Queensland Hunter
Gas Pipeline

Appendix K

Surface and groundwater assessment

Surface and groundwater tiered assessment

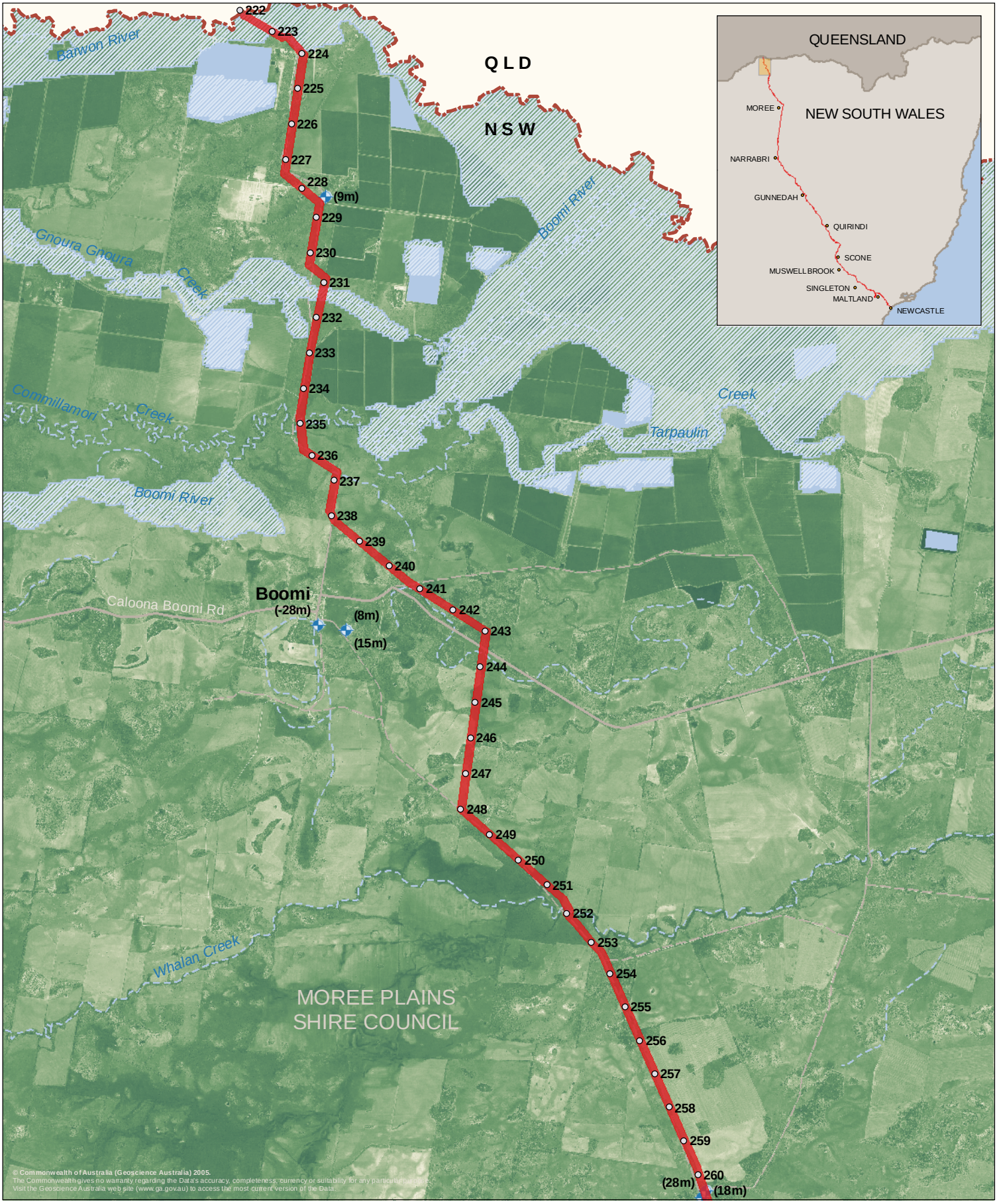
Note: Where it is stated that the probable crossing method is to be confirmed (TBC) this means that the probable construction methodologies for these water features would be confirmed following the outcomes of ongoing consultation with DPI, DWE, DECC and other relevant stakeholders. This consultation would be further informed by the outcomes of additional field work currently programmed, including but not limited to geo-technical, biodiversity and Aboriginal heritage surveys, and in consideration of the seasonal characteristics of the water feature closer to the time of construction.

Boomi region (KP222 to KP260)

Table 1 Boomi region - water feature impact assessment

Water feature	KP	ID Number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Barwon River	222	SW1	• 1st or 2nd class stream. • Wetlands downstream.	**High**	TBC	Field work required.
NSW wetlands	222-223	SW2	• Wetlands downstream.	**High**	TBC	Field work required.
Gnoura Creek	231.5	SW 3	• 1st or 2nd class stream. • Good intact native riparian vegetation. • Wetlands downstream.	**High**	TBC	Field work required.
NSW wetlands	230.5-232	SW 4	• Wetlands downstream.	**High**	TBC	Field work required.
Boomi River	235	SW 5	• 1st or 2nd class stream.	**High**	TBC	Field work required.

Water feature	KP	ID Number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	241	SW 6	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	243.5	SW 7				
Whalan Creek	252	SW 8	• 1st or 2nd class stream.	**High**	TBC	Field work required.



Drawing no. 07002g_CP_W_01-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
NSW Dept Env. & Climate Change
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- NSW wetlands (DECC)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- State border
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.1 Existing environment water - Boomi area

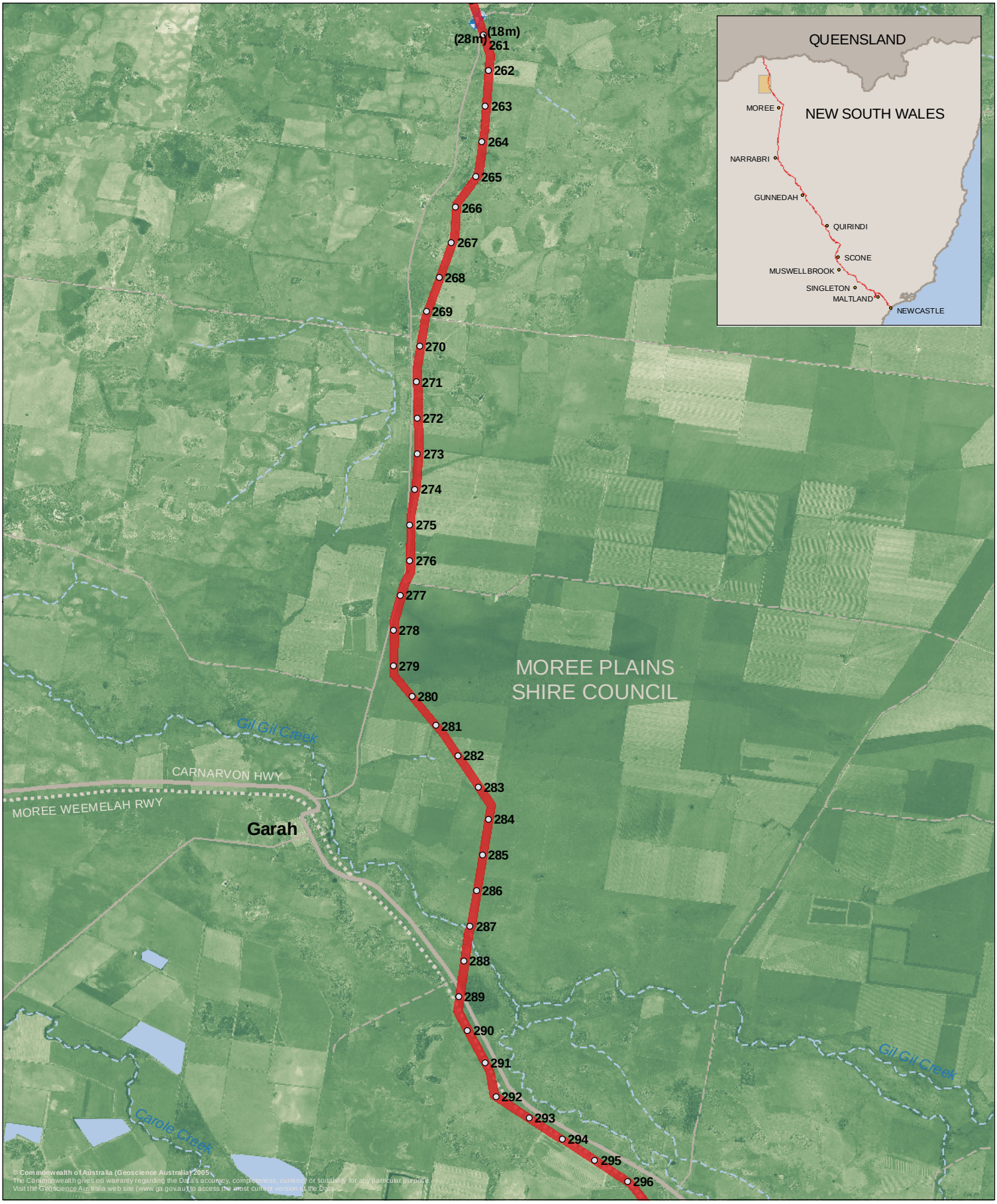
1:140,000 (at A4)

0 1 2 3 4km

Garah region (KP260 to KP295)

Table 2 Garah region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Gil Gil Creek	287	SW9	• Good intact native riparian vegetation. • 3rd Class stream.	**High**	TBC	Field work required.



Drawing no. 07002g_CP_W_02-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- J07002_Reservoirs
- Major river (perennial)
- Minor river (non-perennial)
- Princ pal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.2 Existing environment water - Garah area

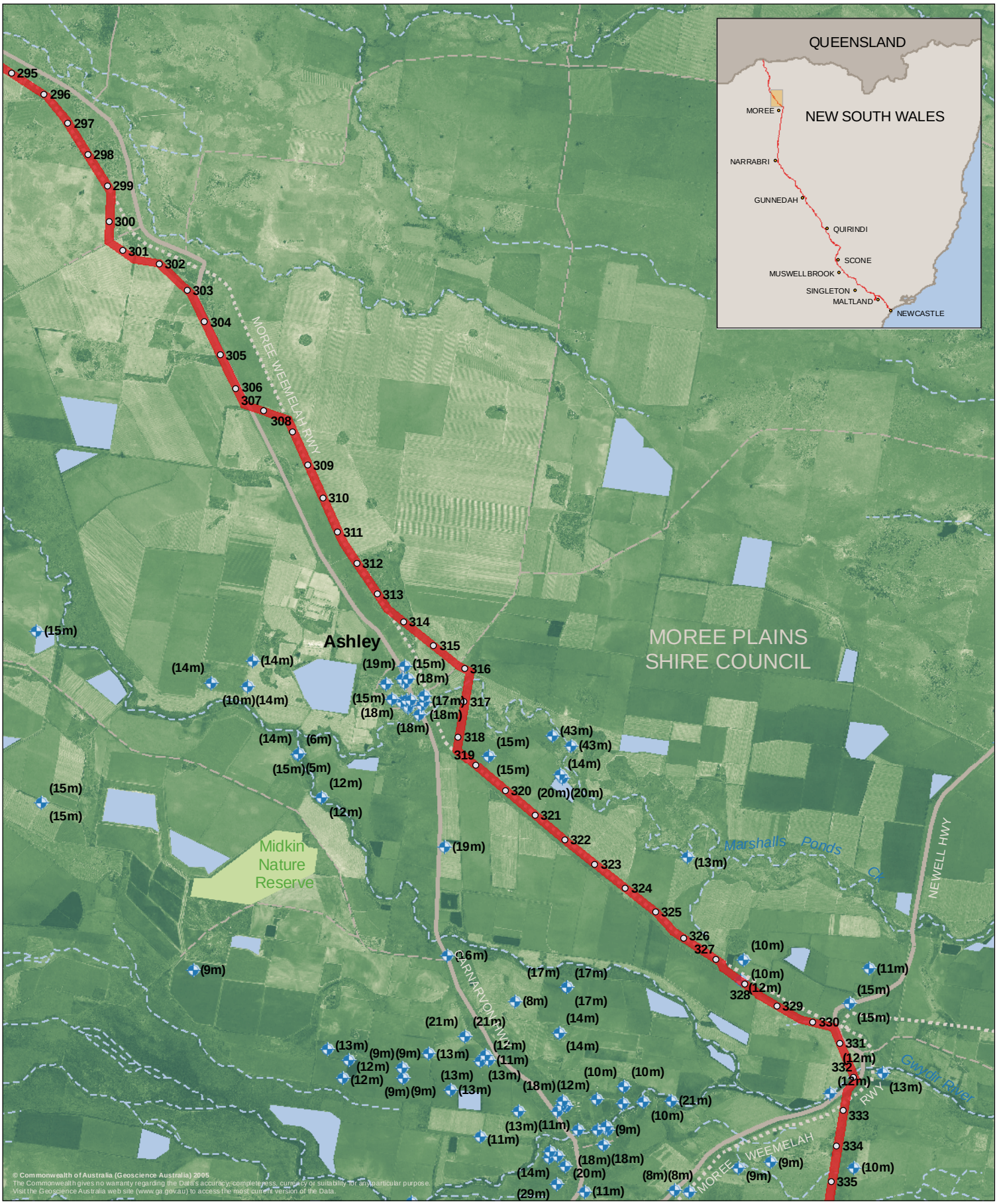
1:140,000 (at A4)

0 1 2 3 4km

Ashley region (KP295 to KP335)

Table 3 Ashley region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Marshalls Ponds Creek.	316.5	SW10	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Unknown	330	SW11	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Gwydir River	332	SW12	• 1st or 2nd class stream. • Good intact riparian vegetation.	**High**	TBC	Field work required.
Unknown	335	SW13	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.



Drawing no. 07002g_CP_W_03-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Water storage areas
- Major river (perennial)
- Minor river (non-perennial)
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.3 Existing environment water - Ashley area

1:140,000 (at A4)

0 1 2 3 4km

Moree region (KP335 to KP368)

Table 4 Moree region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	336	SW14	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	337.5	SW15	• 3rd order stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Field work required.
Mehi River	339	SW16	• Highly sensitive downstream water users. • 1st or 2nd class stream.	**High**	TBC	Field work required.
Unknown	346	SW17	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	347.5	SW18				
Unknown	351.5	SW19				

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
			Department of Primary Industries' Fish Habitat Classes.			
Tycannah Creek	357	SW20	• 1st or 2nd class stream. • 3rd or 4th order stream. • Good intact native vegetation.	**High**	TBC	Field work required.
Unknown	365	SW21	• 1st or 2nd order stream. • Moderate riparian vegetation with some native species present.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Gurley Creek	366	SW22	• 1st or 2nd class stream.	**High**	TBC	Field work required.

Drawing no. 07002g_CP_W_04-1

Date 03 September 2008

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NSW Dept Water & Energy
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Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Major river (perennial)
- Minor river (non-perennial)
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.4 Existing environment water - Moree area

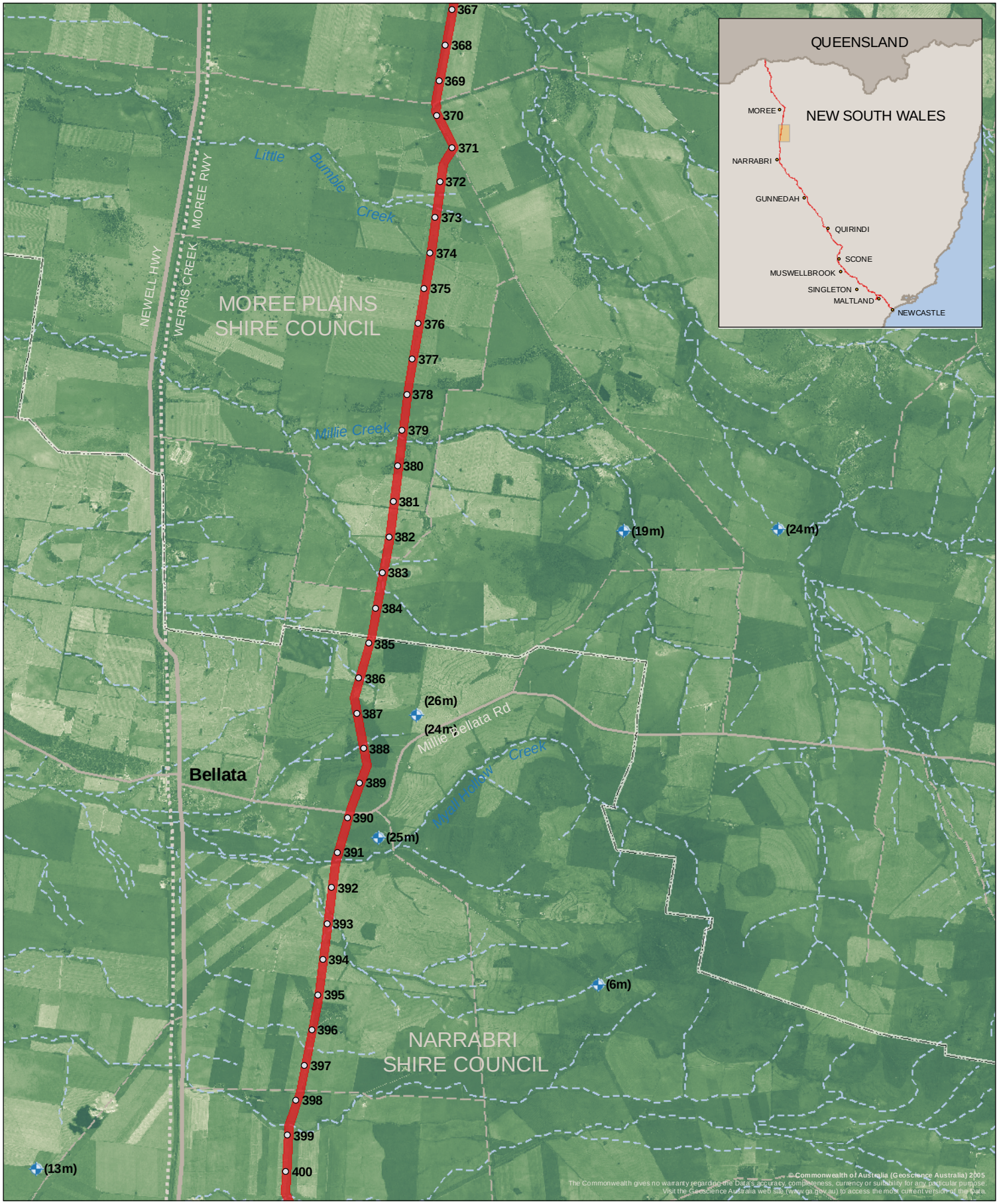
1:140,000 (at A4)

0 1 2 3 4km

Bellata region (KP368 to KP401)

Table 5 Bellata region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	372.5	SW23	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Milli Creek	379	SW24				
Unknown	383	SW25				
Unknown	386	SW26				
Unknown	388	SW27				
Hollow Creek	391	SW28	• Moderate riparian vegetation, with some native species present. • 3rd class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	392.5	SW29	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	396.5	SW30				
Boggy Creek	398.5	SW31				



Drawing no. 07002g_CP_W_05-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary rRoad
- Minor road
- Minor road (unsealed)
- Ra lway

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K.5 Existing environment water - Bellata area

1:140,000 (at A4)

0 1 2 3 4km

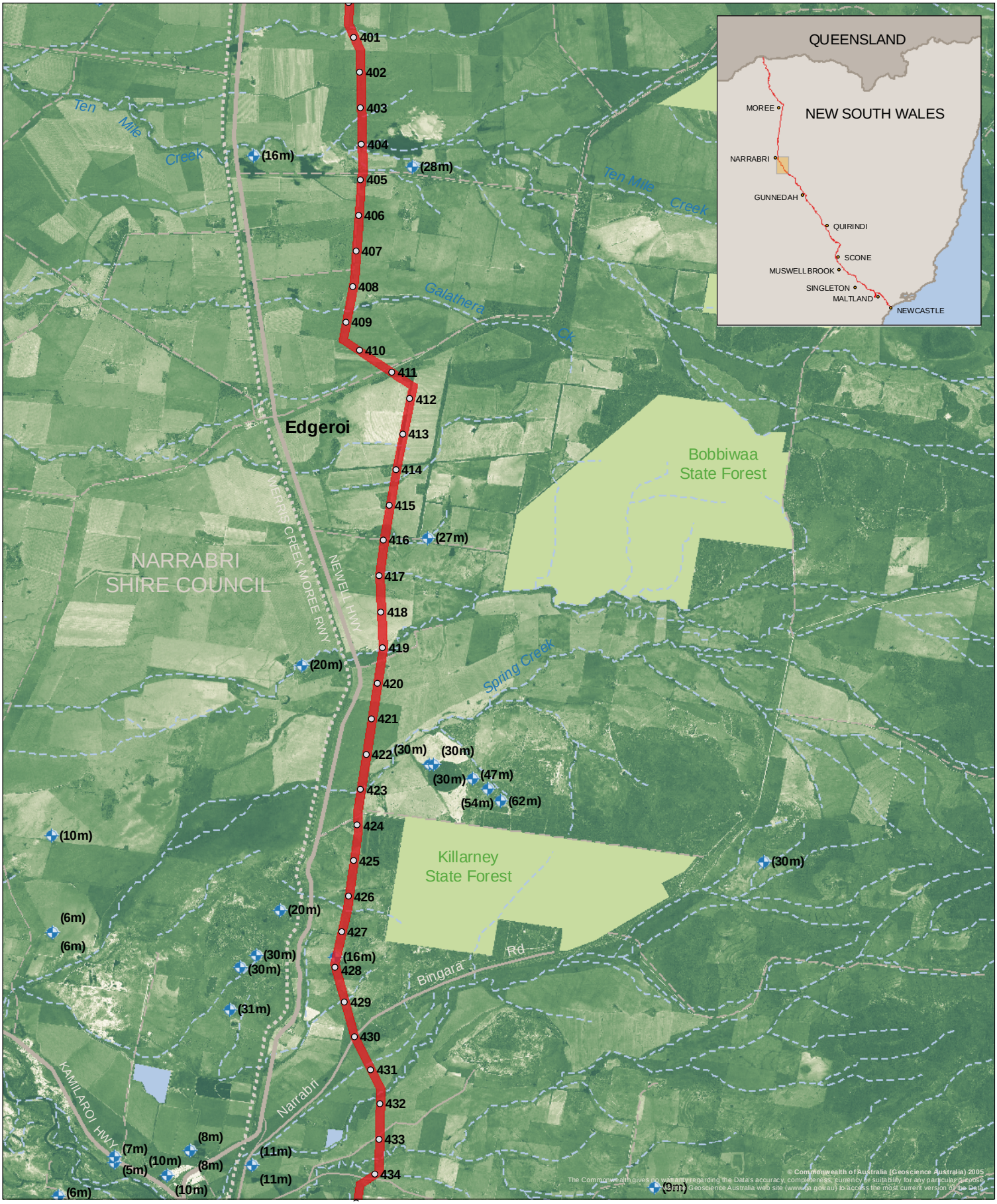
Narrabri North region (KP401 to KP 435)

Table 6 Narrabri North region - water feature impact assessment

Water feature	KP	ID numbers	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	401	SW32	• 3rd class stream. • Moderate riparian vegetation, with some native species present.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Field work required.
Unknown	403	SW33	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Ten Mile Creek	404	SW34	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Unknown	404.5	SW35	• 1st or 2nd order stream.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Galathera Creek	408.5	SW36	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	409	SW37				

Water feature	KP	ID numbers	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	413.5	SW38	categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.			
Unknown	414	SW39				
Unknown	415.5	SW40				
Unknown	417	SW41				
Bobbiwaa Creek	419	SW42	• 3rd order stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Spring Creek	423	SW43				
Unknown	426.5	SW44	• 1st or 2nd order stream. • Less sensitive downstream water users (eg may tolerate temporary increase in sediment load).	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	429	SW45	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	431	SW46	• 2nd order stream	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.

Water feature	KP	ID numbers	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Mulgate Creek	431.5	SW47	• 3rd or 4th order stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	433.5	SW48	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.



Drawing no. 07002g_CP_W_06-1

Date 03 September 2008

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NSW Dept Water & Energy
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Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Major river (perennial)
- Minor river (non-perennial)
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.6 Existing environment water - Narrabri north area

1:140,000 (at A4)

0 1 2 3 4km

Narrabri region (KP435 to KP 474)

Table 7 Narrabri region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	434	SW49	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	436	SW50				
Unknown	437.5	SW51				
Unknown	443	SW52				
Unknown	443.5	SW53				
Namoi River	445.5	SW54	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Unknown	447	SW55	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	449	SW56				
Unknown	450	SW57				
Unknown	451.5	SW58				
Unknown	453	SW59				
Unknown	454	SW60				
Unknown	455	SW61				
Unknown	457	SW62				
Unknown	458.5	SW63				
Unknown	461.5	SW64				
Unknown	465.5	SW65				

Drawing no. 07002g_CP_W_07-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.7 Existing environment water - Narrabri area

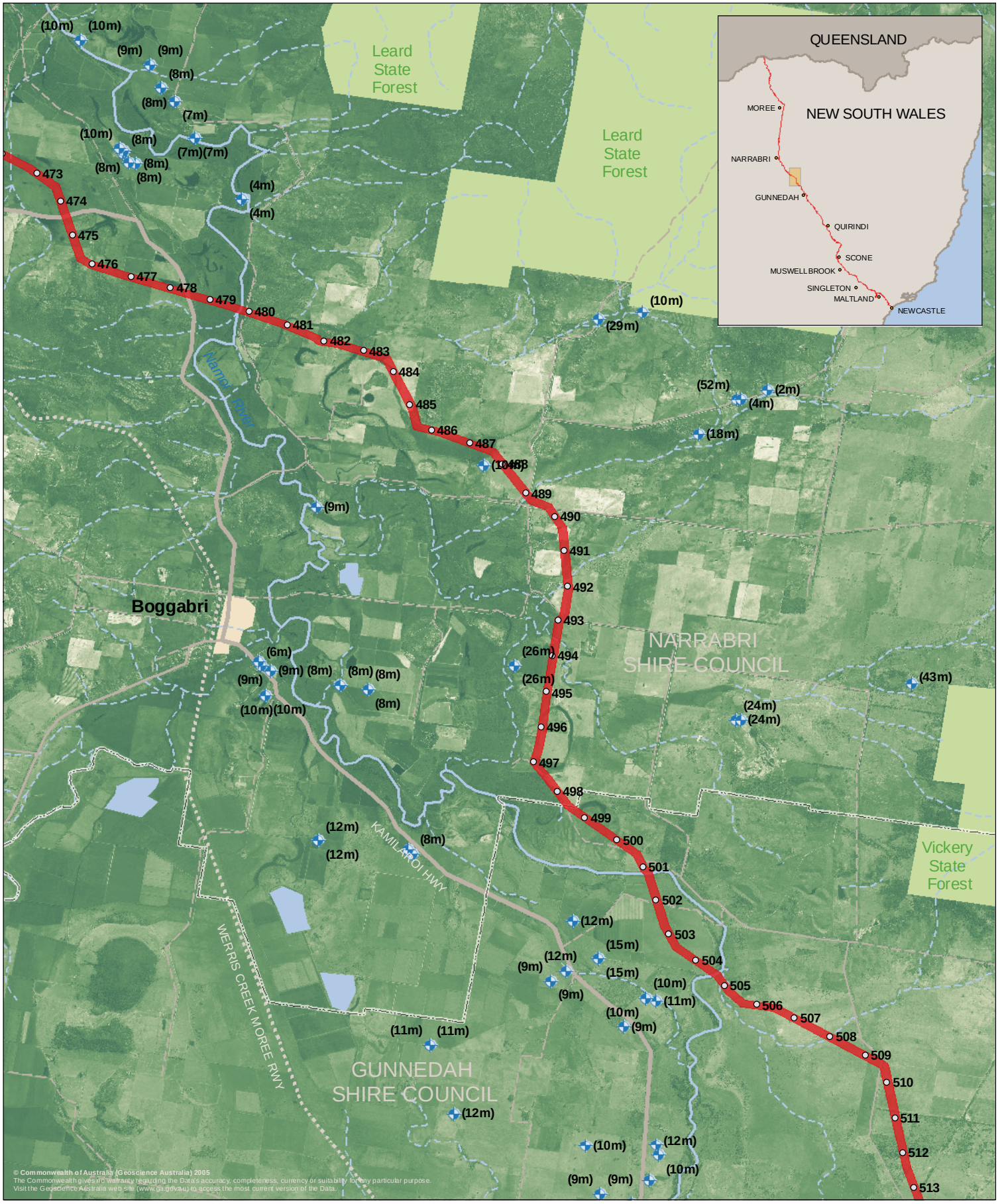
1:140,000 (at A4)

0 1 2 3 4km

Boggabri region (KP474 to KP513)

Table 8 Boggabri region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Namoi River	479.5	SW66	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Namoi River	501	SW67	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Namoi River	504	SW68	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Unknown	472.5	SW69	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	489	SW70				
Unknown	491.5	SW71				
Unknown	493.5	SW72				
Unknown	498	SW73				
Unknown	504.5	SW74				
Unknown	508	SW75				



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Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.8 Existing environment water - Boggabri area

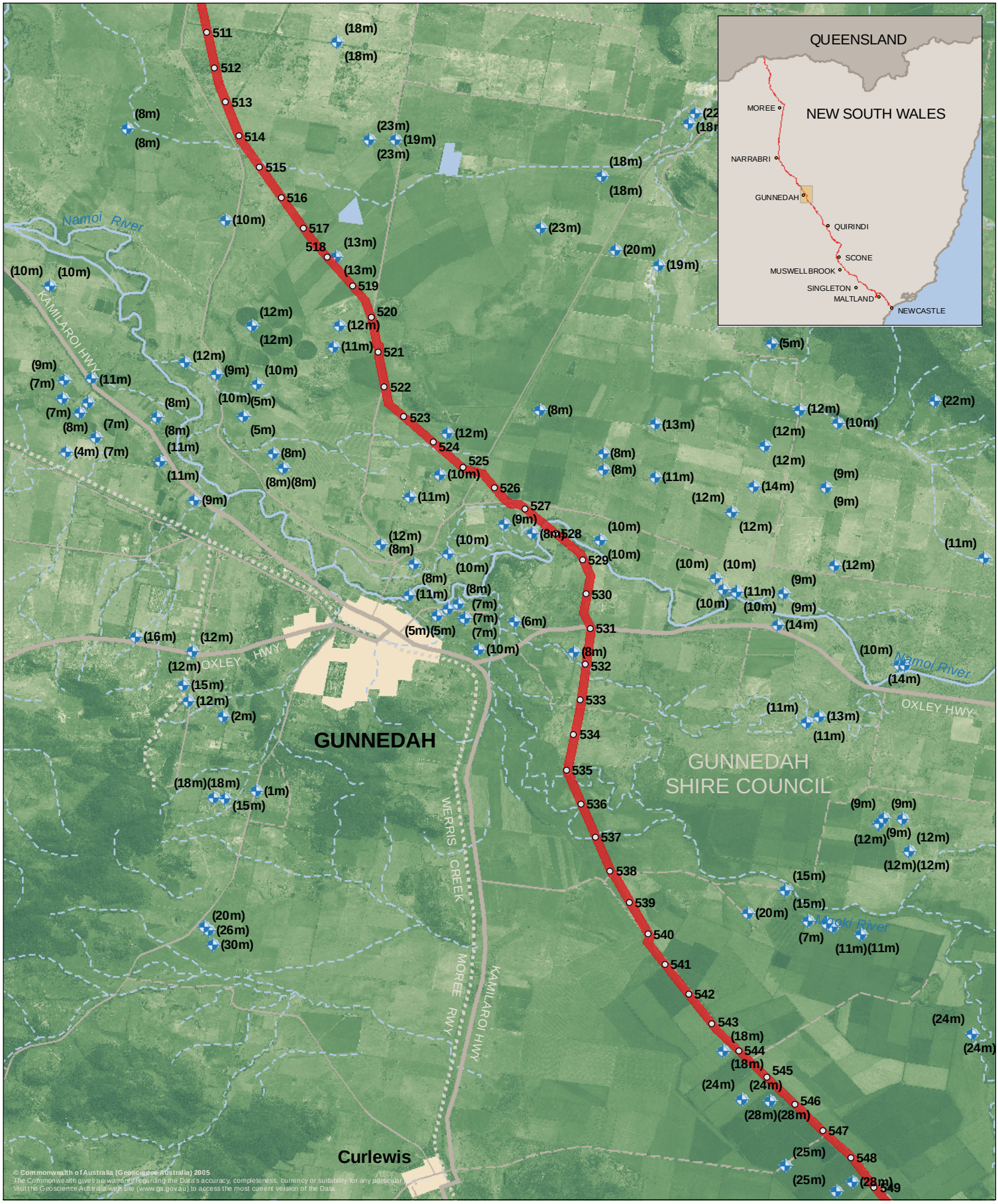
1:140,000 (at A4)

0 1 2 3 4km

Gunnedah region (KP513 to KP552)

Table 9 Gunnedah region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Namoi River	527.5	SW76	• 1st or 2nd class stream	**High**	TBC	Field work required.
Mooki Creek	537	SW77	• 3rd order stream. • 3rd class stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	514.5	SW78	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	524	SW79				
Unknown	526.5	SW80				
Unknown	532	SW81				
Unknown	535	SW82				



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Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.9 Existing environment water - Gunnedah area

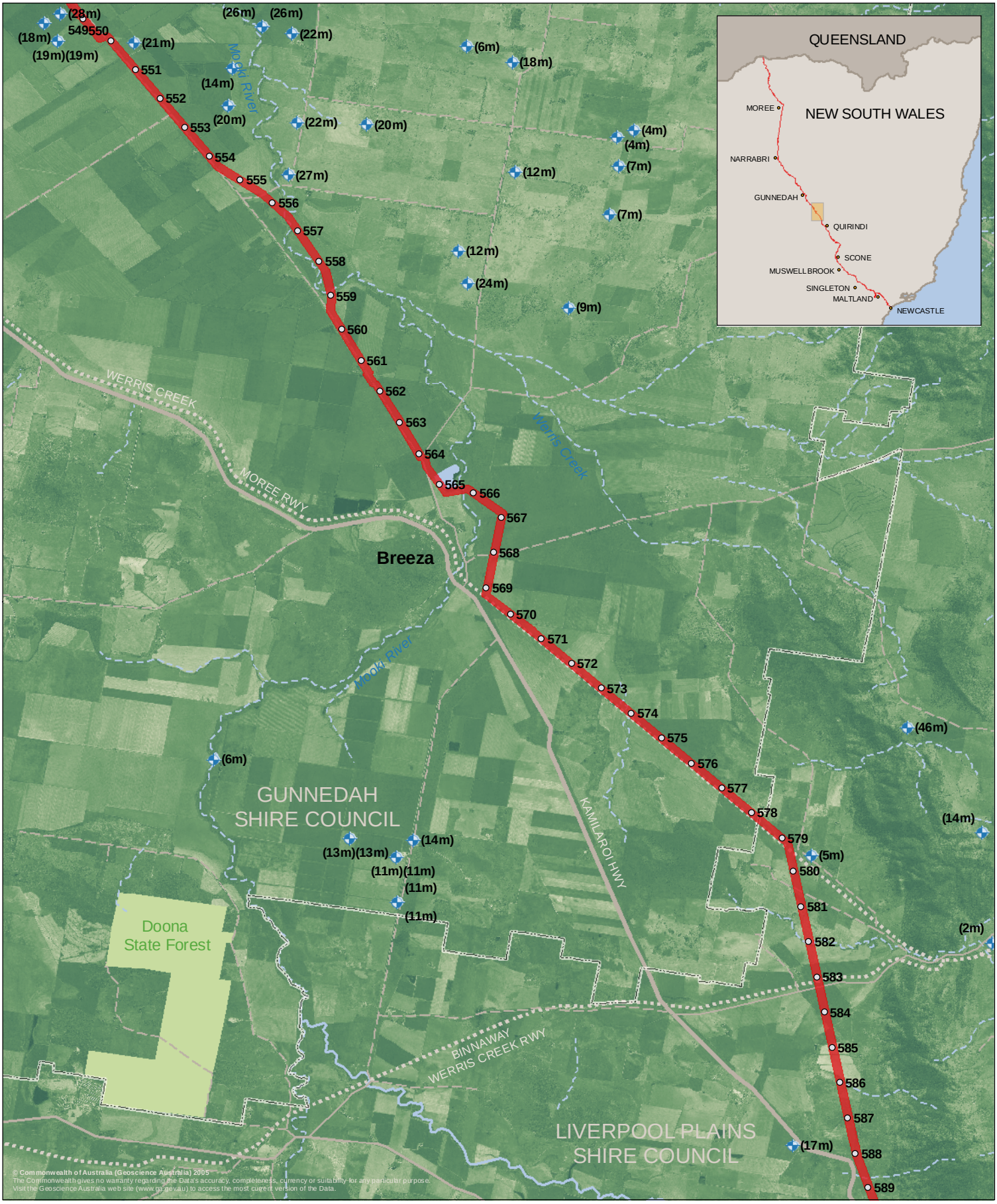
1:140,000 (at A4)

0 1 2 3 4km

Breeza region (KP552 to KP590)

Table 10 Breeza region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Mooki River	556.5	SW83	• 2nd class stream.	**High**	TBC	Field work required.
Mooki River	559	SW84				
Mooki River	566	SW85				
Unknown	574	SW86	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	582	SW87				
Unknown	586	SW88				
Unknown	588.5	SW89				



Drawing no. 07002g_CP_W_10-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in meters)
- J07002_Reservoirs
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.10 Existing environment water - Breeza area

1:140,000 (at A4)

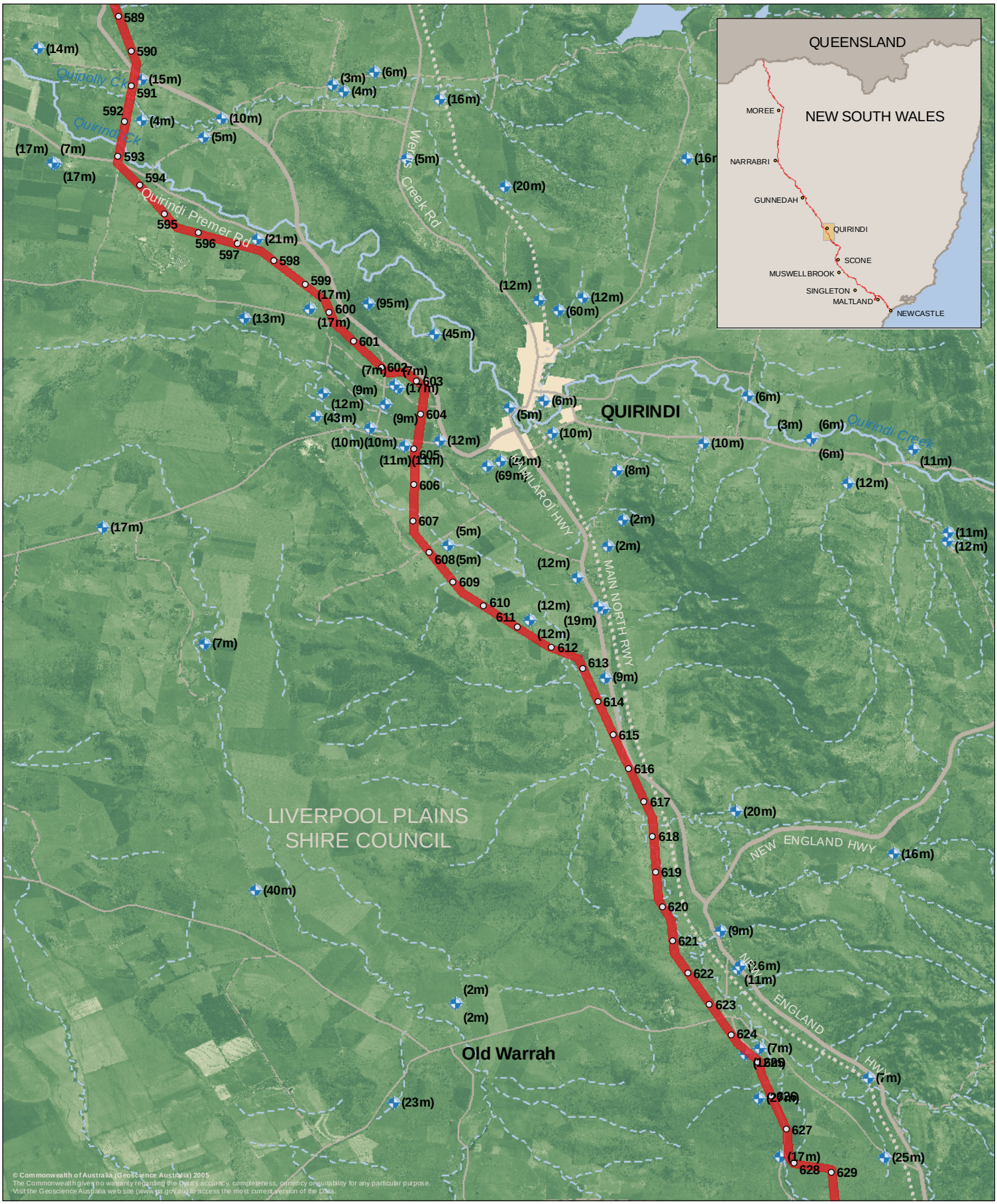
0 1 2 3 4km

Quirindi region (KP590 to KP629)

Table 11 Quirindi region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Quipolly Creek	591.5	SW90	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Quirindi Creek	592.5	SW91	• 3rd class stream. • 3rd or 4th order stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	605	SW92	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	606.5	SW93				
Unknown	609	SW94				
Borambil Creek	612	SW95	• 3rd or 4th order stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	613	SW96				
Unknown	614	SW97	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	617.5	SW98				
Unknown	618.5	SW99				
Unknown	620	SW100				
Unknown	625.5	SW101				

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
			Department of Primary Industries' Fish Habitat Classes.			
Borambil Creek	627.5	SW102	• 3rd or 4th order stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.



Drawing no. 07002g_CP_W_11-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in meters)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.11 Existing environment water - Quirindi area

1:140,000 (at A4)

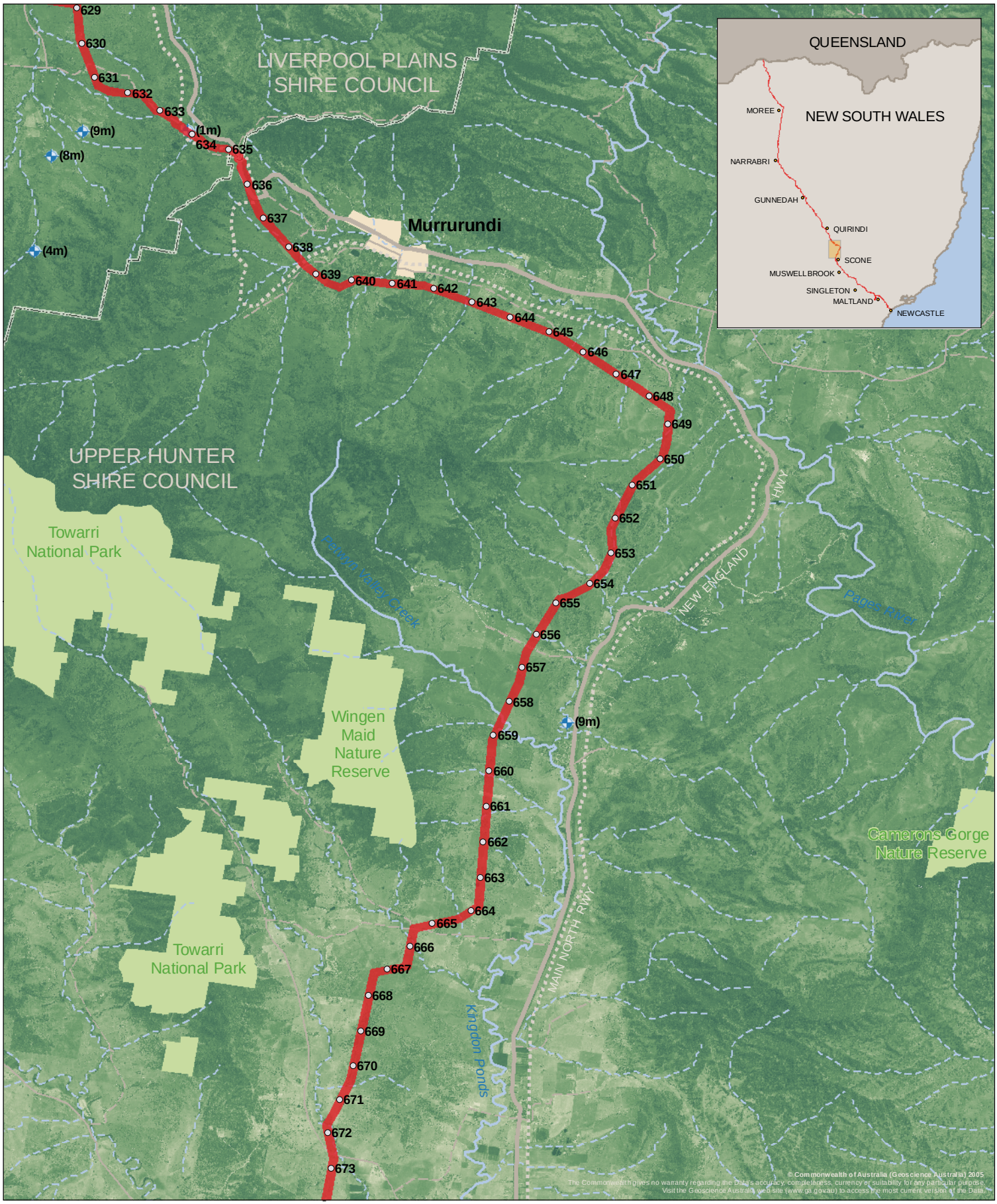
0 1 2 3 4km

Murrurundi region (KP629 to KP673)

Table 12 Murrurundi region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	630	SW103	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	633	SW104				
Unknown	634	SW105				
Groundwater bore	633-635	GW1	• Shallow water tables (less than 1.5m deep).	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	637.5	SW106	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	638.5	SW107				
Unknown	640.5	SW108				
Unknown	643	SW109				
Unknown	645.5	SW110				
Unknown	646	SW111				
Unknown	647	SW112				
Unknown	649	SW113				
Unknown	651.5	SW114				
Unknown	654	SW115				
Unknown	656	SW116				

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Petwyn Valley Creek	658.5	SW117	• 2nd class stream.	**High**	TBC	Field work required.
Unknown	659	SW118	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	660	SW119				
Unknown	661	SW120				
Unknown	664.5	SW121				
Unknown	666	SW122				
Unknown	670.5	SW123				
Unknown	672	SW124				



Drawing no. 07002g_CP_W_12-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in meters)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway
- Major river (perennial)
- Minor river (non-perennial)

Queensland Hunter Gas Pipeline

K.12 Existing environment water - Murrurundi area

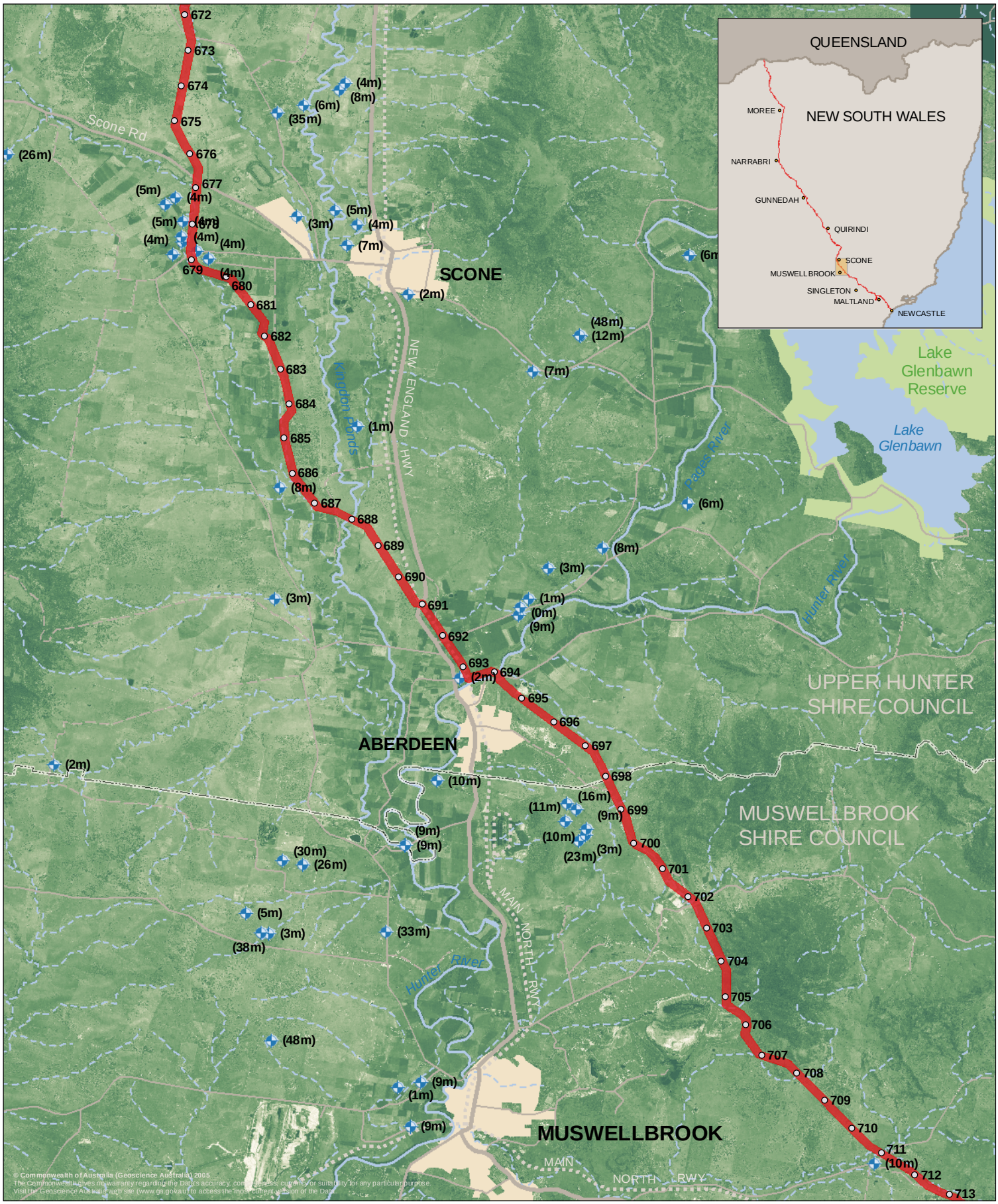
1:140,000 (at A4)

0 1 2 3 4km

Muswellbrook region (KP673 to KP713)

Table 13 Muswellbrook region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	684.5	SW125	• Moderate riparian vegetation, with some native species present.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Kingdon Ponds	688	SW126	• 2nd class stream.	**High**	TBC	Field work required.
Hunter River	694	SW127	• 1st or 2nd class stream. • Highly sensitive downstream users.	**High**	TBC	Minor - Standard mitigation measures apply.
Groundwater bore	692 to 695	GW2	• Shallow water tables (less than 1.5m deep).	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	697	SW128	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	699	SW129				
Unknown	702	SW130				
Unknown	703	SW131				
Unknown	705.5	SW132				
Unknown	708	SW133				



Drawing no. 07002g_CP_W_13-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.13 Existing environment water - Muswellbrook area

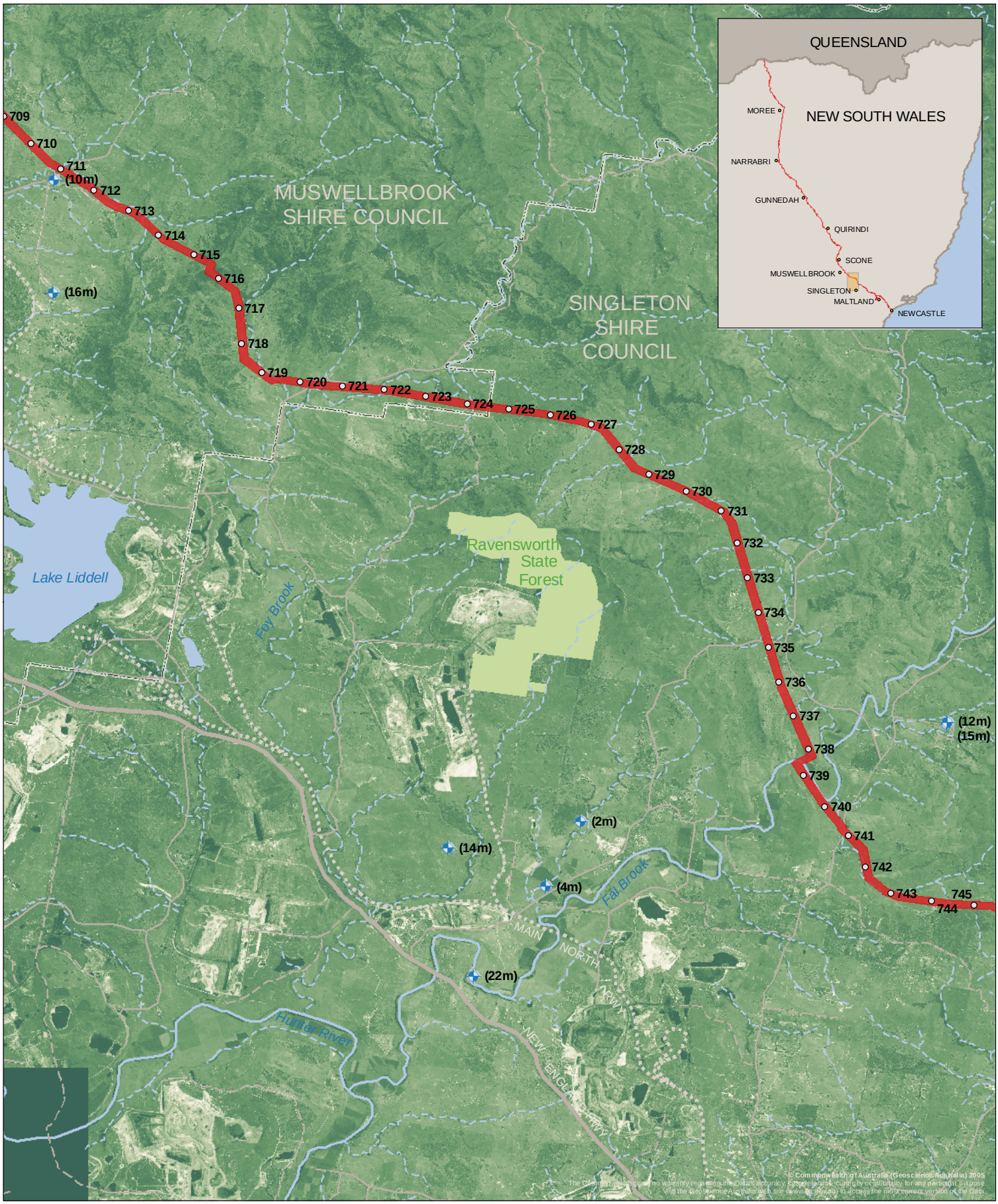
1:140,000 (at A4)

0 1 2 3 4km

Singleton North region (KP713 to KP743)

Table 14 Singleton Northregion - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	711	SW134	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	712.5	SW135				
Unknown	713.5	SW136				
Unknown	717	SW137				
Unknown	719.5	SW138				
Unknown	720.5	SW139				
Foy Brook Creek	722	SW140	• 3rd or 4th order stream. • 3rd class stream. • Moderate riparian vegetation with some native species present.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	724	SW141				
Unknown	727	SW142	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	728	SW143				
Unknown	731.5	SW144				
Unknown	732	SW145				
Unknown	733	SW146				
Unknown	735	SW147				



Drawing no. 07002g_CP_W_14-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.14 Existing environment water - Singleton north area

1:140,000 (at A4)

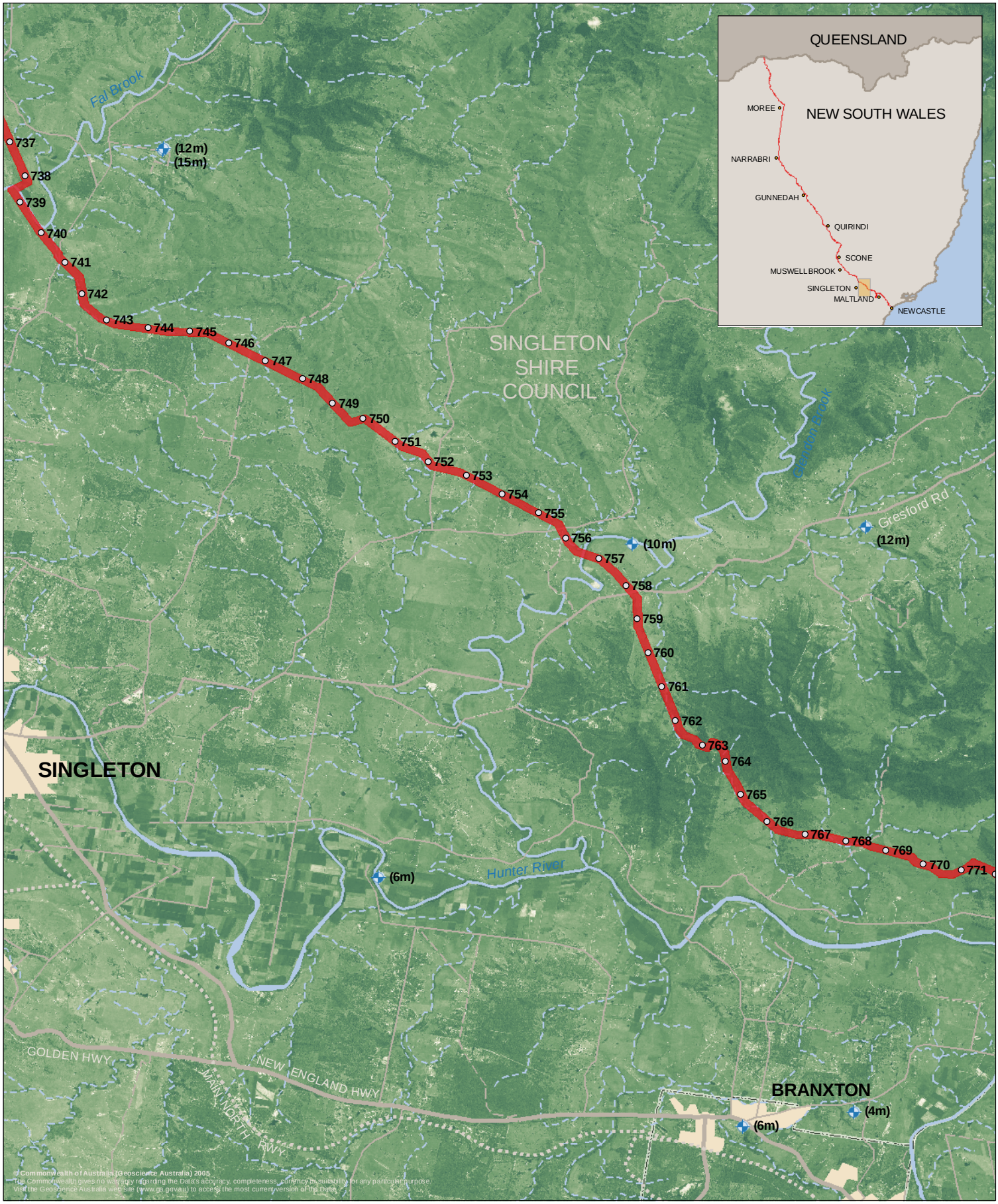
0 1 2 3 4km

Singleton East region (KP743 to KP770)

Table 15 Singleton East region - water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Fal Brook Creek	738.5	SW148	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Unknown	741	SW149	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	742	SW150				
Unknown	743	SW151				
Unknown	744	SW152				
Unknown	747	SW153				
Unknown	751	SW154	• 3rd class stream.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	753.5	SW155	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	755.5	SW156				
Unknown	756	SW157				
Glendon Brook	756.5	SW158	• 1st or 2nd class stream. • Good intact native riparian vegetation.	**High**	TBC	Field work required.

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	761	SW159	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	762	SW160				
Unknown	763.5	SW161	• Moderate riparian vegetation, with some native species present.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	766	SW162				
Unknown	767.5	SW163	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.



Drawing no. 07002g_CP_W_15-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.15 Existing environment water - Singleton east area

1:140,000 (at A4)

0 1 2 3 4km

Maitland region (KP770 to KP797)

Table 16 Maitland region – water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	768.5	SW164	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	774	SW165				
Unknown	777.5	SW166				
Hunter River	780.5	SW167	• 3rd or 4th order stream. • 1st or 2nd class stream. • Good native riparian vegetation.	**High**	TBC	Field work required.
Hunter River	783	SW168				
Unknown	785.5	SW169	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	787	SW170				
Unknown	793	SW171				

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Unknown	Lateral KP8	SW172	• Ephemeral stream. • No riparian vegetation – highly disturbed. • 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.

Drawing no. 07002g_CP_W_16-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
NSW Dept Environment & Climate Change
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- Acid sulphate sites (high risk of)
- Water storage area
- Major river (perennial)
- Minor river (non-perennial)
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.16 Existing environment water - Maitland area

1:140,000 (at A4)

0 1 2 3 4km

Newcastle region (KP797 to KP825)

Table 17 Newcastle region – water feature impact assessment

Water feature	KP	ID number	Relevant sensitivity criteria	Sensitivity	Probable crossing method	Residual impact
Hunter River	800.5	SW173	• 1st or 2nd class stream.	**High**	TBC	Field work required.
Four Mile Creek	802.5	SW174	• 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	808.5	SW175	• 1st or 2nd order stream according to the Department of Natural Resources' stream categories. • 4th class stream according to the Department of Primary Industries' Fish Habitat Classes.	**Low**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Unknown	810	SW176	• 3rd class stream. • Moderate riparian vegetation, with some native species present.	**Moderate**	Open trench with flow diversion (if flow diversion is appropriate).	Minor - Standard mitigation measures apply.
Hunter River	812.5	SW177	• 3rd or 4th order stream. • 1st or 2nd class stream.	**High**	HDD	Minor - Standard mitigation measures apply.
Hunter River	816	SW178	• SEPP 14 or RAMSAR listed wetlands downstream.			
Wetlands	807 to 813	SW179	• SEPP 14 or RAMSAR listed wetlands downstream.	**High**	TBC	Field work required.
Wetlands	816 to 820	SW180	• SEPP 14 or RAMSAR listed wetlands downstream.	**High**	TBC	Field work required.

Drawing no. 07002g_CP_W_17-1

Date 03 September 2008

Source Geoscience Australia
NSW Dept Water & Energy
NSW Dept Env. & Climate Change
RLMS Pty Ltd

Datum GDA 94

Legend

- Kilometre point
- Study Area
- Ground water bore (water level in metres)
- SEPP14
- Acid sulphate sites (high risk of)
- Major river (perennial)
- Minor river (non-perennial)
- Water storage area
- LGA boundary
- Principal road
- Secondary road
- Minor road
- Minor road (unsealed)
- Railway

Queensland Hunter Gas Pipeline

K.17 Existing environment water - Newcastle area

1:140,000 (at A4)

0 1 2 3 4km