constraints are not mapped as they were avoided in the development of Revision L.

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Legend

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- Biodiversity management area


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Figure 4.1 Constraints and Management analysis - Boomi area

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0 1 2 3 4km



4.3.1 Boomi area

The Boomi area represents 39km of the pipeline route and had the largest proportion of identified constraints.

- 25.4km of the Study Area has avoided significant regionalised and localised constraints.
- 8.5km of the Study Area will require management measures to mitigate biodiversity impacts.
- The spring surveying revealed a further 2.1km of the Study Area which will require management measures to mitigate biodiversity impacts.
- 3km was unable to be surveyed due to access limitations.

Table 4.1 Boomi area (KP 222–261)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
C1	Lowland Darling River Aquatic EEC and Coolibah Black Box Woodland EEC. No net loss of mature trees. Reinstate coarse woody debris.	B2A,
C2	Potential stripe faced dunnart habitat. High potential for pale headed snake. Avoid removal of Hollow Bearing Trees (HBT). Reinstate woody debris, ecologist & herpetologist onsite.	B2C, B4
C3	<i>Dichanthium</i> spp. Dominant grasslands of the Brigalow belt Bioregions, EPBC EEC. ROW rerouted to avoid.	
C4	High potential for Five-clawed worm Skink <i>A.mackayi</i> . Cracking black plains present. Reduce ROW. Herpetologist onsite.	B2B, B4
N1	<i>Dicanthium</i> spp grassland - with low potential to conform to the EEC. In this area the construction period would be minimised and grass would be turfed to 100mm depth, stored and kept moist (Sods would not be stacked). Sods would be reinstated in rehabilitation phase.	B2D
C5	High potential for Five-clawed worm Skink <i>A.mackayi</i> . Cracking black plains present. Reduce ROW. Herpetologist onsite.	B2B, B4
C6	<i>Dichanthium</i> spp. Dominant grasslands of the Brigalow belt Bioregions, EPBC EEC. ROW rerouted to avoid. Potential Coolibah-Black Box EEC.	
C7	HBTs and Koala habitat. Turquoise Parrot recorded here. Avoid HBT. Choose crossing point that minimises fragmentation of the movement corridor. Grass seed mix would include native grasses.	B2C
C8	<i>Dichanthium</i> spp. Dominant grasslands of the Brigalow Belt Bioregions, EPBC EEC. ROW rerouted to avoid.	
C9	<i>Dichanthium</i> spp. Dominant grasslands of the Brigalow Belt Bioregions, EPBC EEC. ROW rerouted to avoid.	
N2	<i>Dicanthium</i> spp grassland. Low potential to conform to EEC. Construction period would be minimised and grass turfed to 100mm depth, stored and kept moist (Sods would not be stacked). Sods would be reinstated in rehabilitation phase. Pied honeyeater recorded near here.	B2D
L1	No access. Originally identified as Coolibah-Black Box Woodland EEC Five-clawed worm-skink ground mammals Avifauna habitat.	B18
P1	Field work confirmed no longer a constraint.	

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P2	Field work confirmed no longer a constraint.	
C10	Coolibah Black Box EEC (TSC Act). Avoid mature trees and reinstate easement.	B2C
C11	Potential snail site. ID confirmed the species was not <i>Notopala sublineata</i> and likely to be <i>N. cf. suprafasciata</i> . Reinstate habitat post-construction.	B2D
C12	Lowland Darling River Aquatic EEC.	
P3	Field work confirmed no longer a constraint.	
C13	Coolibah Black Box EEC (TSC Act). Rainbow Bee-eater recorded. Avoid mature trees and reinstate easement.	B2C
P4	Field work confirmed no longer a constraint.	

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Figure 4.2 Constraints and Management analysis- Garah area

1:140,000 (at A4)

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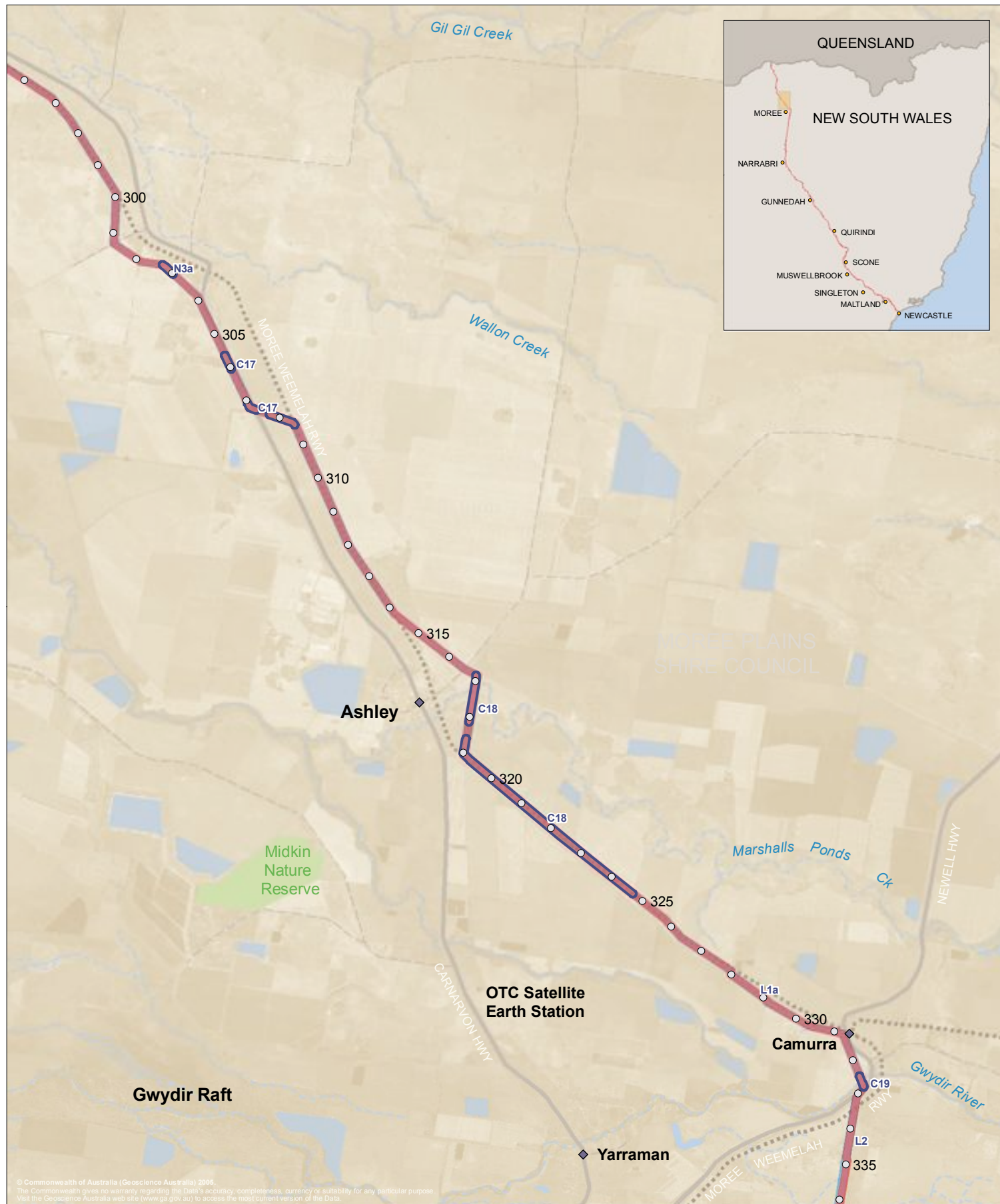
4.3.2 Garah area

The Garah area represents 35km of the pipeline route.

- 32.6km of the Study Area has avoided significant regionalised and localised constraints.
- 1.9km of the Study Area will require management measures to mitigate biodiversity impacts.
- The spring surveying revealed a further 0.5km of the Study Area which will require management measures to mitigate biodiversity impacts.

Table 4.2 Garah area (KP 261–296)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P5	Field work confirmed no longer a constraint.	
C14	Lowland Darling River Aquatic EEC. Avoid mature trees and rehabilitate easement. Reinstate coarse woody debris.	B2C
P6	Field work confirmed no longer a constraint.	
P7	Field work confirmed no longer a constraint.	
P8	Field work confirmed no longer a constraint.	
P9	Field work confirmed no longer a constraint.	
N3	Field work confirmed Myall woodland EEC. ROW realigned to avoid EEC.	
P10	Field work confirmed no longer a constraint.	
C15	Lowland Darling River Aquatic EEC. Fauna movement corridor. Avoid mature trees. Construct ROW through widest gap in vegetation and rehabilitate easement.	B2B, B2C
C16	Fauna movement corridor. Potential Stripe faced dunnart habitat. Turquoise parrot & Rainbow Bee-eater recorded here. Healthy patch of vegetation. ROW realigned to avoid patch by continuing northwest up Carnarvon Hwy for approx 1 km then back to NE to rejoin REV K line.	



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Figure 4.3 Constraints and Management analysis - Ashley area

1:140,000 (at A4)

0 1 2 3 4km



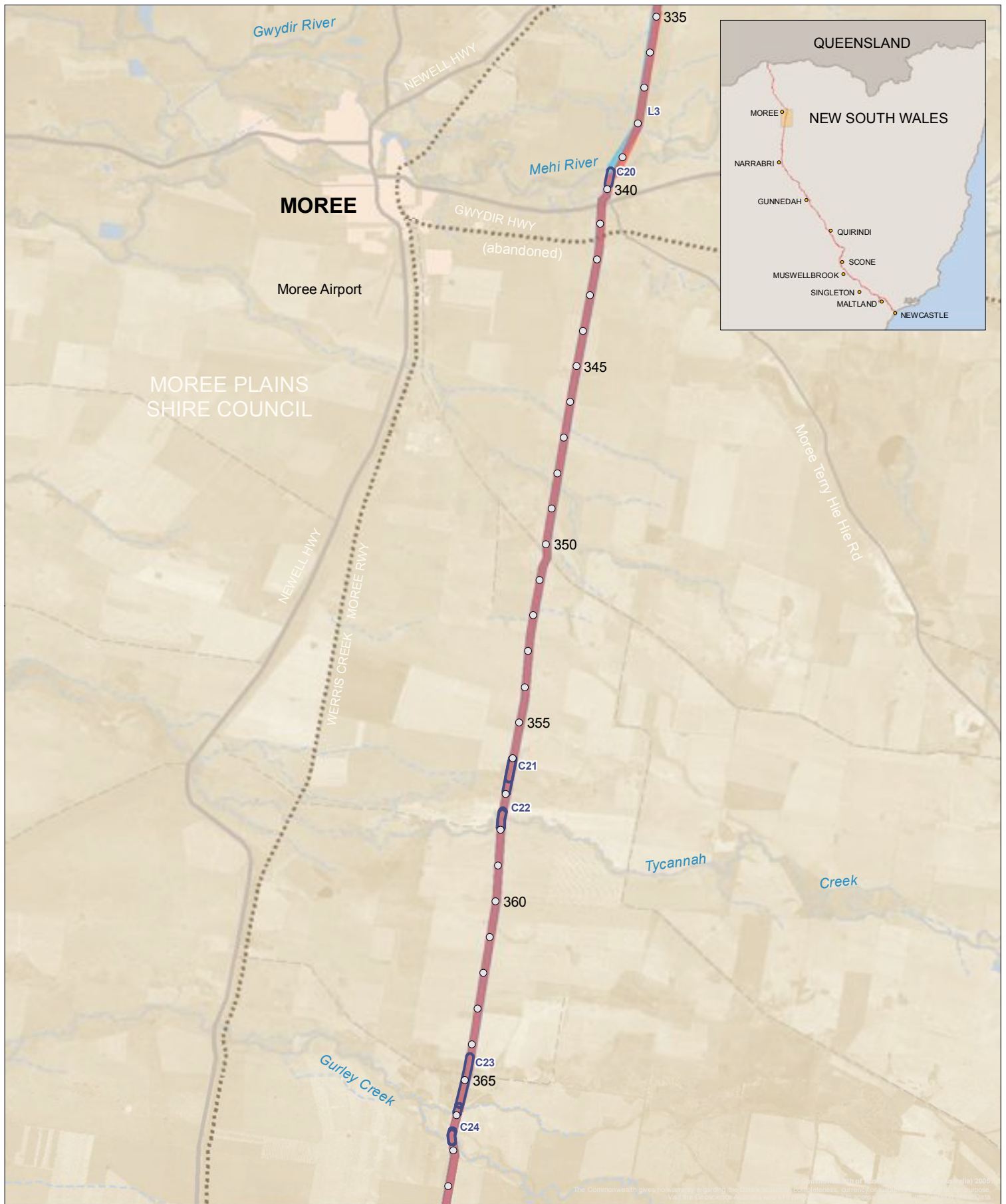
4.3.3 Ashley area

The Ashley area represents 40km of the pipeline route.

- 27.3km of the Study Area has avoided significant regionalised and localised constraints.
- 9.5km of the Study Area will require management measures to mitigate biodiversity impacts
- The spring surveying revealed a further 0.4km of the Study Area which will require management measures to mitigate biodiversity impacts.
- 2.8km was unable to be surveyed due to access limitations.

Table 4.3 Ashley area (KP 296–336)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P11	Field work confirmed no longer a constraint.	
N3a	Grey-crowned Babblers observed foraging. ROW avoids grey-crowned babbler vegetation.	
P12	Field work confirmed no longer a constraint.	
C17	Myall woodland EEC. ROW will not require clearing of native vegetation.	
P13	Field work confirmed no longer a constraint.	
C18	Coolibah Black Box EEC (TSC Act). Lowland Darling River Aquatic EEC. Avoid mature trees and rehabilitate easement.	B2C, B2D
P14	Field work confirmed no longer a constraint.	
L1a	No access.	B18
C19	Lowland Darling River Aquatic EEC. High potential for pale-headed snake and masked owl recorded. No net loss of mature trees. Reinstate coarse woody debris.	B2C, B4
L2	No access.	B18



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Figure 4.4 Constraints and Management analysis - Moree area

1:140,000 (at A4)

0 1 2 3 4km



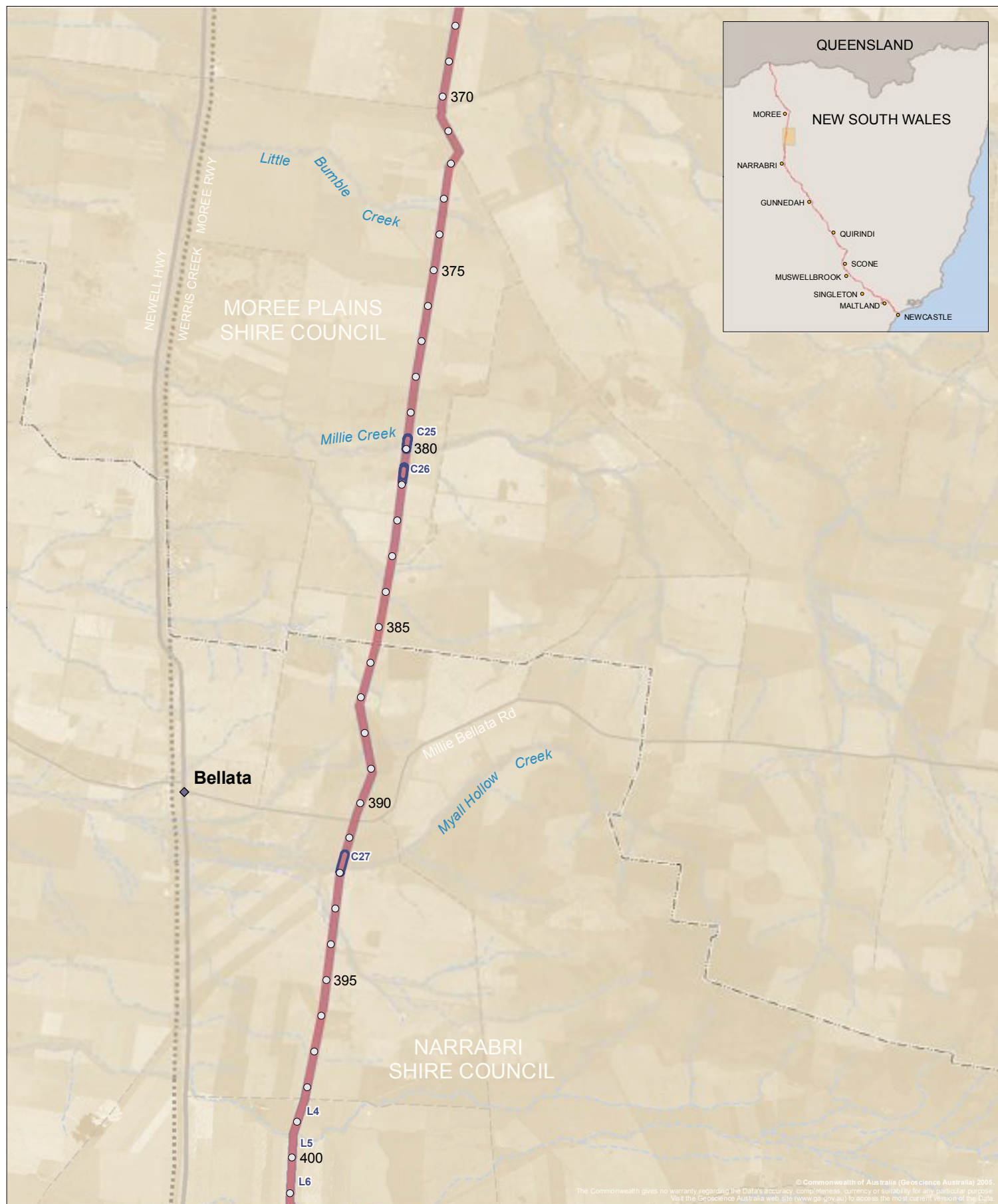
4.3.4 Moree area

The Moree area represents 32km of the pipeline route.

- 29.5km of the Study Area has avoided significant regionalised and localised constraints.
- 2.4km of the Study Area will require management measures to mitigate biodiversity impacts.
- 0.1km was unable to be surveyed due to access limitations.

Table 4.4 Moree area (KP 336–368)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
L3	No access.	B18
C20	Wetland and Koala habitat. Magpie goose and masked owl recorded. ROW realigned to avoid the wetland. No mature trees will be cleared.	B2C
C21	Aquatic EEC & Coolibah Blackbox EEC. Grey-crowned Babblers. ROW would be positioned to avoid mature trees, particularly River Red Gums. Rehabilitate easement.	B2C
C22	Continuous corridor for fauna movement. HBT and Lowland Darling River Aquatic EEC. ROW would be aligned to avoid mature trees. Rehabilitate easement.	B2C
C23	Lowland Darling River Aquatic EEC. Grey-crowned Babblers. Turquoise parrot recorded near here. ROW would avoid mature vegetation. Avoid Grey-crowned Babbler breeding season.	B2B, B2C
P16	Field work confirmed no longer a constraint.	
C24	HBT and Koala Habitat. ROW would avoid River Red Gums at Gurley Creek Crossing.	B2C



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- Biodiversity management area

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Figure 4.5 Constraints and Management analysis - Bellata area

1:140,000 (at A4)

0 1 2 3 4km



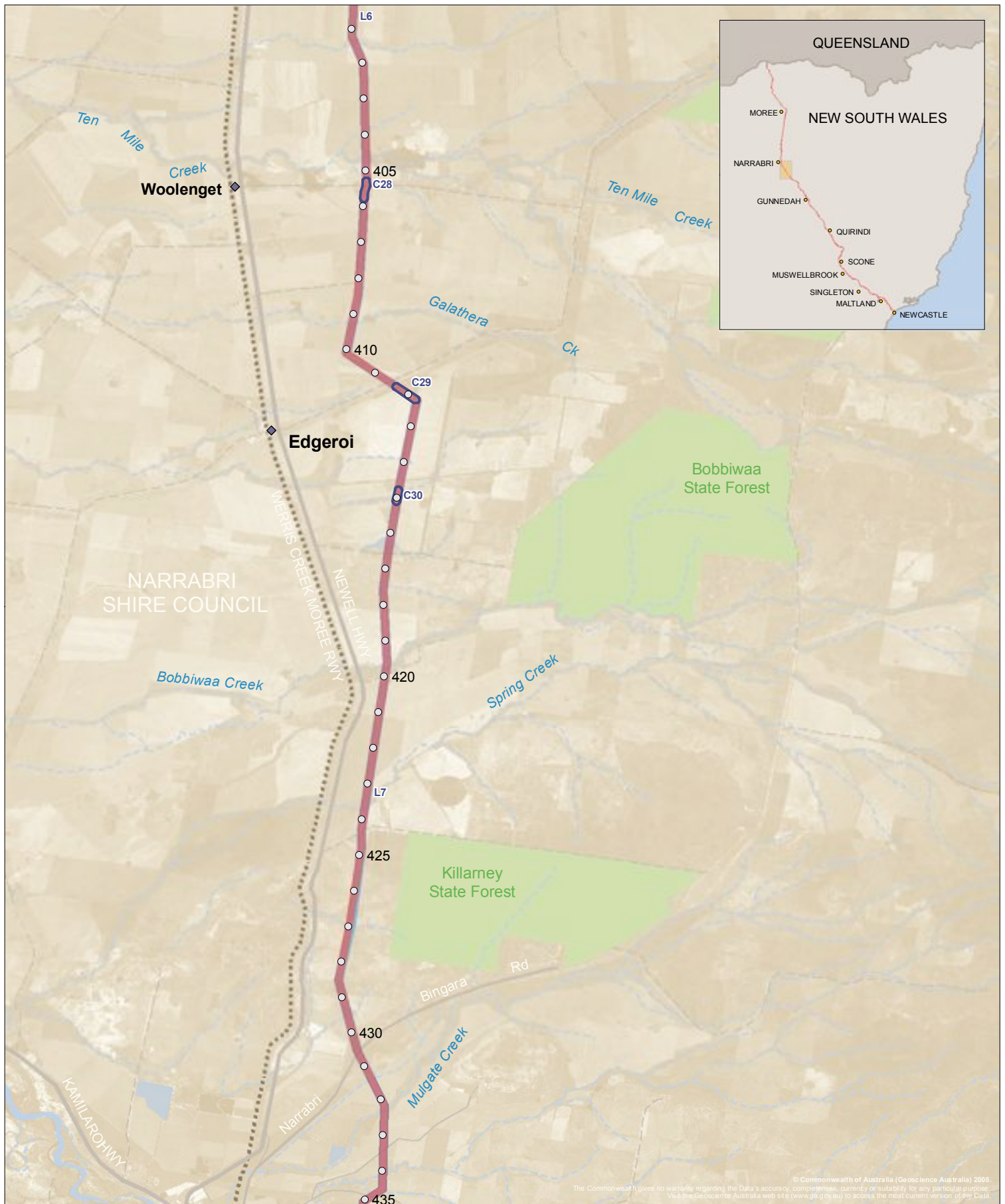
4.3.5 Bellata area

The Bellata area represents 33km of the pipeline route.

- 31.6km of the Study Area has avoided significant regionalised and localised constraints.
- 0.8km of the Study Area will require management measures to mitigate biodiversity impacts.
- 0.6km was unable to be surveyed due to access limitations.

Table 4.5 Bellata area (368–401)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P17	Field work confirmed no longer a constraint.	
C25	Grey-crowned Babbler and nests recorded. Lowland Darling River Aquatic EEC. Clearing would occur outside the Grey-crowned Babbler breeding season of July–December. Where the ROW dissects the native riparian vegetation the ROW would avoid removal of mature vegetation.	B2C
C26	Grey-crowned Babbler and nests recorded. Lowland darling River Aquatic EEC. Clearing would occur outside the Grey-crowned Babbler breeding season of July–December. Where the ROW dissects the native riparian vegetation the ROW would avoid removal of mature vegetation.	B2C
C27	Five clawed worm skink recorded. Reduce ROW width and rehabilitate easement.	B2B, B4
P18	Field work confirmed no longer a constraint.	
L4	No access.	B18
L5	No access.	B18
L6	No access.	B18



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Figure 4.6 Constraints and Management analysis - Narrabri north area

1:140,000 (at A4)

0 1 2 3 4km



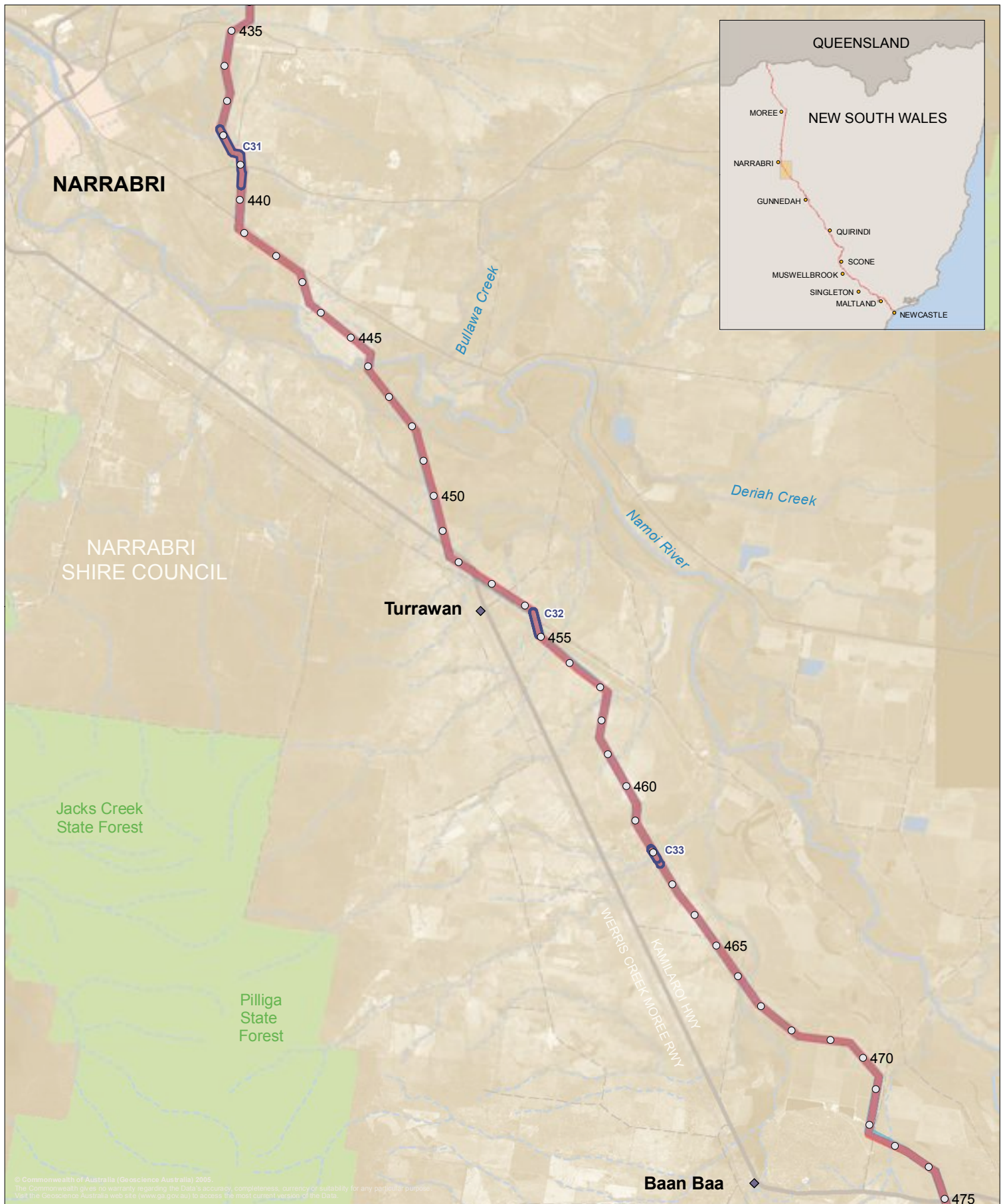
4.3.6 Narrabri north area

The Narrabri North area represents 34km of the pipeline route.

- 32km of the Study Area has avoided significant regionalised and localised constraints.
- 0.8km of the Study Area will require management measures to mitigate biodiversity impacts.
- 1.2km was unable to be surveyed due to access limitations.

Table 4.6 Narrabri North area (401–435)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
C28	Corridor for fauna movement. ROW would be aligned to avoid mature trees. Rehabilitate easement.	B2C
C29	Myall woodland EEC. ROW will not remove mature trees.	B2C
P19	Field work confirmed no longer a constraint.	
C30	Lowland Darling River Aquatic EEC.	
L7	No Access.	B18



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- Biodiversity management area


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Figure 4.7 Constraints and Management analysis - Narrabri area

1:140,000 (at A4)

0 1 2 3 4km



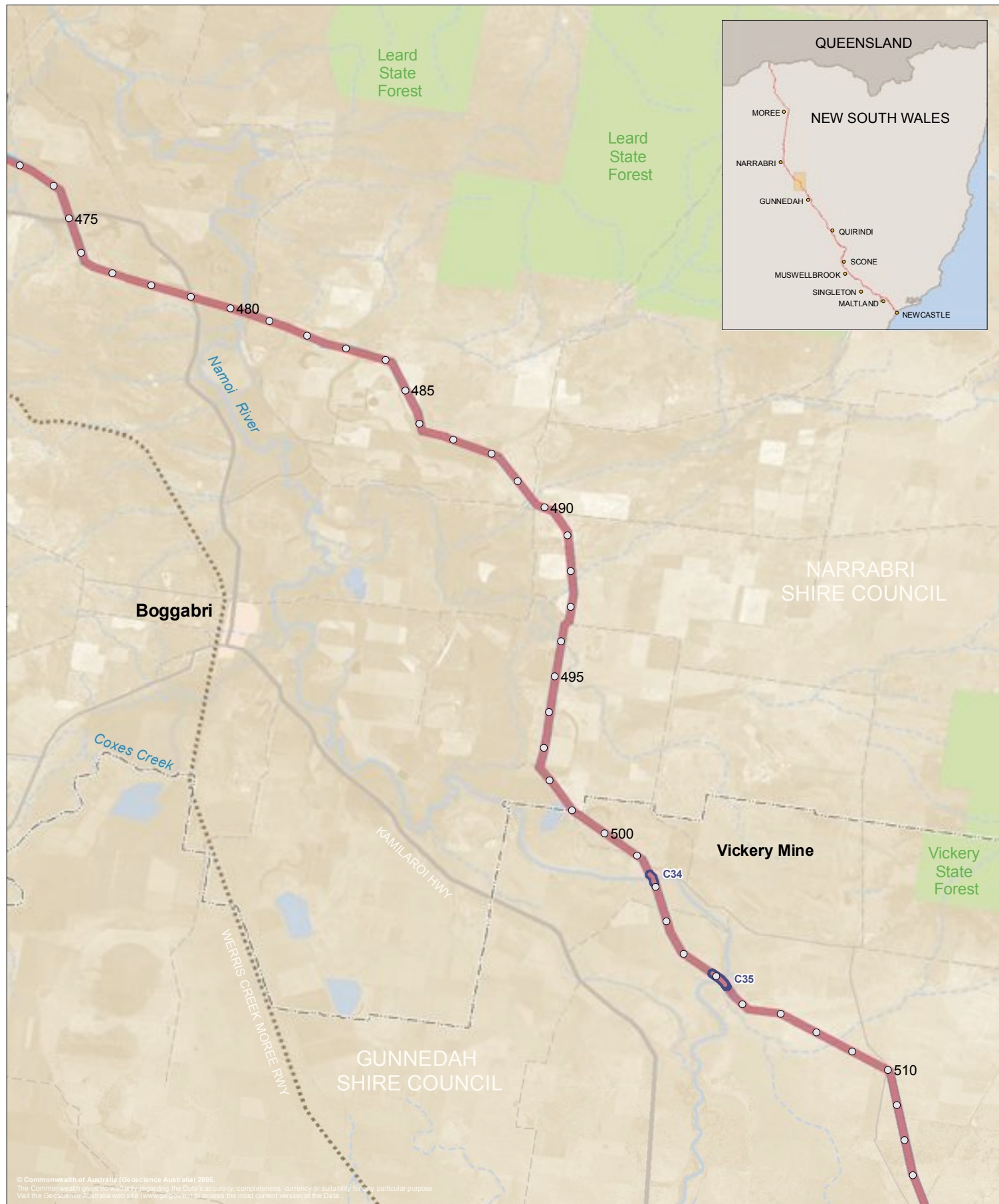
4.3.7 Narrabri area

The Narrabri area represents 40km of the pipeline route.

- 37.4km of the Study Area has avoided significant regionalised and localised constraints.
- 2.6km of the Study Area will require management measures to mitigate biodiversity impacts.

Table 4.7 Narrabri (KP 435–475)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
C31	Grey-crowned Babblers and juveniles recorded. Diamond Firetail recorded. ROW of way does not pass through vegetation.	B2B
C32	Koala, Grey-crowned Babblers, Speckled Warbler seen. Masked Owl identified in response to call playback. ROW to stay in power easement.	B2A
P20	Field work confirmed no longer a constraint.	
C33	Lowland Darling River Aquatic EEC. Fauna movement corridor. Reinstate coarse woody debris. ROW would be aligned to avoid mature trees. Rehabilitate easement.	B2C



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Figure 4.8 Constraints analysis and Management - Boggabri area

1:140,000 (at A4)

0 1 2 3 4km



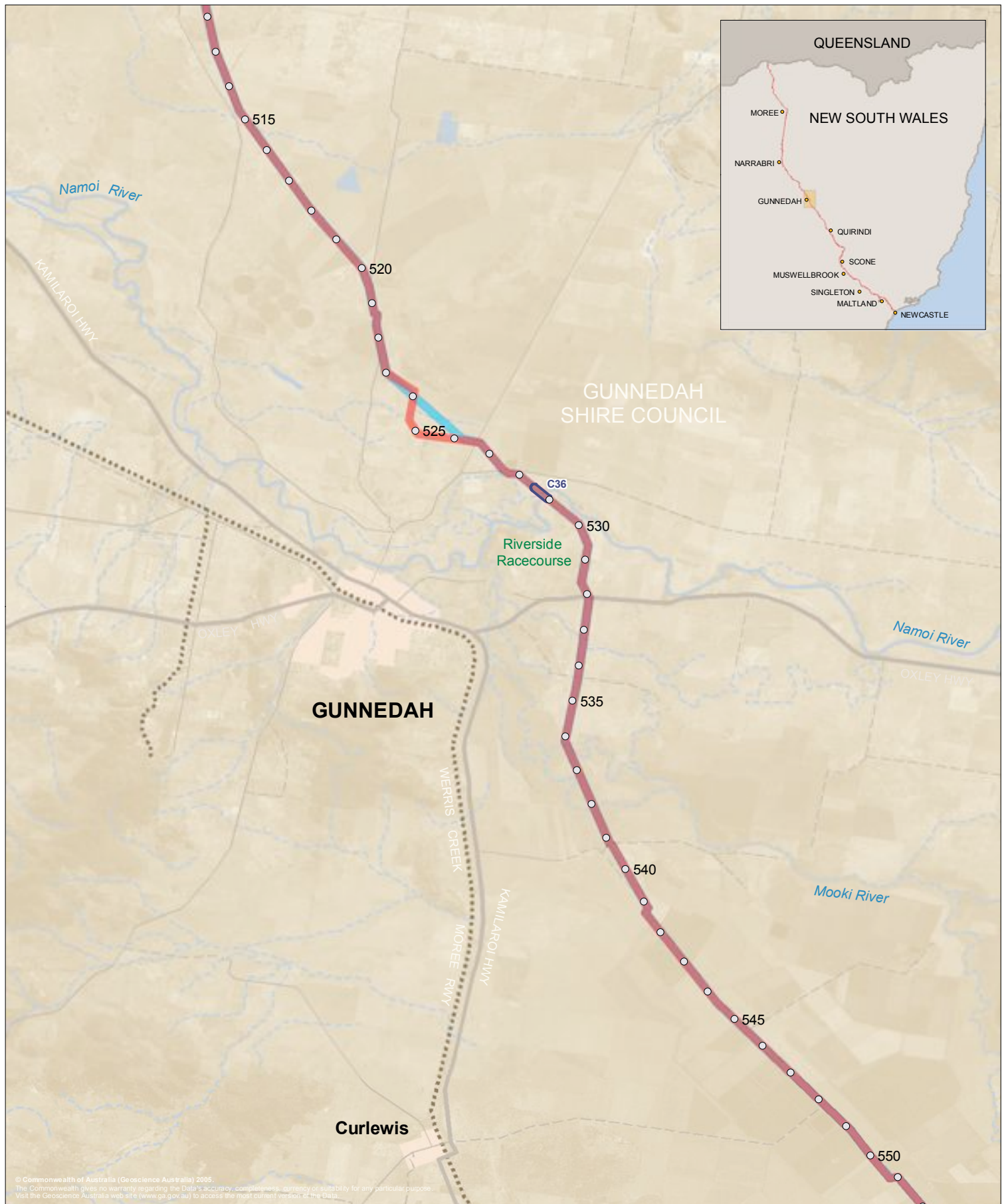
4.3.8 Boggabri area

The Boggabri area represents 38km of the pipeline route.

- 37.5km of the Study Area has avoided significant regionalised and localised constraints.
- 0.5km of the Study Area will require management measures to mitigate biodiversity impacts.

Table 4.8 Boggabri area (KP 475–513)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P21	Field work confirmed no longer a constraint.	
C34	Koala habitat, fauna movement corridor. ROW would be aligned to avoid all mature trees. Rehabilitate easement.	B2C
C35	Lowland Darling River Aquatic EEC. Koala recorded here. ROW would be aligned to avoid all mature trees. Rehabilitate easement.	B2C



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1:140,000 (at A4)

0 1 2 3 4km



4.3.9 Gunnedah area

The Gunnedah area represents 38km of the pipeline route.

- 37.7km of the Study Area has avoided significant regionalised and localised constraints.
- 0.3km of the Study Area will require management measures to mitigate biodiversity impacts.

Table 4.9 Gunnedah area (KP 513–551)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
C36	Koalas recorded feeding in trees within study area. Rainbow Bee-eater recorded. The ROW would be aligned to avoid all mature River Red Gum trees. Rehabilitate easement.	B2B, B2C



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Legend

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- Study Area (RevH)
- Biodiversity management area

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Figure 4.10 Constraints and Management analysis - Breeza area

1:140,000 (at A4)

0 1 2 3 4km



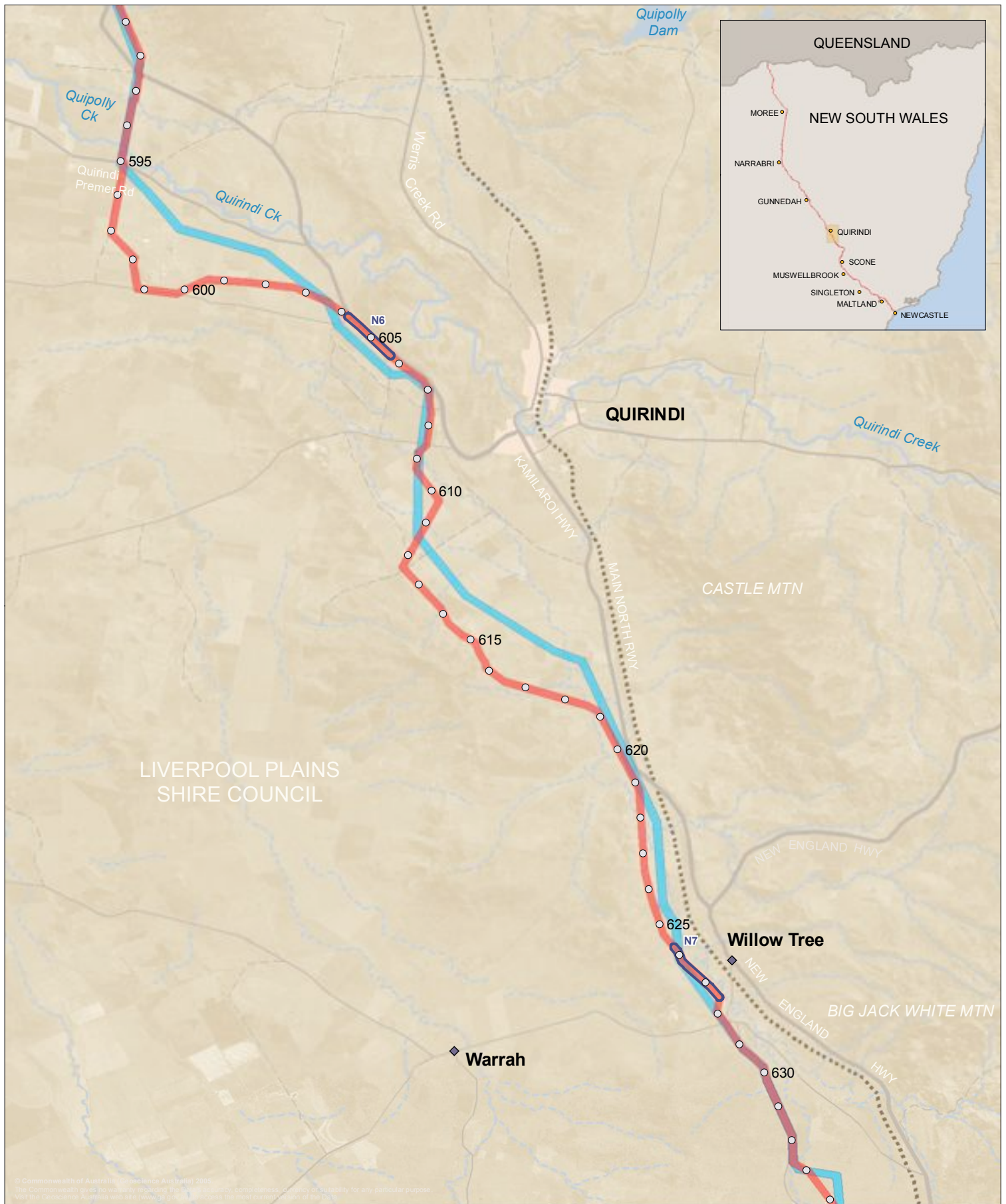
4.3.10 Breeza area

The Breeza area represents 40km of the pipeline route.

- 36.5km of the Study Area has avoided significant regionalised and localised constraints.
- 0.5km of the Study Area will require management measures to mitigate biodiversity impacts.
- The spring surveying revealed a further 3km of the Study Area which will require management measures to mitigate biodiversity impacts.

Table 4.10 Breeza area (KP 551–591)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
C37	HBTs and Koala habitat. Avoid HBTs. Choose crossing point that minimises fragmentation of the movement corridor. Reduce ROW.	B2B, B2C,
C38	HBTs and Koala habitat. Avoid HBTs. Choose crossing point that minimises fragmentation of the movement corridor. Reduce ROW.	B2B, B2C,
C39	HBTs and Koala habitat. Avoid HBTs. Choose crossing point that minimises fragmentation of the movement corridor. Reduce ROW.	B2B, B2C,
N5	White Box Yellow Box Blakeley's Red Gum Grassy Woodland and derived Grassland with exotic ground-cover (TSC Act). Avoid mature trees and rehabilitate easement.	B2B, B2C, B2D



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- Study Area (RevH)
- Biodiversity management area


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Figure 4.11 Constraints and Management analysis - Quirindi area

1:140,000 (at A4)

0 1 2 3 4km



4.3.11 Quirindi area

The Quirindi area represents 43km of the pipeline route.

- 40.7km of the Study Area has avoided significant regionalised and localised constraints.
- The spring surveying revealed a further 2.3km of the Study Area which will require management measures to mitigate biodiversity impacts.

Table 4.11 Quirindi area (591–634)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
N6	White Box Yellow Box Blakeley's Red Gum Grassy Woodland and derived Grassland with exotic ground-cover (TSC Act). Avoid mature trees and rehabilitate easement.	B2B, B2C, B2D
N7	Box gum woodland TSC and EPBC Act. Avoid mature trees – ROW only just touches on edge of this vegetation type.	B2B, B2C, B2D



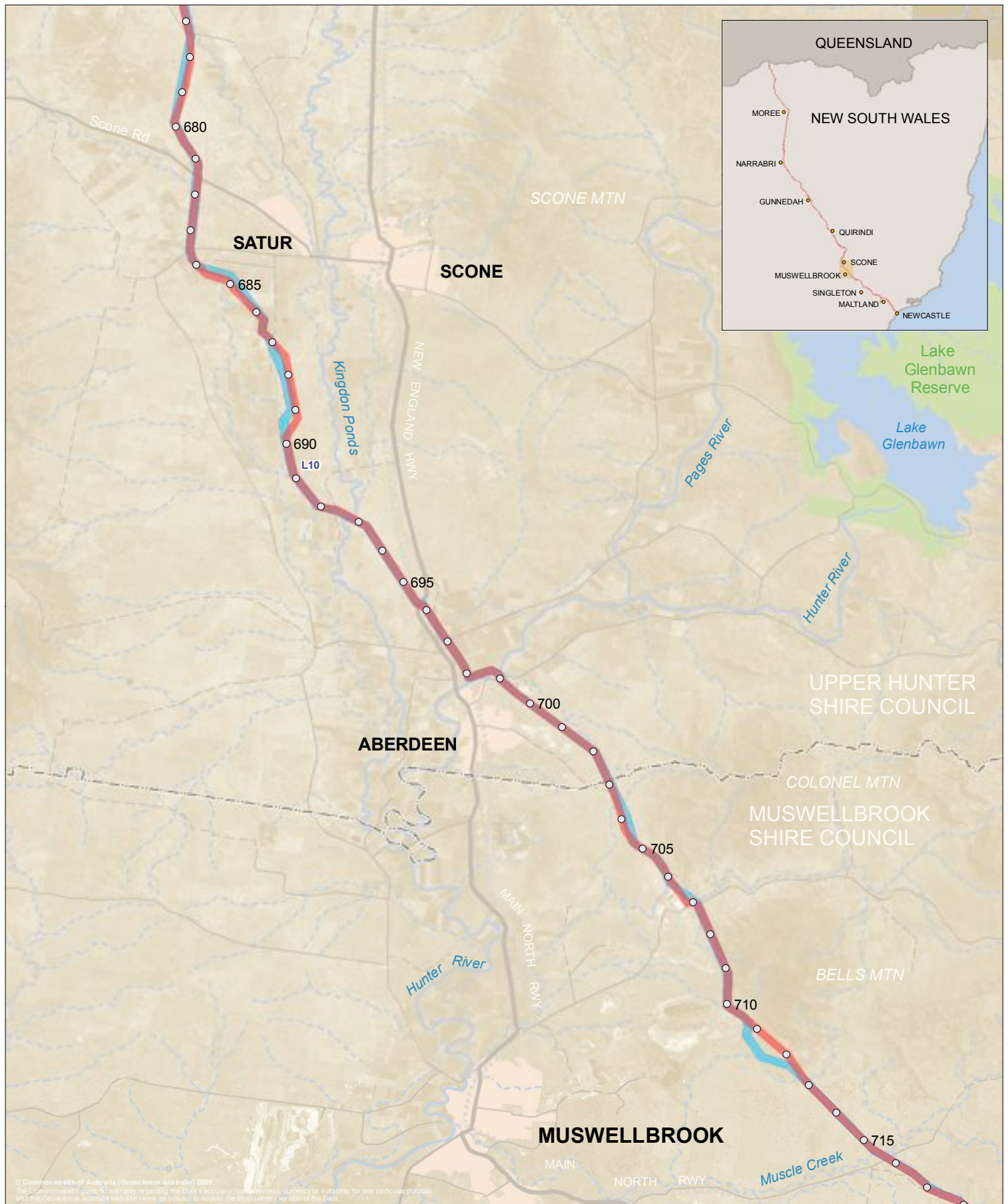
4.3.12 Murrurundi area

The Murrurundi area represents 39km of the pipeline route.

- 30.5km of the Study Area has avoided significant regionalised and localised constraints.
- 1km of the Study Area will require management measures to mitigate biodiversity impacts.
- The spring surveying revealed a further 5km of the Study Area which will require management measures to mitigate biodiversity impacts.
- 2.5km was unable to be surveyed due to access limitations.

Table 4.12 Murrurundi area (KP 634–673)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
N8	White Box Yellow Box Blakeley's Red Gum Grassy Woodland and derived Grassland with exotic ground-cover (TSC Act). Diamond Firetail and Brown treecreeper recorded. Avoid mature trees. Reinstate coarse woody debris and rehabilitate easement.	B2B, B2C, B2D
N9	Box gum woodland (TSC and EPBC). ROW realigned to avoid this EEC.	B2B, B2C, B2D
C40	Grey crowned babblers nesting. Clearing would occur outside the Grey-crowned babbler breeding season of July–December. Where the ROW dissects the native vegetation the ROW would avoid removal of mature vegetation. Rehabilitate easement.	B2C
P22	Field work confirmed no longer a constraint.	
L8	No access.	B18
L9	No access.	B18



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- Study Area (RevH)
- Biodiversity management area

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Figure 4.13 Biodiversity and Management constraints - Muswellbrook area

1:140,000 (at A4)

0 1 2 3 4km



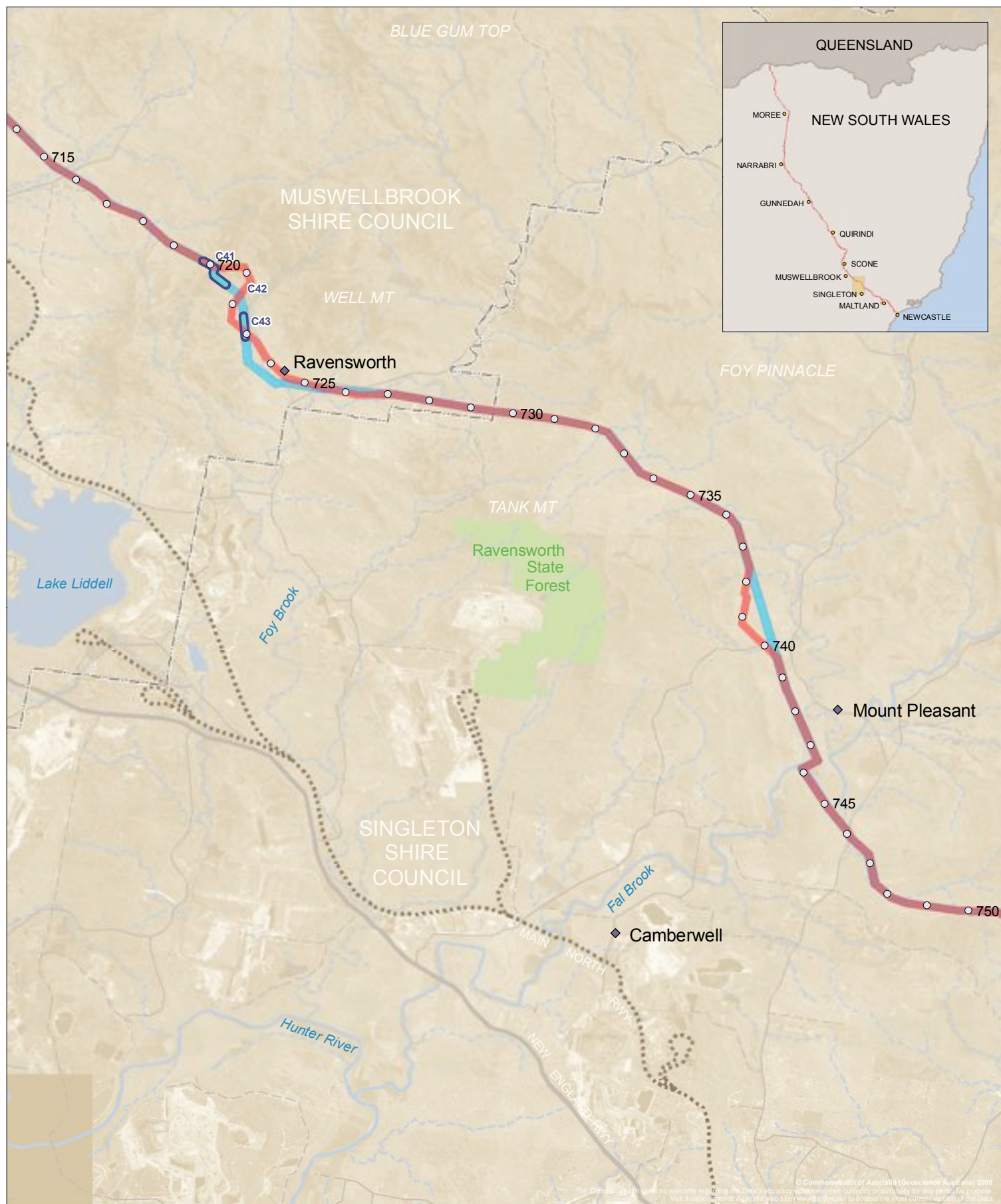
4.3.13 Muswellbrook area

The Muswellbrook area represents 45km of the pipeline route.

- 44km of the Study Area has avoided significant regionalised and localised constraints.
- 1km was unable to be surveyed due to access limitations.

Table 4.13 Muswellbrook area (KP 673–718)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
L10	No access.	B18



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- Study Area (RevH)
- Biodiversity management area

 **Queensland Hunter
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Figure 4.14 Constraints and Management analysis - Singleton north area

1:140,000 (at A4)

0 1 2 3 4km



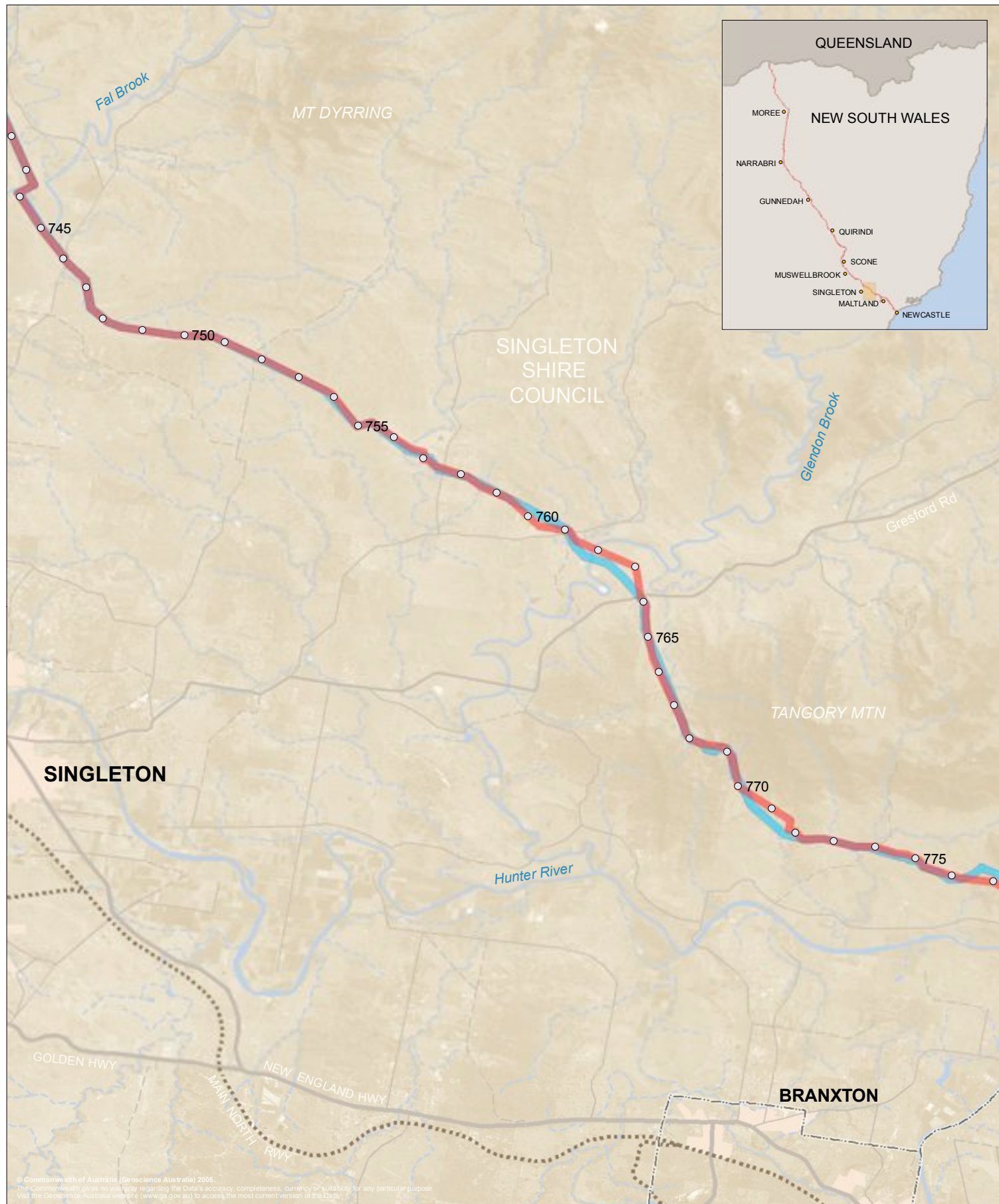
4.3.14 Singleton north area

The Singleton north area represents 32km of the pipeline route.

- 29.8km of the Study Area has avoided significant regionalised and localised constraints.
- 2.2km of the Study Area will require management measures to mitigate biodiversity impacts.

Table 4.14 Singleton north area (KP 718–750)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
C41	Very large spotted gums, hollows, rainforest gullies down slope of track. Habitat for arboreal mammals and hollow dependent birds. ROW aligned to avoid large mature vegetation.	B2C
C42	Gully vegetation. HBT, arboreal fauna habitat etc. ROW realigned to avoid gully entirely.	
C43	Scattered remnant vegetation. The ROW would not remove any mature trees in this section.	B2C



Drawing no. 07002g_CP_SI_15-2

Date 14 November 2008

Source Geoscience Australia
RLMS Pty Ltd AHMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Study Area (RevL)
- Study Area (RevH)
- Biodiversity management area

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Figure 4.15 Constraints and Management analysis - Singleton east area

1:140,000 (at A4)

0 1 2 3 4km



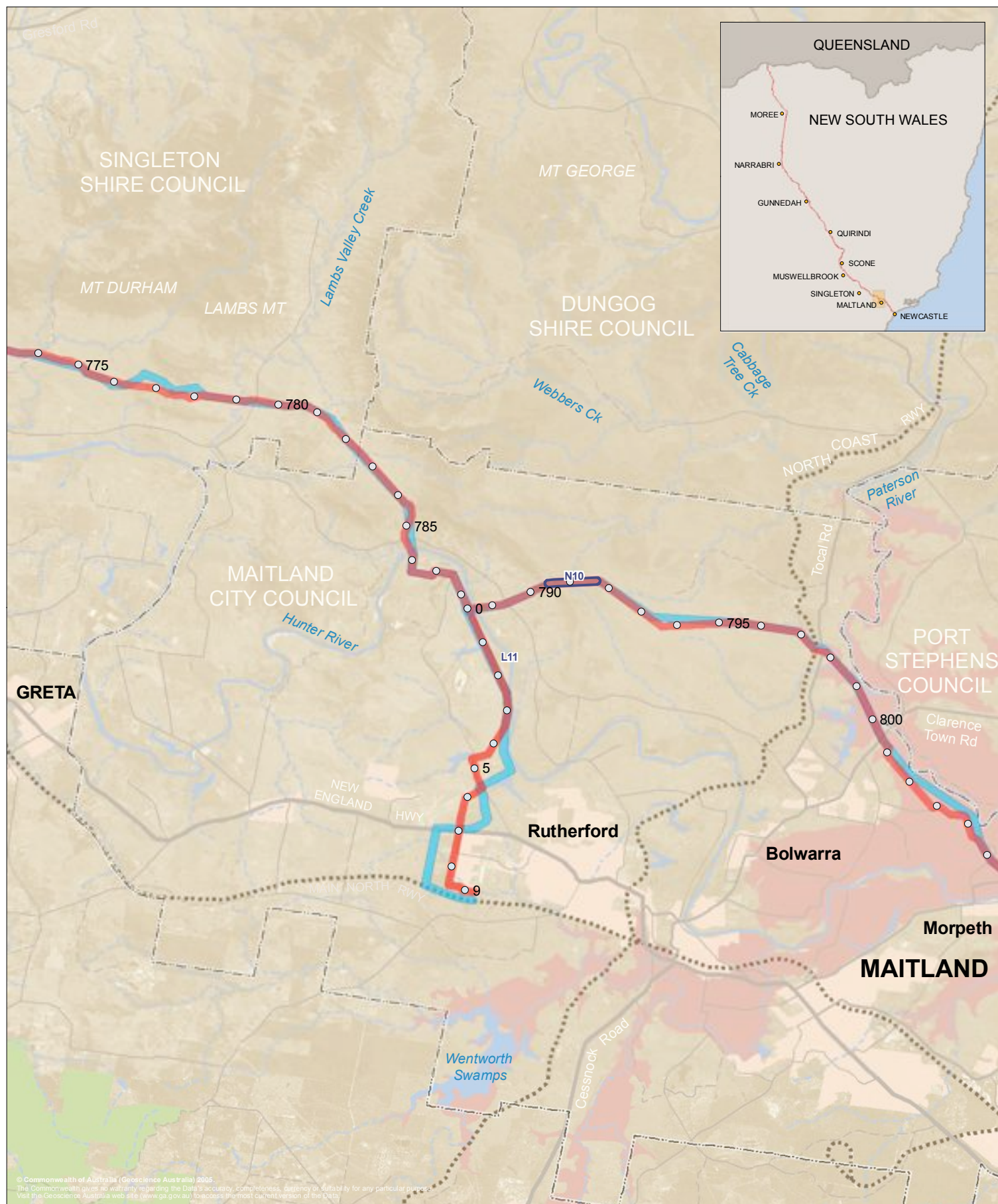
4.3.15 Singleton east area

The Singleton east area represents 24km of the pipeline route.

- The Study Area has avoided significant regionalised and localised constraints.

Table 4.15 Singleton east (KP 750–774)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P24	Speckled warbler and rufous fantail recorded at KPs 761-769. Avoid mature vegetation and rehabilitate easement.	B2C



Drawing no. 07002g_CP_SI_16-2

Date 14 November 2008

Source Geoscience Australia
RLMS Pty Ltd AHMS Pty Ltd
ngh environmental

Datum GDA 94

Legend

- Kilometre point
- Study Area (RevL)
- Study Area (RevH)
- Biodiversity management area
- Acid sulphate soils - high risk

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Figure 4.16 Constraints and Management analysis - Maitland area

1:140,000 (at A4)

0 1 2 3 4km



4.3.16 Maitland area

The Maitland area represents 31km of the pipeline route. The 9km long Rutherford lateral is in addition to this length.

- 30km of the mainline Study Area has avoided significant regionalised and localised constraints.
- 1km of the mainline Study Area will require management measures to mitigate biodiversity impacts.
- 9km of the lateral was unable to be surveyed due to access limitations.

Table 4.16 Maitland area (KP 774–805)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
N10	Lower Hunter Spotted Ironbark Forest EEC (TSC Act). The ROW would be aligned through the existing gap in the mature trees and as such no native canopy vegetation would be removed.	B2C
L11	Squirrel Glider records in the area. Good patch of woodland. Very high population of possums. Flowering Melaleucas may provide foraging habitat for Grey Headed Flying-fox (EPBC). Some very large habitat trees. Unable to access so no HBT survey done.	B18



The Newcastle area represents 28km of the pipeline route.

- 16.2km of the Study Area has avoided significant regionalised and localised constraints.
- 8.8km of the Study Area will require management measures to mitigate biodiversity impacts.
- 3km was unable to be surveyed due to access limitations.

Table 4.17 Newcastle area (KP 805–833)

Reference Code	Summary of issues and associated management approaches	Location specific SoC reference
P25	Field work confirmed no longer a constraint.	
L12	No access.	B18
P26	Field work confirmed no longer a constraint.	
C44	Patches of Swamp Oak floodplain forest EEC. Koala records in area. Good bird and amphibian habitat. The ROW would remain as much as possible in the powerline easement to minimise vegetation clearing and loss of fauna habitat. The corner of vegetation at KP 820 would be completely avoided and the ROW would remain in the existing infrastructure corridor.	B2A, B2B, B2C
C45	River flat Eucalypt forest on Coastal flood plain EEC (both sides of the electrical easement 820-821 and near the playing field at 821–821.3) and Swamp Oak Floodplain Forest EEC (patches 820–821.3) Swamp Sclerophyll Forest on coastal floodplains (at 821 south of Tomago Road). The ROW would be in the cleared areas to 821. HDD used under the Hunter River KPs 821–822. The stand of <i>Grevillea parviflora subsp. parviflora</i> is located on the western side and outside of the ROW just north of KP 820, but care should be taken to ensure that the population is not accidentally harmed by parking of vehicles or storage of materials. The entire population should be protected by a temporary cordon during clearing, excavation and filling.	B2E
C46	Coastal saltmarsh EEC. Key population of <i>L.aurea</i> . Construction will occur in the existing disturbed area associated with the access track from KP 822.5–826.5. Construction should only occur in winter so as to not disrupt breeding season. <i>L.aurea</i> management plan will be prepared and a specialist onsite during all clearing, trenching, HDD and filling to manage construction team and species (including Chytrid controls).	B2A, B2B
C47	Excellent diverse habitat for wetland birds including nationally and internationally habitat for EPBC listed migratory birds. Measures as for C46.	B2A, B2B
C48	Good quality mangroves and saltmarsh. Habitat connectivity. Migratory bird habitat. This creek flows through the Ramsar site. ROW would be within existing road and easement and methods would avoid any direct impact to the mangrove creek.	B2A, B2B

4.4 Conclusion

The additional biodiversity fieldwork undertaken since the public display of the EA has clarified identified constraints through field validation of the features in and around the proposal.

In some areas where physical access was not possible, minor limitations have been noted and a process developed to ensure that any potential constraints and impacts are appropriately considered and managed prior to construction. Commitment B18 provides to conduct further fieldwork in identified constraint areas where surveying was precluded by lack of access permission. This is consistent with the adaptive management principle provided in commitment AM1.

The results of the fieldwork have led to a number of alignment refinements, which have resulted in the avoidance of significant impacts to key biodiversity features. In areas where impacts cannot be directly avoided, specific mitigation measures have been proposed to reduce potentially adverse impacts to an acceptable level. These location specific mitigations are also underpinned by the general framework of biodiversity commitments outlined in Chapter 6.