



Appendix A

Proposed Crossing

Listing of crossings

Plans of crossing locations (Figures A1(a) to A1(f))

Table A1

1 of 2

Project: Highlands Source Project Environmental Assessment

Client: Goulburn Mulwarree Council

WATERCOURSE CROSSINGS

Sector	Ref No.	Name	Chainage (m)	Proposed construction method
GLENQUARRY	WAT 1	KELLYS CREEK	3,178	Trenched
WERAI - MOSS VALE	WAT 2	MEDWAY RIVULET	13,607	Trenched
SUTTON FOREST - EXETER	WAT 3	WELLS CREEK	19,438	Trenched
SUTTON FOREST - EXETER	WAT 4	BLACK BOBS CREEK	20,793	Trenched
SUTTON FOREST - EXETER	WAT 5	LONG SWAMP CREEK	24,503	Trenched
PADDYS RIVER	WAT 6	PADDYS RIVER	37,193	Trenched
PADDYS RIVER	WAT 7	URINGALLA CREEK	39,627	Trenched
MARULAN	WAT 8	JAORMIN CREEK	47,770	Trenched
TOWRANG	WAT 9	LOCKYERSLEIGH CREEK	55,124	Trenched
TOWRANG	WAT 10	NARAMBULLA CREEK	57,202	Trenched
TOWRANG	WAT 11	OSBORNS CREEK	60,589	Trenched
TOWRANG	WAT 12	WOLLONDILLY RIVER	64,073	HDD
TOWRANG	WAT 13	WOLLONDILLY RIVER	65,269	Trenched
TOWRANG	WAT 14	BOXERS CREEK	65,893	Trenched
MURRAYS FLAT	WAT 15	WOLLONDILLY RIVER	70,753	Trenched
MURRAYS FLAT	WAT 16	KENMORE CREEK	70,928	Trenched
MURRAYS FLAT	WAT 17	KENMORE CREEK	71,774	Trenched
MURRAYS FLAT	WAT 18	KENMORE CREEK	71,928	Trenched
MURRAYS FLAT	WAT 19	KENMORE CREEK	72,042	Trenched
GOULBURN	WAT 20	WOLLONDILLY RIVER	78,651	HDD

ROAD CROSSINGS

Sector	Road Ref. No.	Road Name	Chainage (m)	Proposed construction method
GLENQUARRY	ROAD 1	UNNAMED ROAD 1	23	Trenched
GLENQUARRY	ROAD 2	UNNAMED ROAD 2	47	Trenched
GLENQUARRY	ROAD 3	SHEEPWASH ROAD	839	Trenched
GLENQUARRY	ROAD 4	UNNAMED ROAD 4	2,969	Trenched
GLENQUARRY	ROAD 5	IONA PARK ROAD	5,787	Trenched
WERAI - MOSS VALE	ROAD 6	ROBERTSON ROAD	7,607	Thrust boring
WERAI - MOSS VALE	ROAD 7	UNNAMED ROAD 7	9,557	Trenched
WERAI - MOSS VALE	ROAD 8	YARRAWA ROAD	10,074	Trenched
WERAI - MOSS VALE	ROAD 9	UNNAMED ROAD 9	10,256	Trenched
WERAI - MOSS VALE	ROAD 10	UNNAMED ROAD 10	10,729	Trenched
WERAI - MOSS VALE	ROAD 11	BIBBYS LANE	12,101	Trenched
WERAI - MOSS VALE	ROAD 12	MOUNT BROUGHTON ROAD	12,769	Trenched
SUTTON FOREST - EXETER	ROAD 13	UNNAMED ROAD 13	15,486	Trenched
SUTTON FOREST - EXETER	ROAD 14	UNNAMED ROAD 14	16,169	Trenched
SUTTON FOREST - EXETER	ROAD 15	EXETER ROAD	16,182	Trenched
SUTTON FOREST - EXETER	ROAD 16	UNNAMED ROAD 16	16,620	Trenched
SUTTON FOREST - EXETER	ROAD 17	UNNAMED ROAD 17	19,210	Trenched
SUTTON FOREST - EXETER	ROAD 18	OLD ARGYLE ROAD	19,720	Trenched
SUTTON FOREST - EXETER	ROAD 19	SALLYS CORNER ROAD	24,989	Trenched
SUTTON FOREST - EXETER	ROAD 20	MIDDLE ROAD	25,089	Trenched
SUTTON FOREST - EXETER	ROAD 21	UNNAMED ROAD 21	25,157	Trenched
SUTTON FOREST - EXETER	ROAD 22	HUME HIGHWAY	26,383	Thrust boring
SUTTON FOREST - EXETER	ROAD 23	HUME HIGHWAY	26,417	Thrust boring
PADDYS RIVER	ROAD 24	UNNAMED ROAD 24	27,004	Trenched
PADDYS RIVER	ROAD 25	UNNAMED ROAD 25	28,497	Trenched
PADDYS RIVER	ROAD 26	UNNAMED ROAD 26	29,351	Trenched
PADDYS RIVER	ROAD 27	UNNAMED ROAD 27	29,372	Trenched
PADDYS RIVER	ROAD 28	UNNAMED ROAD 28	29,448	Trenched
PADDYS RIVER	ROAD 29	UNNAMED ROAD 29	29,854	Trenched

Table A1

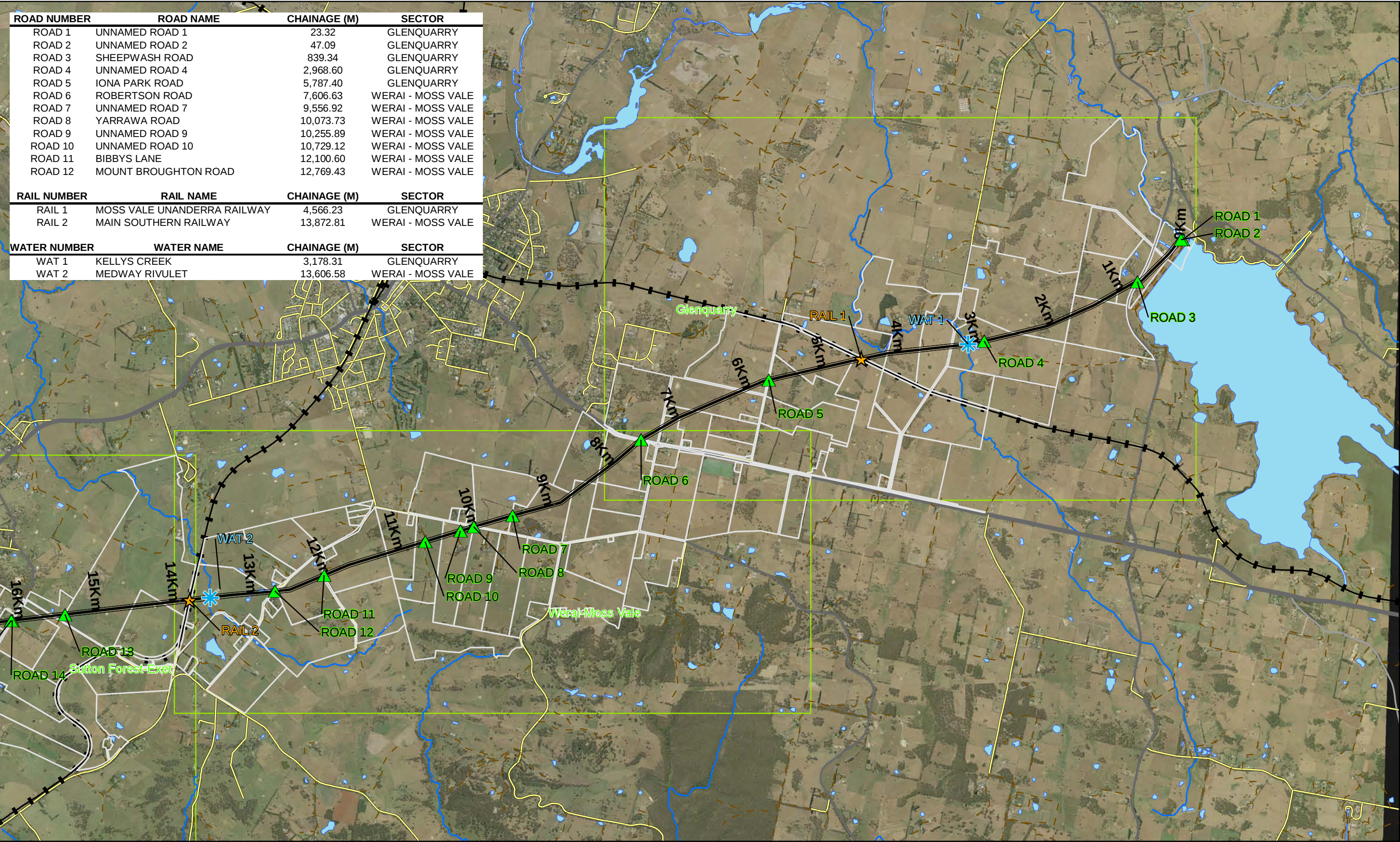
Project: Highlands Source Project Environmental Assessment

Client: Goulburn Mulwarree Council

Sector	Ref No.	Name	Chainage (m)	Proposed construction method
PADDYS RIVER	ROAD 30	UNNAMED ROAD 30	30,243	Trenched
PADDYS RIVER	ROAD 31	UNNAMED ROAD 31	30,534	Trenched
PADDYS RIVER	ROAD 32	UNNAMED ROAD 32	30,735	Trenched
PADDYS RIVER	ROAD 33	UNNAMED ROAD 33	31,148	Trenched
PADDYS RIVER	ROAD 34	UNNAMED ROAD 34	31,648	Trenched
PADDYS RIVER	ROAD 35	UNNAMED ROAD 35	31,825	Trenched
PADDYS RIVER	ROAD 36	UNNAMED ROAD 36	32,105	Trenched
PADDYS RIVER	ROAD 37	UNNAMED ROAD 37	32,620	Trenched
PADDYS RIVER	ROAD 38	UNNAMED ROAD 38	33,608	Trenched
PADDYS RIVER	ROAD 39	UNNAMED ROAD 39	34,506	Trenched
PADDYS RIVER	ROAD 40	INVERARY ROAD	37,045	Trenched
PADDYS RIVER	ROAD 41	UNNAMED ROAD 41	37,274	Trenched
PADDYS RIVER	ROAD 42	UNNAMED ROAD 42	38,112	Trenched
PADDYS RIVER	ROAD 43	UNNAMED ROAD 43	38,572	Trenched
PADDYS RIVER	ROAD 44	UNNAMED ROAD 44	39,184	Trenched
PADDYS RIVER	ROAD 45	WOLLUMBI ROAD	39,877	Trenched
MARULAN	ROAD 46	UNNAMED ROAD 46	40,927	Trenched
MARULAN	ROAD 47	RED HILLS ROAD	42,409	Trenched
MARULAN	ROAD 48	UNNAMED ROAD 48	42,851	Trenched
MARULAN	ROAD 49	UNNAMED ROAD 49	44,834	Trenched
MARULAN	ROAD 50	UNNAMED ROAD 50	45,013	Trenched
MARULAN	ROAD 51	RED HILLS ROAD	45,286	Trenched
MARULAN	ROAD 52	UNNAMED ROAD 52	45,288	Trenched
MARULAN	ROAD 53	UNNAMED ROAD 53	45,323	Trenched
MARULAN	ROAD 54	BRAYTON ROAD	49,127	Trenched
MARULAN	ROAD 55	UNNAMED ROAD 55	51,740	Trenched
TOWRANG	ROAD 56	UNNAMED ROAD 56	54,400	Trenched
TOWRANG	ROAD 57	UNNAMED ROAD 57	55,482	Trenched
TOWRANG	ROAD 58	UNNAMED ROAD 58	55,993	Trenched
TOWRANG	ROAD 59	CARRICK ROAD	61,413	Trenched
TOWRANG	ROAD 60	UNNAMED ROAD 60	63,584	Trenched
TOWRANG	ROAD 61	UNNAMED ROAD 61	63,638	Trenched
TOWRANG	ROAD 62	TOWRANG ROAD	64,573	Trenched
TOWRANG	ROAD 63	UNNAMED ROAD 63	65,686	Trenched
TOWRANG	ROAD 64	MURRAYS FLAT ROAD	68,097	Trenched
MURRAY FLAT	ROAD 65	UNNAMED ROAD 65	68,345	Trenched
MURRAY FLAT	ROAD 66	UNNAMED ROAD 66	69,607	Trenched
MURRAY FLAT	ROAD 67	UNNAMED ROAD 67	70,414	Trenched
MURRAY FLAT	ROAD 68	TARALGA ROAD	71,737	Trenched
GOULBURN	ROAD 69	UNNAMED ROAD 69	72,738	Trenched
GOULBURN	ROAD 70	MIDDLE ARM ROAD	74,016	Trenched
GOULBURN	ROAD 71	CROOKWELL ROAD	76,715	Thrust boring
GOULBURN	ROAD 72	CHINAMANS LANE	77,805	Trenched
GOULBURN	ROAD 73	CLINTON STREET	80,461	Trenched

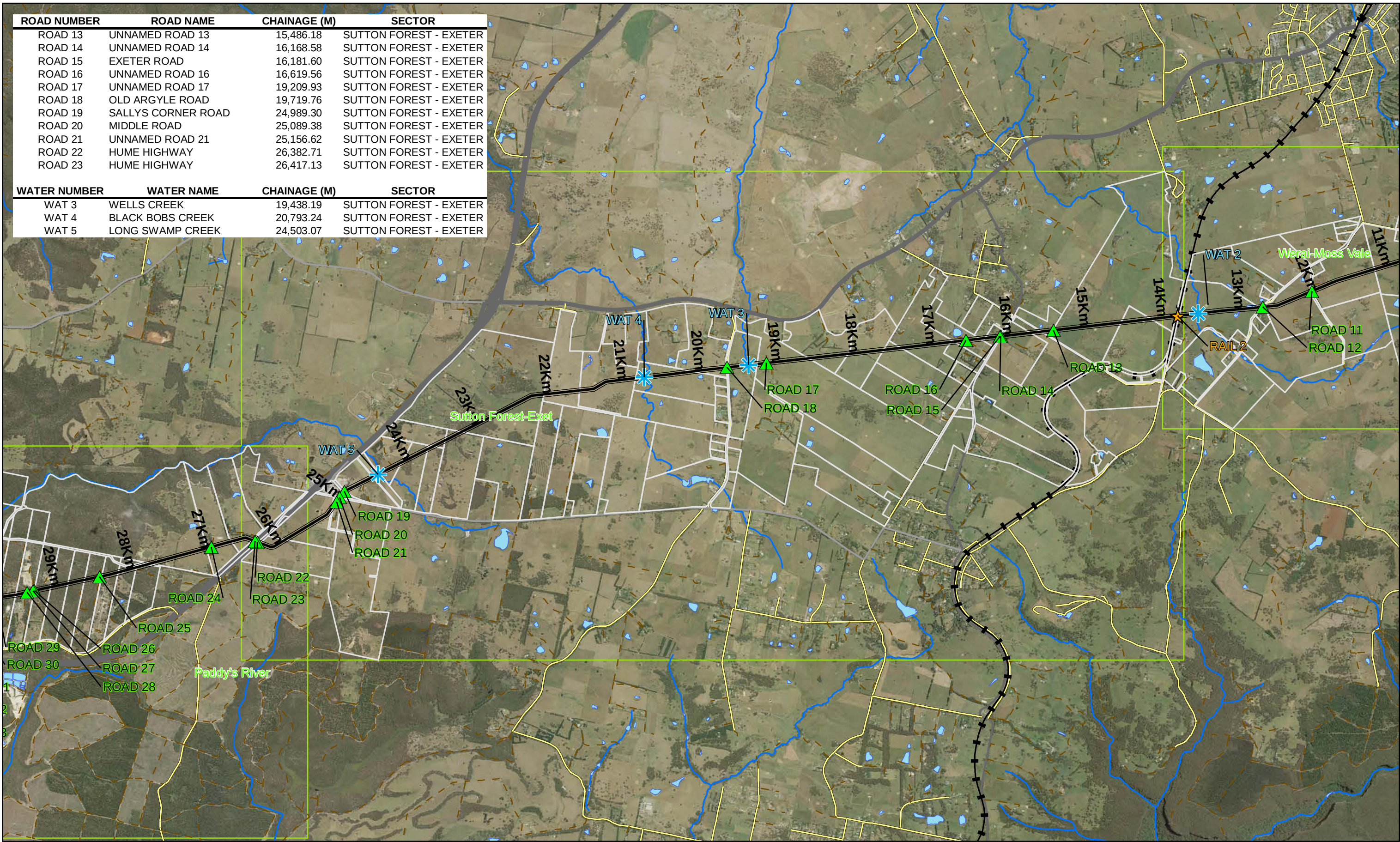
RAILWAY LINES CROSSINGS

Sector	Ref No.	Name	Chainage (m)	Proposed construction method
GLENQUARRY	RAIL 1	MOSS VALE UNANDERRA RAIL	4,566	Thrust boring
WERAI - MOSS VALE	RAIL 2	MAIN SOUTHERN RAILWAY	13,873	Thrust boring
MARULAN	RAIL 3	MAIN SOUTHERN RAILWAY	52,626	Thrust boring
TOWRANG	RAIL 4	MAIN SOUTHERN RAILWAY	68,034	Thrust boring
GOULBURN	RAIL 5	GOULBURN CROOKWELL RAIL	72,798	Thrust boring



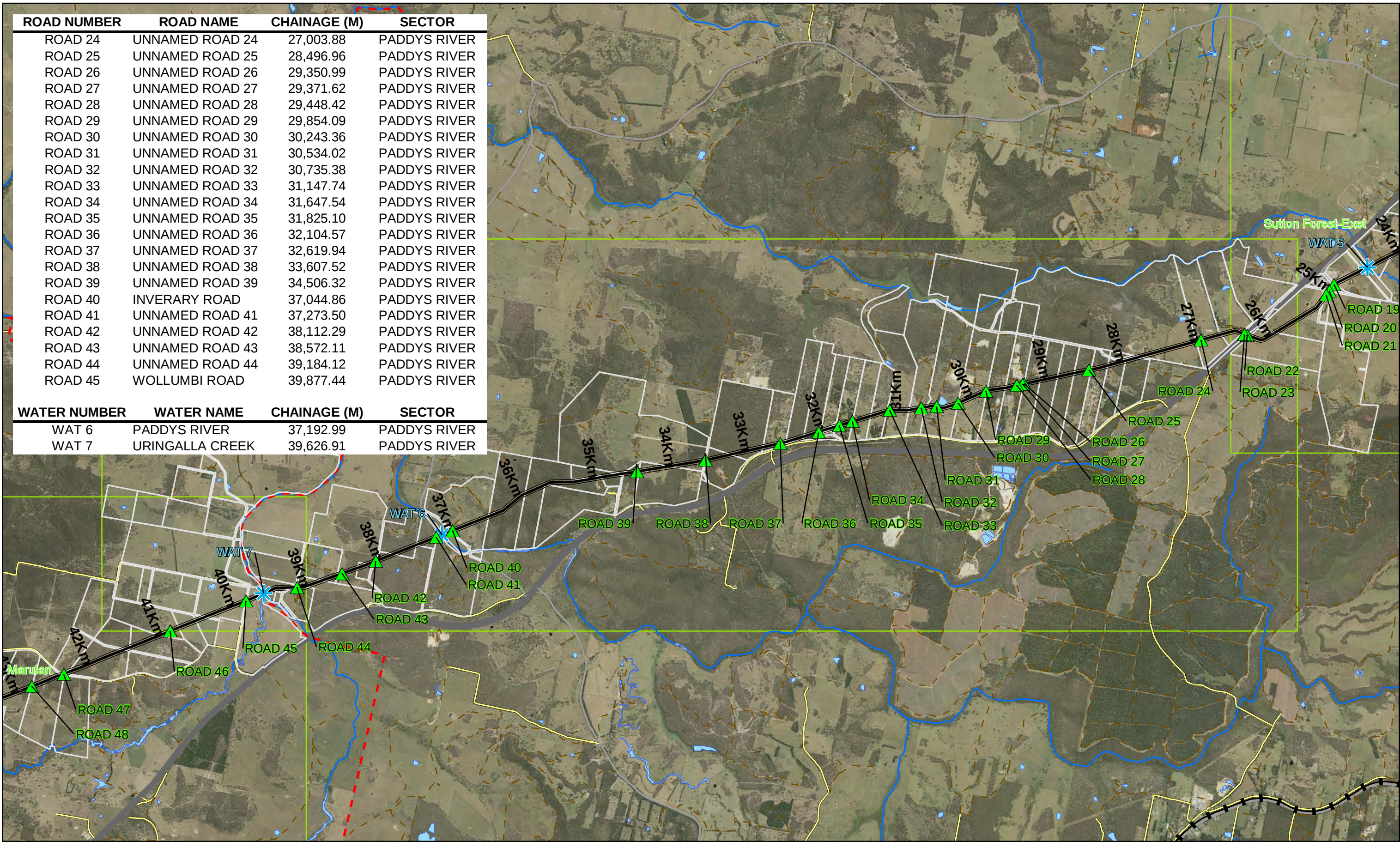
ROAD NUMBER	ROAD NAME	CHAINAGE (M)	SECTOR
ROAD 13	UNNAMED ROAD 13	15,486.18	SUTTON FOREST - EXETER
ROAD 14	UNNAMED ROAD 14	16,168.58	SUTTON FOREST - EXETER
ROAD 15	EXETER ROAD	16,181.60	SUTTON FOREST - EXETER
ROAD 16	UNNAMED ROAD 16	16,619.56	SUTTON FOREST - EXETER
ROAD 17	UNNAMED ROAD 17	19,209.93	SUTTON FOREST - EXETER
ROAD 18	OLD ARGYLE ROAD	19,719.76	SUTTON FOREST - EXETER
ROAD 19	SALLY'S CORNER ROAD	24,989.30	SUTTON FOREST - EXETER
ROAD 20	MIDDLE ROAD	25,089.38	SUTTON FOREST - EXETER
ROAD 21	UNNAMED ROAD 21	25,156.62	SUTTON FOREST - EXETER
ROAD 22	HUME HIGHWAY	26,382.71	SUTTON FOREST - EXETER
ROAD 23	HUME HIGHWAY	26,417.13	SUTTON FOREST - EXETER

WATER NUMBER	WATER NAME	CHAINAGE (M)	SECTOR
WAT 3	WELLS CREEK	19,438.19	SUTTON FOREST - EXETER
WAT 4	BLACK BOBS CREEK	20,793.24	SUTTON FOREST - EXETER
WAT 5	LONG SWAMP CREEK	24,503.07	SUTTON FOREST - EXETER



ROAD NUMBER	ROAD NAME	CHAINAGE (M)	SECTOR
ROAD 24	UNNAMED ROAD 24	27,003.88	PADDYS RIVER
ROAD 25	UNNAMED ROAD 25	28,496.96	PADDYS RIVER
ROAD 26	UNNAMED ROAD 26	29,350.99	PADDYS RIVER
ROAD 27	UNNAMED ROAD 27	29,371.62	PADDYS RIVER
ROAD 28	UNNAMED ROAD 28	29,448.42	PADDYS RIVER
ROAD 29	UNNAMED ROAD 29	29,854.09	PADDYS RIVER
ROAD 30	UNNAMED ROAD 30	30,243.36	PADDYS RIVER
ROAD 31	UNNAMED ROAD 31	30,534.02	PADDYS RIVER
ROAD 32	UNNAMED ROAD 32	30,735.38	PADDYS RIVER
ROAD 33	UNNAMED ROAD 33	31,147.74	PADDYS RIVER
ROAD 34	UNNAMED ROAD 34	31,647.54	PADDYS RIVER
ROAD 35	UNNAMED ROAD 35	31,825.10	PADDYS RIVER
ROAD 36	UNNAMED ROAD 36	32,104.57	PADDYS RIVER
ROAD 37	UNNAMED ROAD 37	32,619.94	PADDYS RIVER
ROAD 38	UNNAMED ROAD 38	33,607.52	PADDYS RIVER
ROAD 39	UNNAMED ROAD 39	34,506.32	PADDYS RIVER
ROAD 40	INVERARY ROAD	37,044.86	PADDYS RIVER
ROAD 41	UNNAMED ROAD 41	37,273.50	PADDYS RIVER
ROAD 42	UNNAMED ROAD 42	38,112.29	PADDYS RIVER
ROAD 43	UNNAMED ROAD 43	38,572.11	PADDYS RIVER
ROAD 44	UNNAMED ROAD 44	39,184.12	PADDYS RIVER
ROAD 45	WOLLUMBI ROAD	39,877.44	PADDYS RIVER

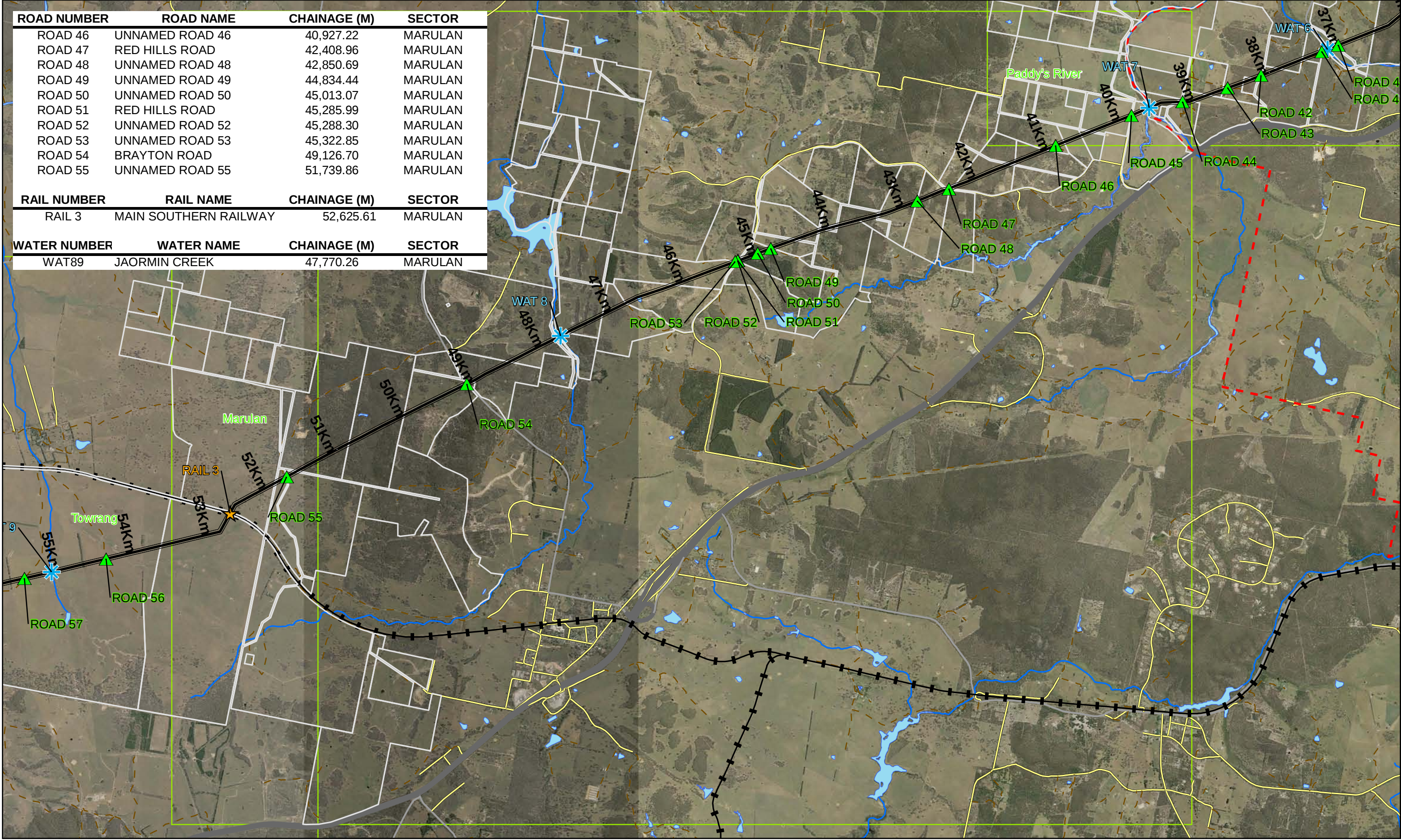
WATER NUMBER	WATER NAME	CHAINAGE (M)	SECTOR
WAT 6	PADDYS RIVER	37,192.99	PADDYS RIVER
WAT 7	URINGALLA CREEK	39,626.91	PADDYS RIVER



ROAD NUMBER	ROAD NAME	CHAINAGE (M)	SECTOR
ROAD 46	UNNAMED ROAD 46	40,927.22	MARULAN
ROAD 47	RED HILLS ROAD	42,408.96	MARULAN
ROAD 48	UNNAMED ROAD 48	42,850.69	MARULAN
ROAD 49	UNNAMED ROAD 49	44,834.44	MARULAN
ROAD 50	UNNAMED ROAD 50	45,013.07	MARULAN
ROAD 51	RED HILLS ROAD	45,285.99	MARULAN
ROAD 52	UNNAMED ROAD 52	45,288.30	MARULAN
ROAD 53	UNNAMED ROAD 53	45,322.85	MARULAN
ROAD 54	BRAYTON ROAD	49,126.70	MARULAN
ROAD 55	UNNAMED ROAD 55	51,739.86	MARULAN

RAIL NUMBER	RAIL NAME	CHAINAGE (M)	SECTOR
RAIL 3	MAIN SOUTHERN RAILWAY	52,625.61	MARULAN

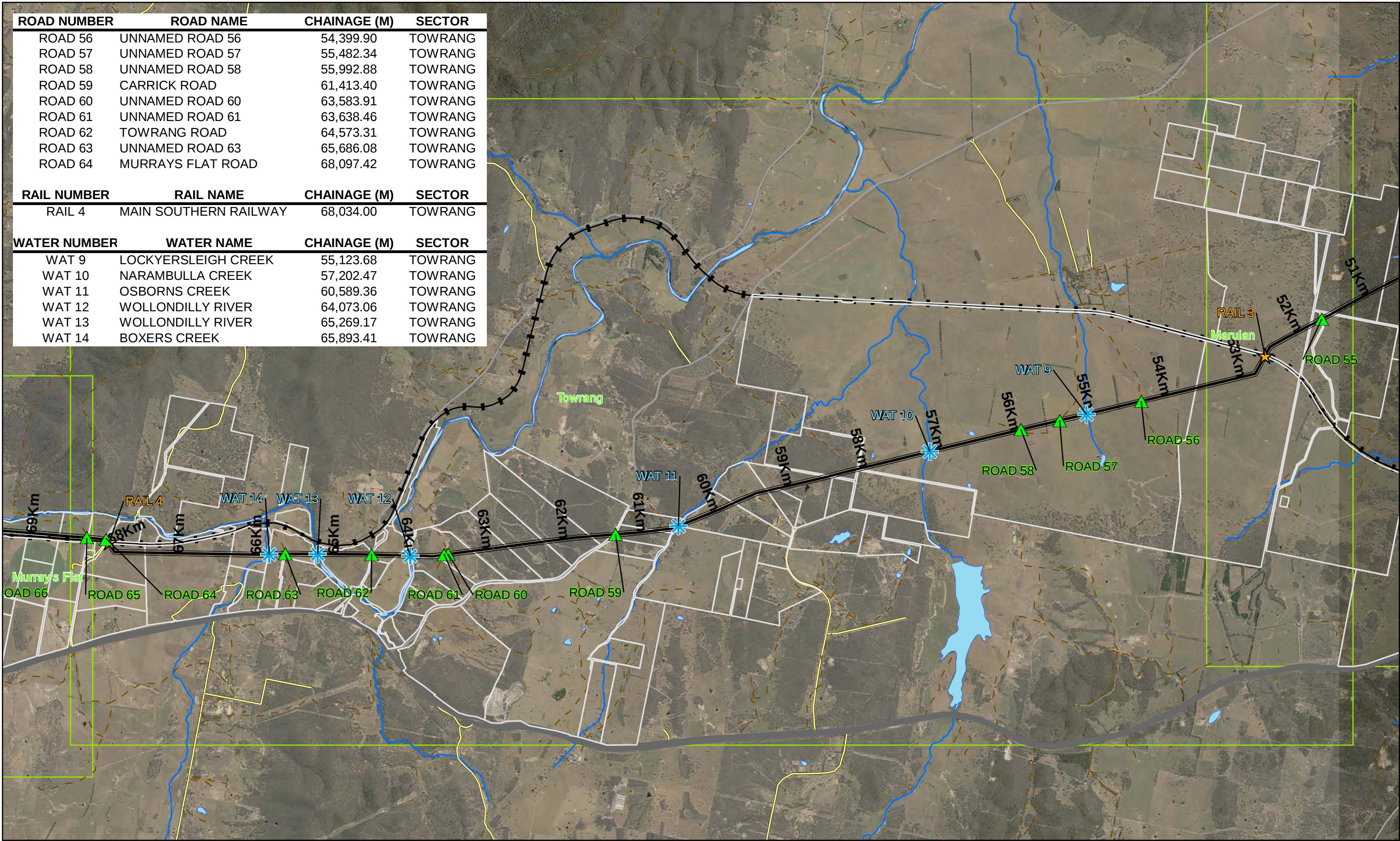
WATER NUMBER	WATER NAME	CHAINAGE (M)	SECTOR
WAT89	JAORMIN CREEK	47,770.26	MARULAN



ROAD NUMBER	ROAD NAME	CHAINAGE (M)	SECTOR
ROAD 56	UNNAMED ROAD 56	54,399.90	TOWRANG
ROAD 57	UNNAMED ROAD 57	55,482.34	TOWRANG
ROAD 58	UNNAMED ROAD 58	55,992.88	TOWRANG
ROAD 59	CARRICK ROAD	61,413.40	TOWRANG
ROAD 60	UNNAMED ROAD 60	63,583.91	TOWRANG
ROAD 61	UNNAMED ROAD 61	63,638.46	TOWRANG
ROAD 62	TOWRANG ROAD	64,573.31	TOWRANG
ROAD 63	UNNAMED ROAD 63	65,686.08	TOWRANG
ROAD 64	MURRAYS FLAT ROAD	68,097.42	TOWRANG

RAIL NUMBER	RAIL NAME	CHAINAGE (M)	SECTOR
RAIL 4	MAIN SOUTHERN RAILWAY	68,034.00	TOWRANG

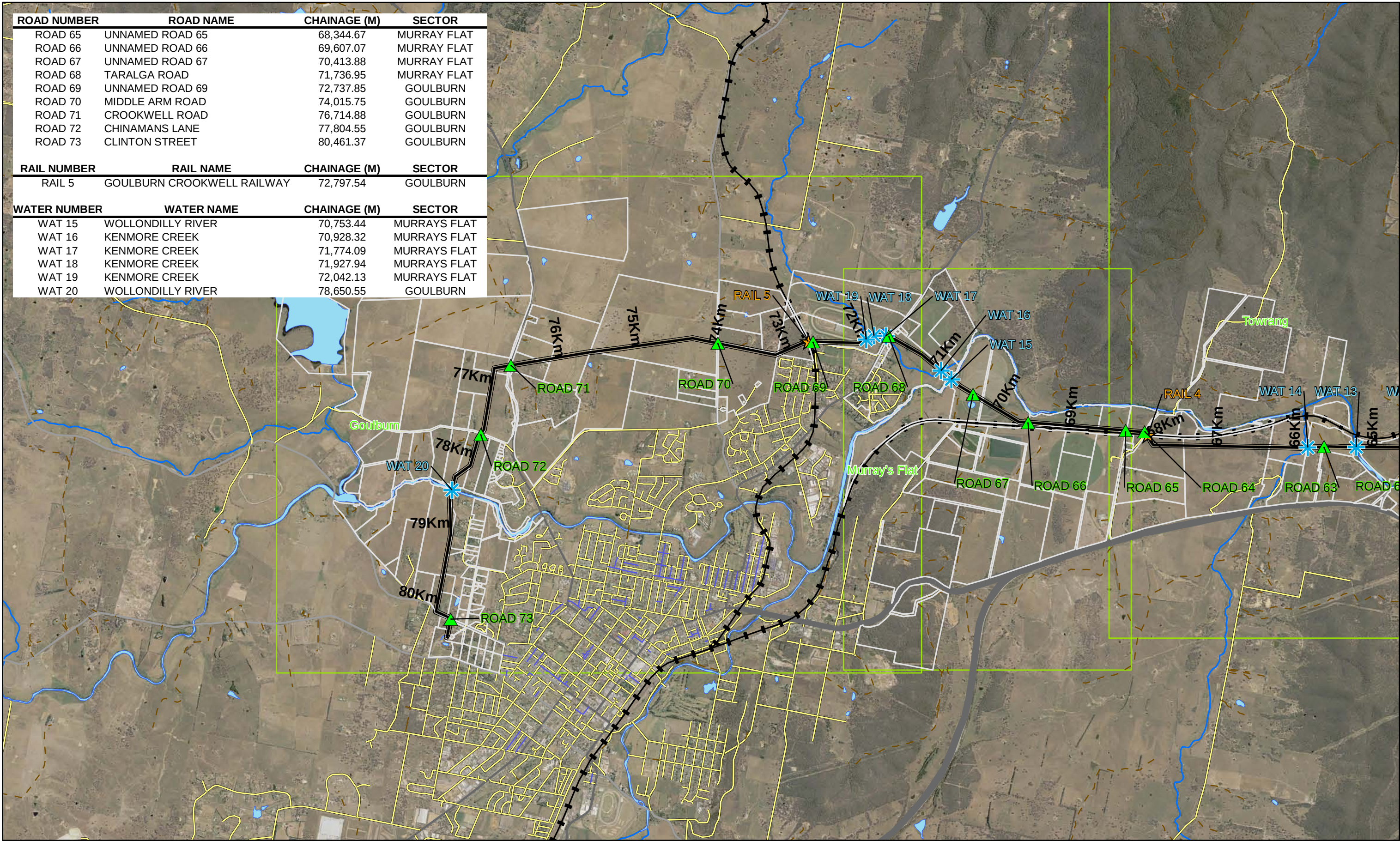
WATER NUMBER	WATER NAME	CHAINAGE (M)	SECTOR
WAT 9	LOCKYERSLEIGH CREEK	55,123.68	TOWRANG
WAT 10	NARAMBULLA CREEK	57,202.47	TOWRANG
WAT 11	OSBORNS CREEK	60,589.36	TOWRANG
WAT 12	WOLLONDILLY RIVER	64,073.06	TOWRANG
WAT 13	WOLLONDILLY RIVER	65,269.17	TOWRANG
WAT 14	BOXERS CREEK	65,893.41	TOWRANG



ROAD NUMBER	ROAD NAME	CHAINAGE (M)	SECTOR
ROAD 65	UNNAMED ROAD 65	68,344.67	MURRAY FLAT
ROAD 66	UNNAMED ROAD 66	69,607.07	MURRAY FLAT
ROAD 67	UNNAMED ROAD 67	70,413.88	MURRAY FLAT
ROAD 68	TARALGA ROAD	71,736.95	MURRAY FLAT
ROAD 69	UNNAMED ROAD 69	72,737.85	GOULBURN
ROAD 70	MIDDLE ARM ROAD	74,015.75	GOULBURN
ROAD 71	CROOKWELL ROAD	76,714.88	GOULBURN
ROAD 72	CHINAMANS LANE	77,804.55	GOULBURN
ROAD 73	CLINTON STREET	80,461.37	GOULBURN

RAIL NUMBER	RAIL NAME	CHAINAGE (M)	SECTOR
RAIL 5	GOULBURN CROOKWELL RAILWAY	72,797.54	GOULBURN

WATER NUMBER	WATER NAME	CHAINAGE (M)	SECTOR
WAT 15	WOLLONDILLY RIVER	70,753.44	MURRAY'S FLAT
WAT 16	KENMORE CREEK	70,928.32	MURRAY'S FLAT
WAT 17	KENMORE CREEK	71,774.09	MURRAY'S FLAT
WAT 18	KENMORE CREEK	71,927.94	MURRAY'S FLAT
WAT 19	KENMORE CREEK	72,042.13	MURRAY'S FLAT
WAT 20	WOLLONDILLY RIVER	78,650.55	GOULBURN





Appendix B

Project controls to prevent soil erosion and sedimentation

Project controls to prevent soil erosion and sedimentation

General

All erosion and sediment control measures would be designed, implemented and maintained in accordance with the following guidelines:

- ▶ *Managing Stormwater: Urban Soils and Construction Vol 1*(Landcom, 2004);
- ▶ *Managing Stormwater: Urban Soils and Construction Vol 2A Installation of Services* (DECC, 2008a); and
- ▶ *Managing Stormwater: Urban Soils and Construction Vol 2C Unsealed Roads* (DECC, 2008b).

A detailed soil and water management plan would be prepared which would contain designs of the erosion and sediment controls that would be implemented.

Pipeline trench excavations

Trench excavations would only remain open for a short period of time as the pipeline is progressively laid and the trench backfilled. This approach would limit the opportunity for the following detrimental impacts to occur:

- ▶ Sediment laden surface water flows into and within the trench;
- ▶ Contaminants (such as 'dirty' water or fuels spills) to enter the trench and infiltrate to underlying groundwater;
- ▶ Stormwater erosion and wind erosion of exposed stockpiles of topsoil and sub soils.

On steeper sloping sections of trench, earth banks would be installed to prevent erosion of the backfilled trench. Earth banks would direct runoff onto stable or well vegetated ground or sediment filters such as straw bales. Typical arrangements for trench excavations and backfilling and earth bank arrangement is shown in Figure B 1.

Stockpiles of spoil from trenching

As discussed above, small quantities of excess spoil are expected and would be stockpiled before removal off site. Excess spoil would be stockpiled within the construction corridor for no longer than two to three days. Where stockpiling of materials are required over such as period the following control measures would be implemented:

- ▶ Stockpiles would not be located in drainage lines, near water features, within flood prone land (at the Wingecaribee Water Treatment Plant site), on steep land or with 5 m of trees;
- ▶ Excavated material generated during trenching would be stockpiled on the high side of the trench;
- ▶ Small diversion drains would be place around the high side of stockpiles to diver water away from the stockpiled material; and
- ▶ Sediment fences would be erected on the low side of stockpiles to capture stormwater runoff.

A typical stockpile arrangement is shown in Figure B 2.

Figure B 1 Typical trench excavation and backfilling and earth bank arrangement
 (Source: DECC, 2008a p26)

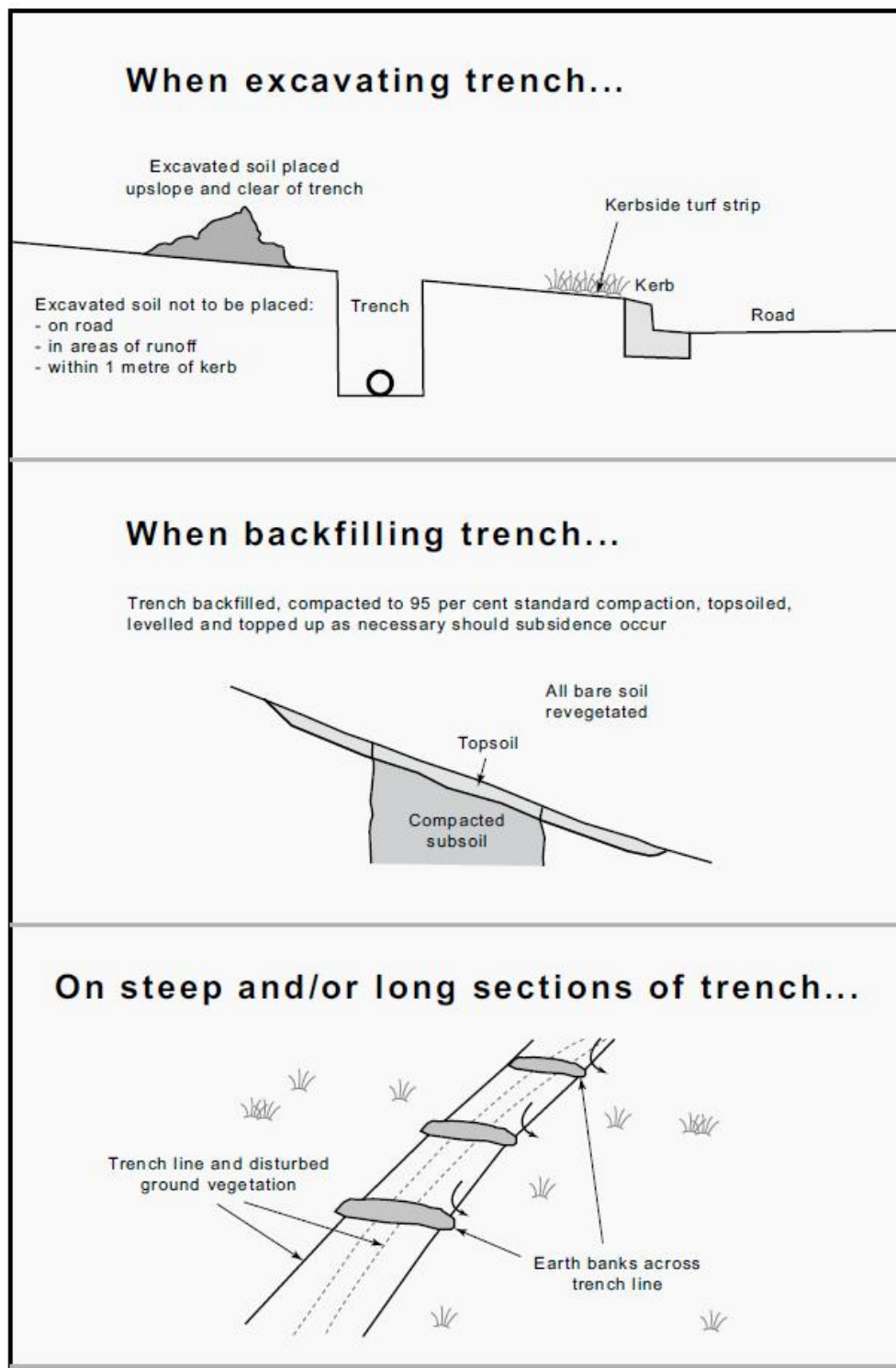
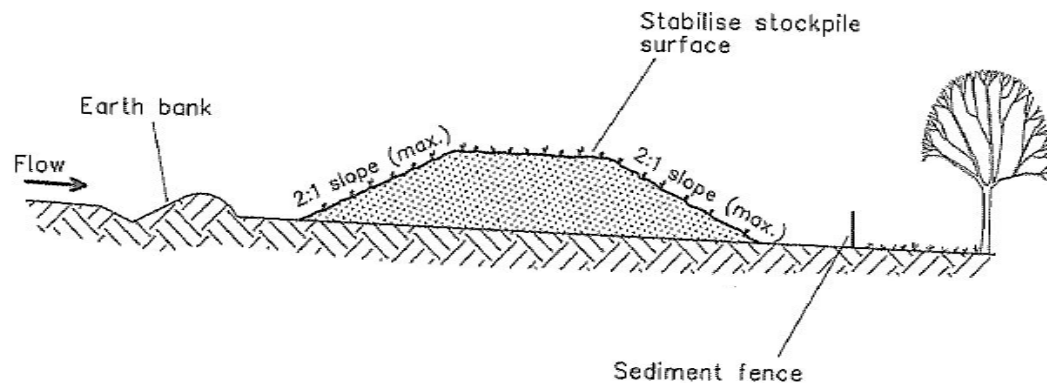


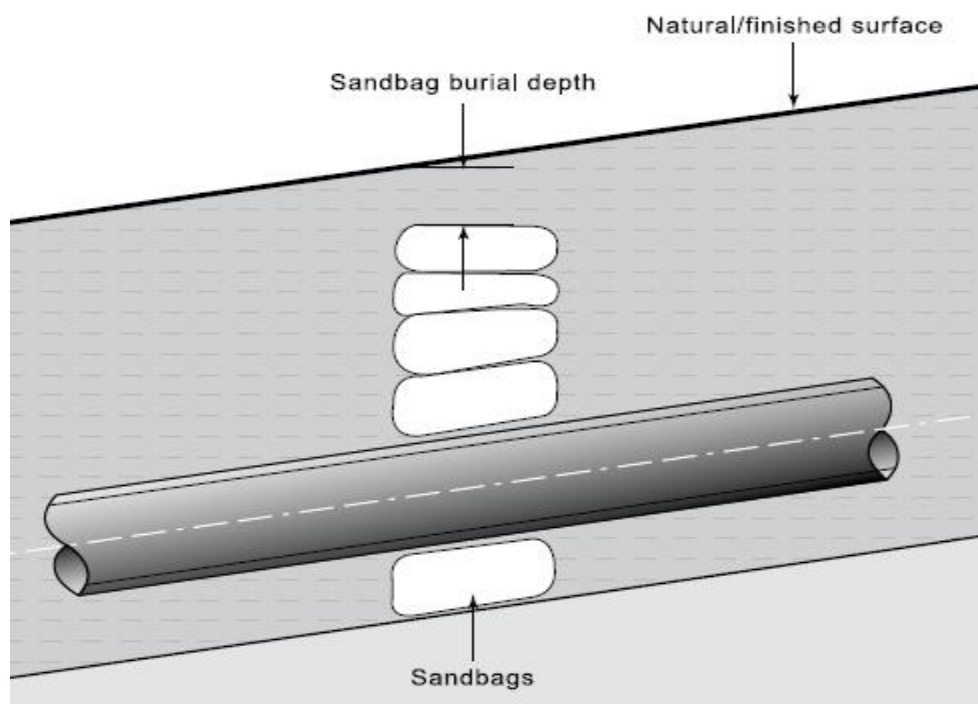
Figure B 2 Typical stockpile arrangement (Source: Landcom 2004, p4-5)



Tunnel erosion control

A course material such as bedding sand would be placed in the base of the trench above which the pipe is laid. Backfilled material (other than topsoil) would be compacted to 95% standard compaction. Such measure would limit the risk of tunnel erosion. On steep sections of the pipeline, the risk of tunnel erosion would be higher. Therefore seepage collars or bulk heads would be installed as appropriate. A typical arrangement for a seepage collar is shown in [Figure B 3](#).

Figure B 3 Typical seepage collar arrangement (DECC, 2008a p28)

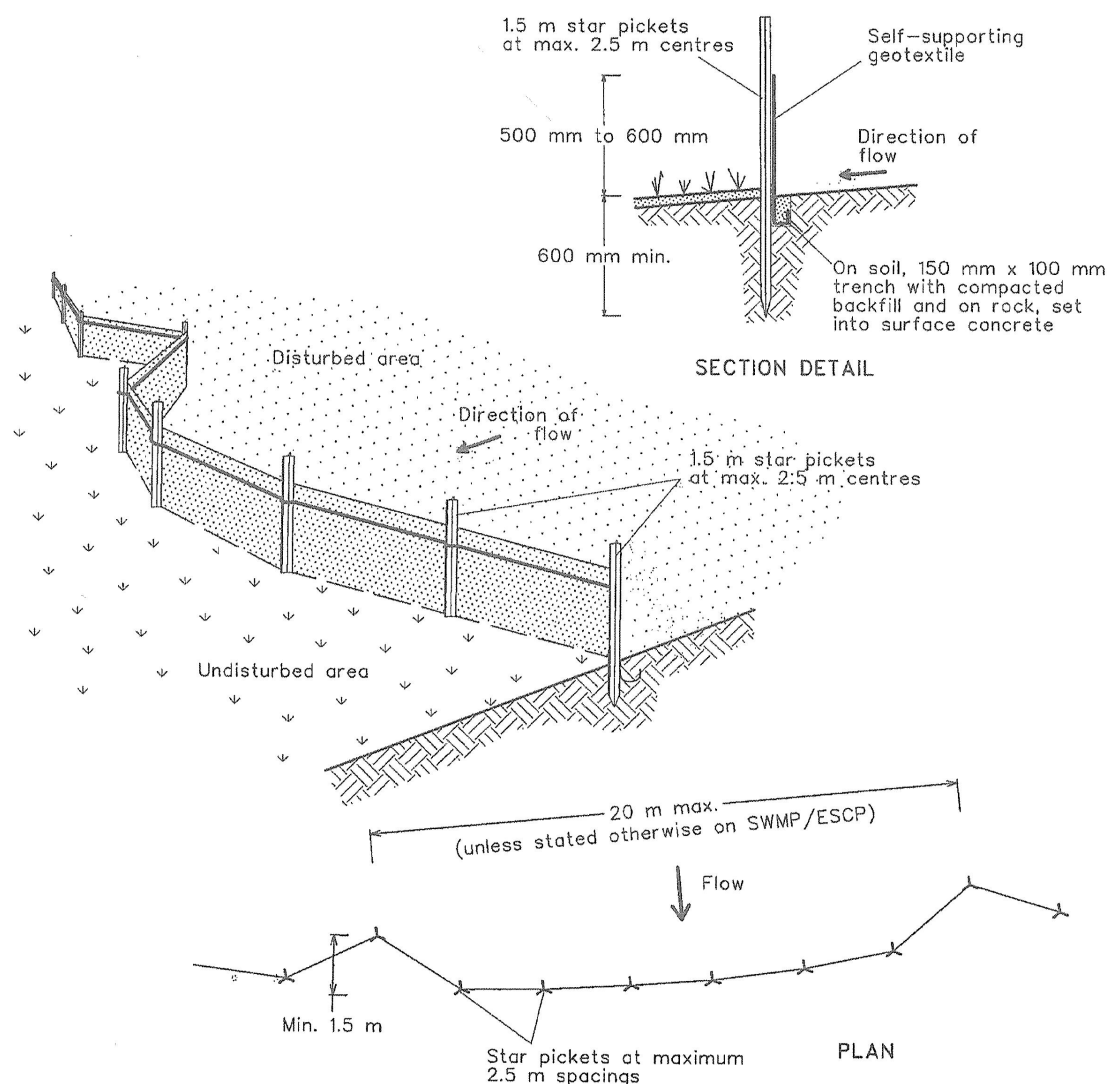


Construction corridor, site compounds and lay down sites

- ▶ Whilst all work would be undertaken to minimise disturbance to the existing ground cover, it is likely that most of the ground within the construction corridor, site compounds and lay down sites would be disturbed by construction activities. Control measure to minimise erosion of disturbed areas would include the following:
- ▶ Sediment fences would be installed to prevent sediment transport from disturbed areas (See Figure B 4) ;
- ▶ Straw bales would be used in drainage lines and gullies to capture and slow sediment laden runoff;
- ▶ Temporary diversion drains would be place to divert surface water flows away from the disturbed areas; and
- ▶ Earth banks would be installed to prevent erosion within the disturbed areas. Earth banks would direct runoff onto stable or well vegetated ground.

Rehabilitation of the disturbed areas would be undertaken in accordance with the principal described in Section **Error! Reference source not found.**.

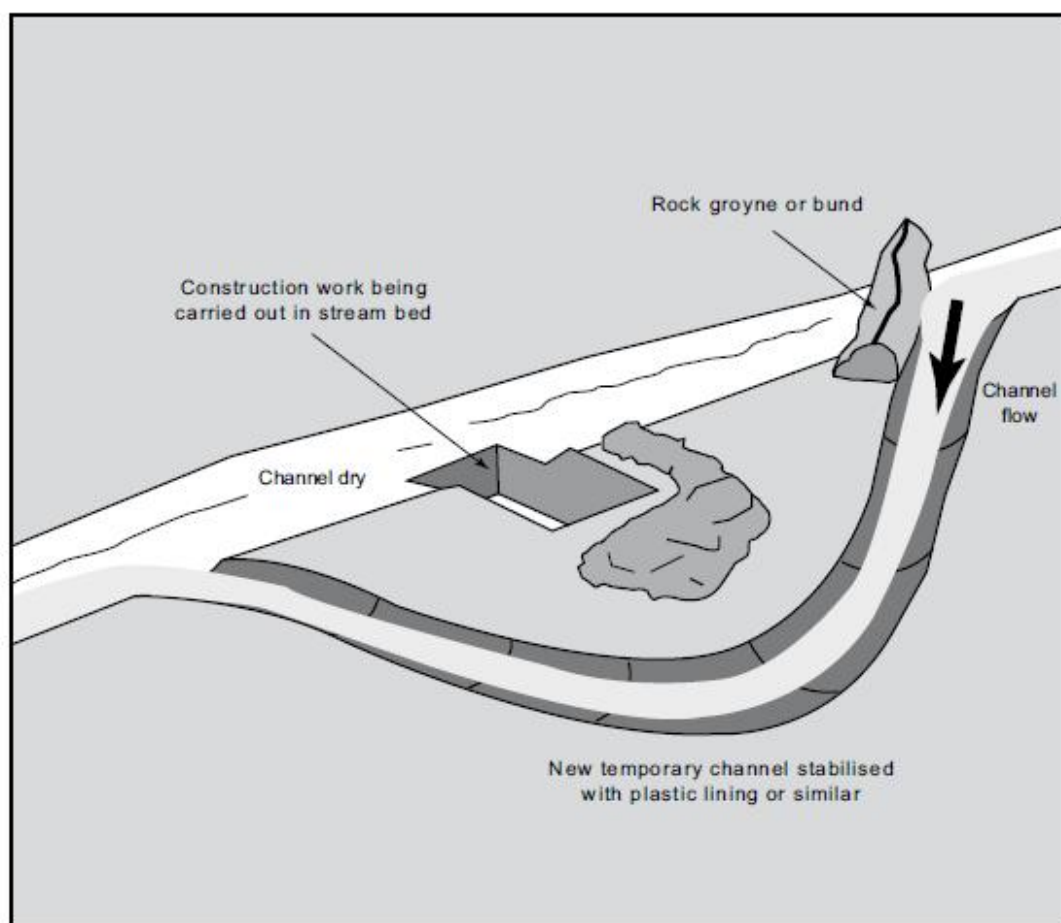
Figure B 4 Typical sediment fence arrangement



Crossings by trenching

Constructing waterway crossings by trenching is described in Section **Error! Reference source not found.**, and would mostly involve installing temporary dam upstream and downstream of the crossing point and allowing the dammed water to be pumped around the crossing point to the downstream channel whereby creating a dry construction area. The temporary dams would be constructed using sandbags or 'aqua- barriers'. Alternatively, a temporary diversion drain would be installed as shown in the typical arrangement shown in Figure B5. The channel bed would be remediated using suitable clean, coarse and stable material to prevent erosion. The riparian areas would be revegetated and stabilised. Where appropriate the measures described above would also be implemented.

Figure B5 Typical diversion arrange for stream bed crossings (Source: DECC 2008a p30)



Crossings by thrust boring

Thrust boring would involve the excavation of a launch pit and receiving pit. Excavated materials would be stockpiled adjacent to the pit excavation. The following control measures to prevent erosion of stockpiled material would be implemented:

- ▶ Top soil would be carefully removed and stockpiled separately for reuse during rehabilitation of the work area;

- ▶ Stockpiles would not be located in drainage lines, near water features, on steep land or with 5 m of retained trees;
- ▶ Excavated material generated would be stockpiled on the high side of the pit;
- ▶ Diversion drains would be placed around the high side of stockpiles to divert stormwater runoff away from the stockpiled material; and
- ▶ Sediment fences would be erected on the low side of stockpiles to capture sediment laden runoff.

To minimise slumping of the backfilled pits, additional material would be placed over the pits to compensate for settlement. Following completion of the crossing, rehabilitation of the work areas would be undertaken in accordance with the principal described in Section **Error!**

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If shallow groundwater is intercepted in the excavated pits, it would be pumped out to a holding tank, treated on site and released into vegetated areas or transported off site.

Crossings by under boring

Under boring is proposed for crossings under significant watercourse (see list of crossing in Appendix A). As discussed in Section **Error! Reference source not found..**, under boring would cause minimal disturbance of subsurface soils, but would require a working area of approximately 1,350 m². It is likely that this ground surface in this work area would be disturbed. To control erosion of the disturbed surface in these work areas the following control measures would be used:

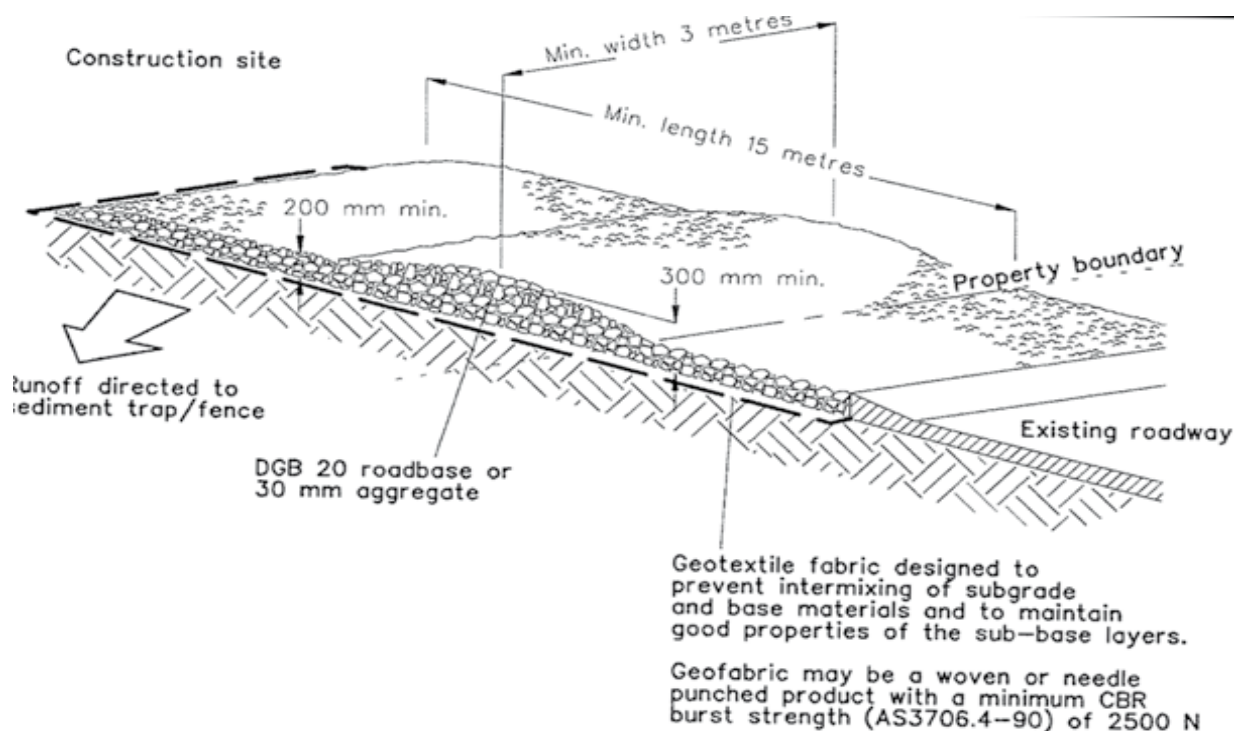
- ▶ Sediment fences would be installed to prevent sediment transport from rehabilitated areas (see Figure B 4);
- ▶ Straw bales would be used in drainage lines and gullies to capture and slow sediment laden runoff;
- ▶ In steep areas, diversion drains would be placed to divert surface water flows away from the rehabilitated areas; and
- ▶ Earth banks would be installed to prevent erosion within the revegetated areas. Earth banks would direct runoff onto stable or well vegetated ground; and
- ▶ All bare soil would be immediately rehabilitated following demobilisation of the work area;

Rehabilitation of the work areas would be undertaken in accordance with the principal described in Section **Error! Reference source not found..**

Trafficable areas and access points

Site access points that would be subject to heavy construction traffic movements would be stabilised before construction work commences. A general arrangement for a stabilised access point is shown in Figure B 6. Following construction, the stabilised access point would be returned to its previous state. It is common however for landholders to request that the access point stabilisation remains in place.

Figure B 6 Typical arrangements for a stabilised access point (Landcom, 2004 p6-48)



Crossing of minor waterways by construction traffic

Drainage lines and shallow creeks would most likely be crossed by construction traffic.

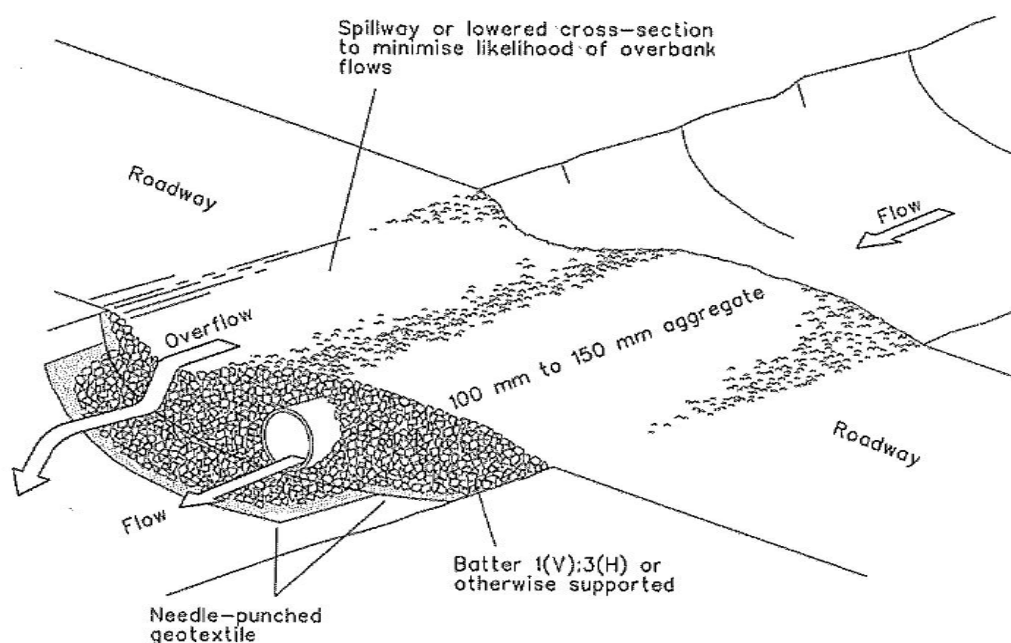
Temporary waterway crossings would be installed to prevent sedimentation of water and erosion of the waterway's bed and banks. A typical waterway crossing is shown in Figure B 7.

Whilst all work would be undertaken to minimise disturbance to the existing ground cover, it is likely that most of the ground in site compounds and lay down sites would be disturbed.

Control measure to minimise erosion of disturbed areas would include the following:

- ▶ Sediment fences would be installed to prevent sediment transport from disturbed areas;
- ▶ Straw bales would be used in drainage lines and gullies to capture and slow sediment laden runoff;
- ▶ Temporary diversion drains would be place to divert surface water flows away from the disturbed areas; and
- ▶ Earth banks would be installed to prevent erosion within the disturbed areas. Earth banks would direct runoff onto stable or well vegetated ground.
- ▶ Rehabilitation of the disturbed areas would be undertaken in accordance with the principal described in Section Error! Reference source not found..

Figure B 7 Temporary waterway crossing (Landcom 2004, p5-14)



Rehabilitation

General principles

All disturbed ground would be rehabilitated in general accordance with the following principals:

- ▶ Rehabilitation objectives would be agreed with the landholder prior to construction. The agreed rehabilitation objectives would be included in the land acquisition agreement negotiated with the landholder;
- ▶ The basis of the rehabilitation objectives would be to establish stabilised ground of a nature similar to the pre-construction condition, over approximately 80% of the disturbed area. Rehabilitation is to be designed in general accordance with the documents listed above;
- ▶ Rehabilitation of the disturbed areas would be undertaken progressively, immediately after a section of pipeline trench has been backfilled or a crossing has been constructed;
- ▶ Erosion and sediment controls would remain in place until the rehabilitation objectives are achieved. GMC would remove all controls once the rehabilitation objectives are achieved;
- ▶ Rehabilitated areas would be periodically inspected, reinstated (if required) and maintained by GMC on an on-going basis until the rehabilitation objectives are achieved.

Areas subject to sheet erosion and shallow soil

Much of the construction corridor would exist in areas where there is a high sheet erosion potential and shallow soil cover. As such, rehabilitation of these areas would be undertaken in a two step process. The primary rehabilitation stage would seek to rapidly stabilise disturbed areas. The second phase would seek to establish a permanent cover of the species that originally occurred, whereby restoring the aesthetic quality of the area. This

would be endemic species or improved pastures. Separately stored topsoil would be returned and the litter layer restored.

Riparian zone areas

The aim of rehabilitating riparian zones would be to restore the zone to its pre-construction condition taking into consideration the original vegetation, geomorphic structure, hydrology and water quality conditions. Rehabilitation would aim to quickly ensure that the soil in all disturbed areas, especially areas subject to concentrated water flows, is bounded.

Detention basins would be considered where runoff from construction areas has the potential to impact water quality in the associated watercourse.

Maintenance would ensure that the re-vegetation is sustainably established, weeds are controlled and the ground is stabilised.

Stabilising stream banks

Stream bank rehabilitation would be designed by a geomorphologist. The original terrestrial and aquatic vegetation would be re-established and river banks would be stabilised using appropriate materials such as rock and gravel to re-establish the original channel form.



Appendix C

Regional geology and soil landscapes

List of crossings and expected geology and soil

Geology plan (Figure C1)

Soil landscape plan (Figure C2)

Soil constraints plans (Figures C3 to C8)

TABLE C1: Geology and Soils at Crossings

Project: Highlands Source Project Environmental Assessment

Client: Goulburn Mulwarree Council

WATERCOURSE CROSSINGS

Sector	Ref No.	Name	Chainage (m)	Proposed construction method	Geology	Soils	Steep slopes / Mass movement hazard	Salinity hazard	Sheet erosion	Sodicity	Shallow soils
GLENQUARRY	WAT 1	KELLYS CREEK	3,178	Trenched	Wianamatta Group Shales (Rw)	Alluvial	Not observed	Not observed	Not observed	Localised	Not observed
WERAI - MOSS VALE	WAT 2	MEDWAY RIVULET	13,607	Trenched	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
SUTTON FOREST - EXETER	WAT 3	WELLS CREEK	19,438	Trenched	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
SUTTON FOREST - EXETER	WAT 4	BLACK BOBS CREEK	20,793	Trenched	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
SUTTON FOREST - EXETER	WAT 5	LONG SWAMP CREEK	24,503	Trenched	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
PADDYS RIVER	WAT 6	PADDYS RIVER	37,193	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Alluvial	Not observed	Not observed	Not observed	Not observed	Not observed
PADDYS RIVER	WAT 7	URINGALLA CREEK	39,627	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Alluvial	Not observed	Not observed	Not observed	Not observed	Not observed
MARULAN	WAT 8	JAORMIN CREEK	47,770	Trenched	Granite (Dlb)	Alluvial	Not observed	Not observed	Not observed	Not observed	Not observed
TOWRANG	WAT 9	LOCKYERSLEIGH CREEK	55,124	Trenched	Lockersleigh Adamellite (Cgb)	Alluvial	Not observed	Not observed	Widespread	Widespread	Not observed
TOWRANG	WAT 10	NARAMBULLA CREEK	57,202	Trenched	Lockersleigh Adamellite (Cgb)	Alluvial	Not observed	Not observed	Widespread	Widespread	Not observed
TOWRANG	WAT 11	OSBORNS CREEK	60,589	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
TOWRANG	WAT 12	WOLLONDILLY RIVER	64,073	HDD	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Widespread	Not observed
TOWRANG	WAT 13	WOLLONDILLY RIVER	65,269	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
TOWRANG	WAT 14	BOXERS CREEK	65,893	Trenched	Towrang Beds (St)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
MURRAYS FLAT	WAT 15	WOLLONDILLY RIVER	70,753	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
MURRAYS FLAT	WAT 16	KENMORE CREEK	70,928	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
MURRAYS FLAT	WAT 17	KENMORE CREEK	71,774	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Widespread	Not observed
MURRAYS FLAT	WAT 18	KENMORE CREEK	71,928	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Widespread	Not observed
MURRAYS FLAT	WAT 19	KENMORE CREEK	72,042	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Widespread	Not observed
GOULBURN	WAT 20	WOLLONDILLY RIVER	78,651	HDD	Dolerite (Lg)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed

ROAD CROSSINGS

Sector	Road Ref. No.	Road Name	Chainage (m)	Proposed construction method	Geology	Soils	Steep slopes / Mass movement hazard	Salinity hazard	Sheet erosion	Sodicity	Shallow soils
GLENQUARRY	ROAD 1	UNNAMED ROAD 1	23	Trenched	Hawkesbury Sandstone (Rh)	Alluvial	Not observed	Not observed	Not observed	Localised	Not observed
GLENQUARRY	ROAD 2	UNNAMED ROAD 2	47	Trenched	Hawkesbury Sandstone (Rh)	Alluvial	Not observed	Not observed	Not observed	Localised	Not observed
GLENQUARRY	ROAD 3	SHEEPWASH ROAD	839	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
GLENQUARRY	ROAD 4	UNNAMED ROAD 4	2,969	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
GLENQUARRY	ROAD 5	IONA PARK ROAD	5,787	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
WERAI - MOSS VALE	ROAD 6	ILLAWARRA HWY	7,607	Thrust boring	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
WERAI - MOSS VALE	ROAD 7	UNNAMED ROAD 7	9,557	Trenched	Basalts (Jss/Tob)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
WERAI - MOSS VALE	ROAD 8	YARRAWA ROAD	10,074	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
WERAI - MOSS VALE	ROAD 9	UNNAMED ROAD 9	10,256	Trenched	Basalts (Jss/Tob)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
WERAI - MOSS VALE	ROAD 10	UNNAMED ROAD 10	10,729	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
WERAI - MOSS VALE	ROAD 11	BIBBYS LANE	12,101	Trenched	Syenite-Murosyenite (Jes)	Colluvial	Widespread	Not observed	Widespread	Not observed	Localised
WERAI - MOSS VALE	ROAD 12	MOUNT BROUGHTON ROAD	12,769	Trenched	Syenite-Murosyenite (Jes)	Colluvial	Localised	Not observed	Widespread	Not observed	Not observed
SUTTON FOREST - EXETER	ROAD 13	UNNAMED ROAD 13	15,486	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
SUTTON FOREST - EXETER	ROAD 14	UNNAMED ROAD 14	16,169	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
SUTTON FOREST - EXETER	ROAD 15	EXETER ROAD	16,182	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
SUTTON FOREST - EXETER	ROAD 16	UNNAMED ROAD 16	16,620	Trenched	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
SUTTON FOREST - EXETER	ROAD 17	UNNAMED ROAD 17	19,210	Trenched	Wianamatta Group Shales (Rw)	Erosional	Localised	Not observed	Widespread	Not observed	Not observed
SUTTON FOREST - EXETER	ROAD 18	OLD ARGYLE ROAD	19,720	Trenched	Basalts (Jss/Tob)	Residual	Not observed	Not observed	Localised	Not observed	Not observed
SUTTON FOREST - EXETER	ROAD 19	SALLYS CORNER ROAD	24,989	Trenched	Wianamatta Group Shales (Rw)	Disturbed terrain	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed
SUTTON FOREST - EXETER	ROAD 20	MIDDLE ROAD	25,089	Trenched	Wianamatta Group Shales (Rw)	Disturbed terrain	Disturbed	Disturbed	Disturbed	Disturbed	Disturbed
SUTTON FOREST - EXETER	ROAD 21	UNNAMED ROAD 21	25,157	Trenched	Wianamatta Group Shales (Rw)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
SUTTON FOREST - EXETER	ROAD 22	HUME HIGHWAY	26,383	Thrust boring	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
SUTTON FOREST - EXETER	ROAD 23	HUME HIGHWAY	26,417	Thrust boring	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Widespread	Localised
PADDYS RIVER	ROAD 24	UNNAMED ROAD 24	27,004	Trenched	Hawkesbury Sandstone (Rh)	Residual	Not observed	Not observed	Localised	Not observed	Not observed
PADDYS RIVER	ROAD 25	UNNAMED ROAD 25	28,497	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Localised	Not observed	Widespread	Not observed	Localised
PADDYS RIVER	ROAD 26	UNNAMED ROAD 26	29,351	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 27	UNNAMED ROAD 27	29,372	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 28	UNNAMED ROAD 28	29,448	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 29	UNNAMED ROAD 29	29,854	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 30	UNNAMED ROAD 30	30,243	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 31	UNNAMED ROAD 31	30,534	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 32	UNNAMED ROAD 32	30,735	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 33	UNNAMED ROAD 33	31,148	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 34	UNNAMED ROAD 34	31,648	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 35	UNNAMED ROAD 35	31,825	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 36	UNNAMED ROAD 36	32,105	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 37	UNNAMED ROAD 37	32,620	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 38	UNNAMED ROAD 38	33,608	Trenched	Hawkesbury Sandstone (Rh)	Erosional	Not observed	Not observed	Widespread	Localised	Not observed
PADDYS RIVER	ROAD 39	UNNAMED ROAD 39	34,506	Trenched	Shoalhaven Groupd - Illawarra Coal Measure (Ps)	Colluvial	Widespread	Not observed	Widespread	Widespread	Widespread
PADDYS RIVER	ROAD 40	INVERARY ROAD	37,045	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Colluvial	Widespread	Not observed	Widespread	Widespread	Widespread
PADDYS RIVER	ROAD 41	UNNAMED ROAD 41	37,274	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Not observed	Localised	Localised	Localised
PADDYS RIVER	ROAD 42	UNNAMED ROAD 42	38,112	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Not observed	Localised	Localised	Localised
PADDYS RIVER	ROAD 43	UNNAMED ROAD 43	38,572	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Not observed	Localised	Localised	Localised
PADDYS RIVER	ROAD 44	UNNAMED ROAD 44	39,184	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Not observed	Localised	Localised	Localised
PADDYS RIVER	ROAD 45	WOLLUMBI ROAD	39,877	Trenched	Porphyry (Dgm)	Transferral	Not observed	Localised	Widespread	Widespread	Not observed
MARULAN	ROAD 46	UNNAMED ROAD 46	40,927	Trenched	Porphyry (Dgm)	Erosional	Localised	Not observed	Widespread	Localised	Not observed
MARULAN	ROAD 47	RED HILLS ROAD	42,409	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Erosional	Localised	Not observed	Widespread	Localised	Localised

TABLE C1: Geology and Soils at Crossings

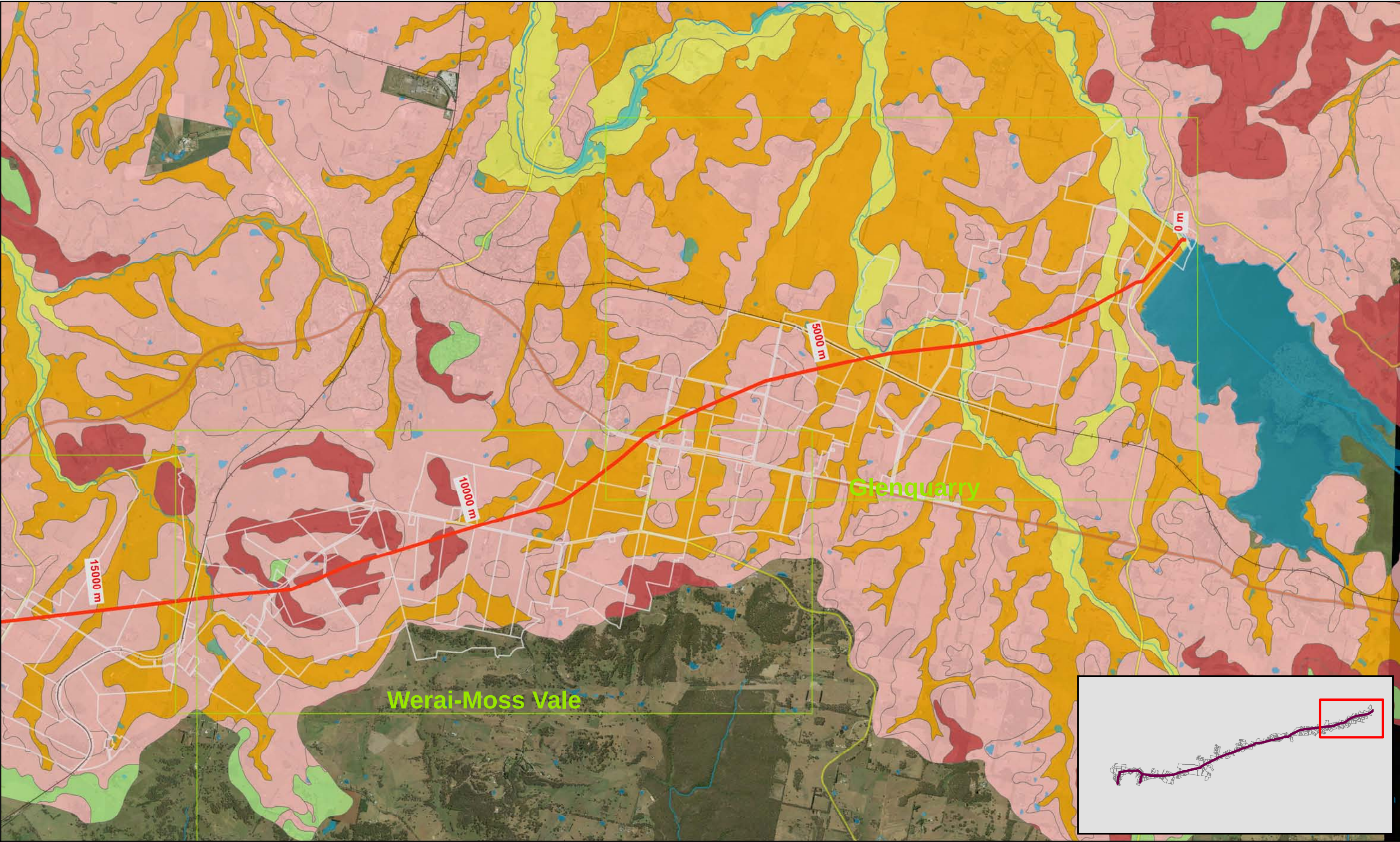
Project: Highlands Source Project Environmental Assessment

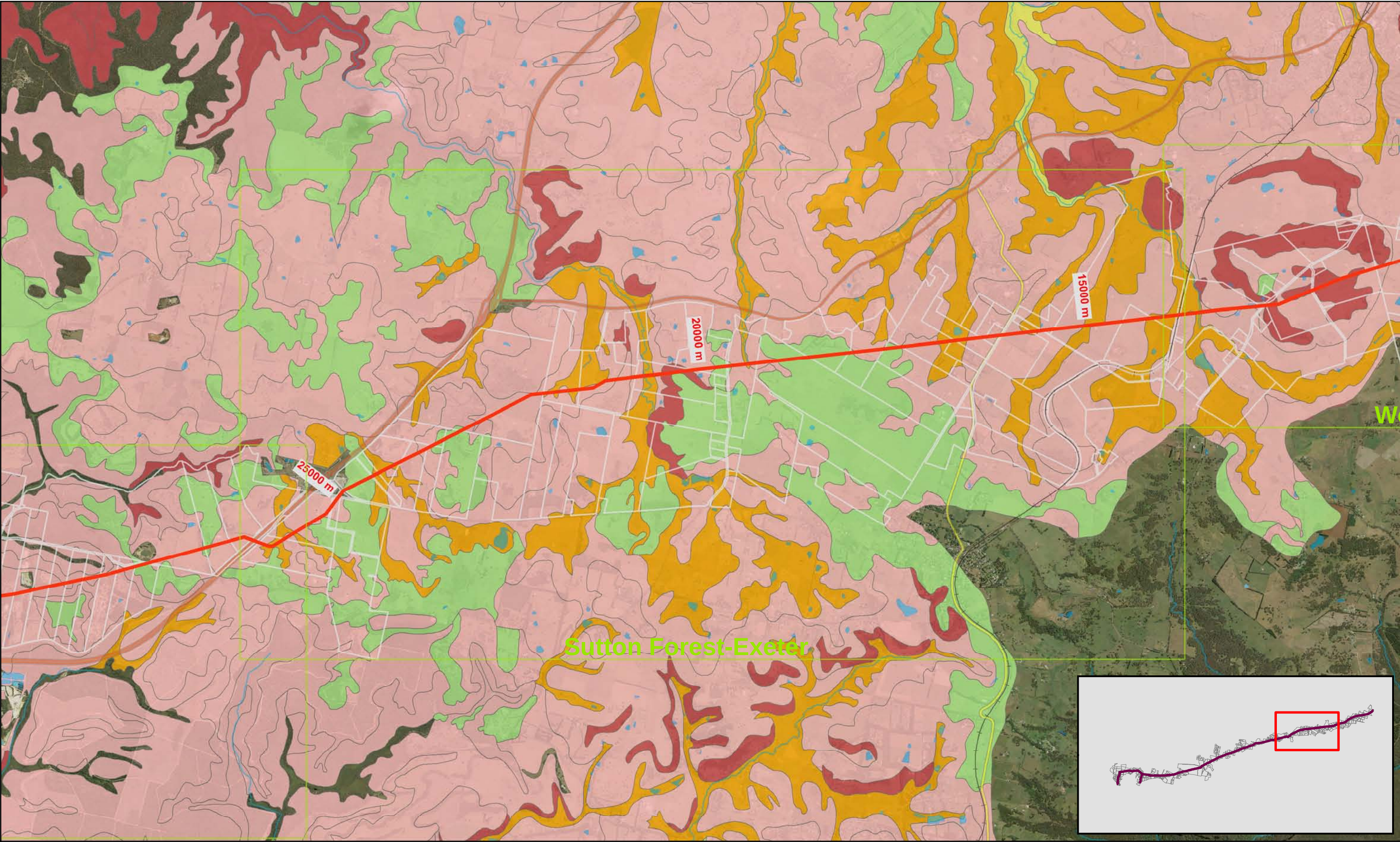
Client: Goulburn Mulwarree Council

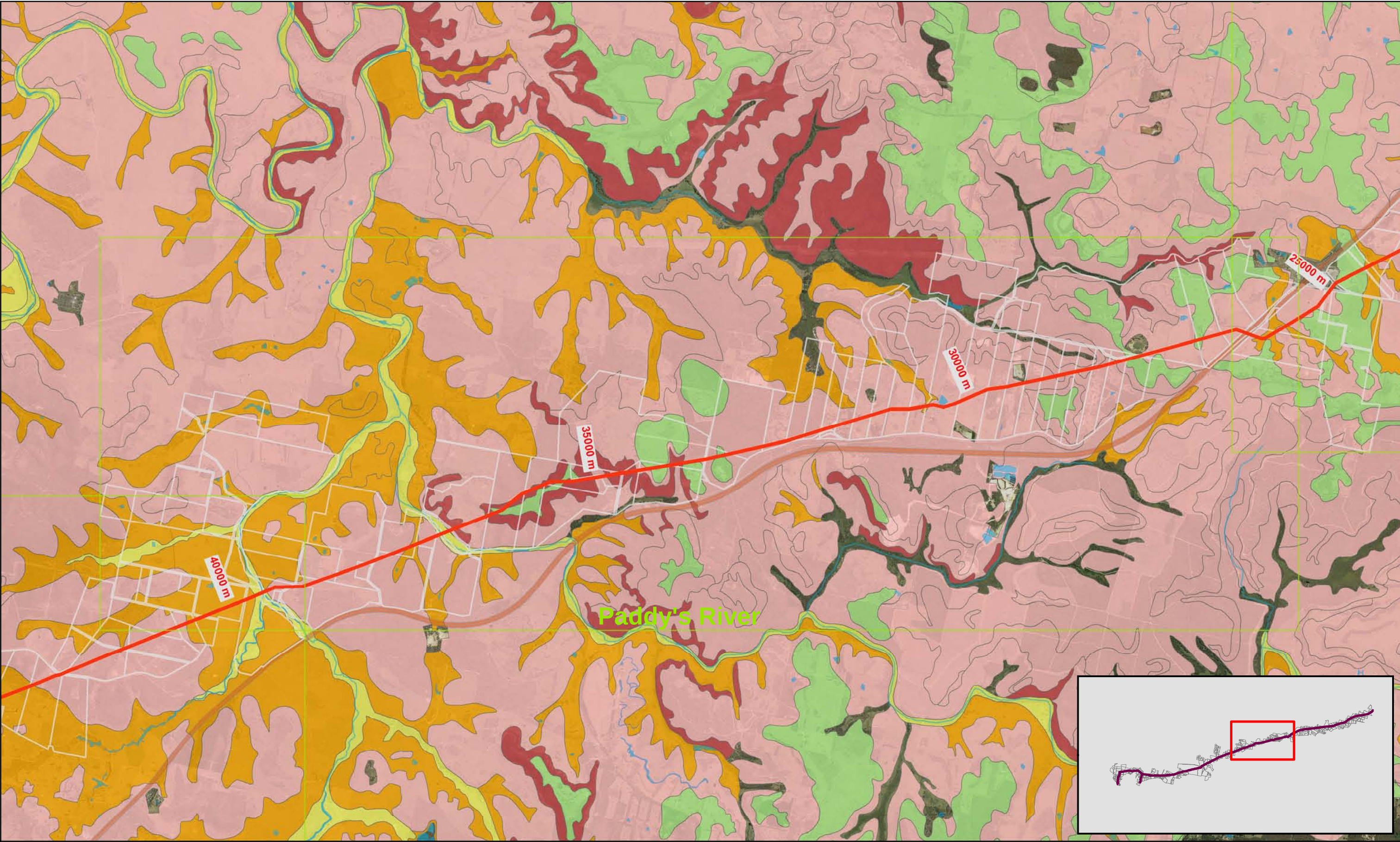
Sector	Ref No.	Name	Chainage (m)	Proposed construction method	Geology	Soils	Steep slopes / Mass movement hazard	Salinity hazard	Sheet erosion	Sodicity	Shallow soils
MARULAN	ROAD 48	UNNAMED ROAD 48	42,851	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Transferral	Not observed	Localised	Widespread	Widespread	Not observed
MARULAN	ROAD 49	UNNAMED ROAD 49	44,834	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Erosional	Localised	Not observed	Widespread	Localised	Localised
MARULAN	ROAD 50	UNNAMED ROAD 50	45,013	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Erosional	Localised	Not observed	Widespread	Localised	Localised
MARULAN	ROAD 51	RED HILLS ROAD	45,286	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Erosional	Localised	Not observed	Widespread	Localised	Localised
MARULAN	ROAD 52	UNNAMED ROAD 52	45,288	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Erosional	Localised	Not observed	Widespread	Localised	Localised
MARULAN	ROAD 53	UNNAMED ROAD 53	45,323	Trenched	Shoalhaven Group (d) - Illawarra Coal Measure (Ps)	Erosional	Localised	Not observed	Widespread	Localised	Localised
MARULAN	ROAD 54	BRAYTON ROAD	49,127	Trenched	Granite (Dlb)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
MARULAN	ROAD 55	UNNAMED ROAD 55	51,740	Trenched	Granite (Dlb)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
TOWRANG	ROAD 56	UNNAMED ROAD 56	54,400	Trenched	Lockersleigh Adamellite (Cgb)	Transferral	Not observed	Not observed	Widespread	Widespread	Localised
TOWRANG	ROAD 57	UNNAMED ROAD 57	55,482	Trenched	Lockersleigh Adamellite (Cgb)	Transferral	Not observed	Not observed	Widespread	Widespread	Localised
TOWRANG	ROAD 58	UNNAMED ROAD 58	55,993	Trenched	Lockersleigh Adamellite (Cgb)	Transferral	Not observed	Not observed	Widespread	Widespread	Localised
TOWRANG	ROAD 59	CARRICK ROAD	61,413	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
TOWRANG	ROAD 60	UNNAMED ROAD 60	63,584	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
TOWRANG	ROAD 61	UNNAMED ROAD 61	63,638	Trenched	Sandstone, siltstone, quartzite, phyllite (Os-s)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
TOWRANG	ROAD 62	TOWRANG ROAD	64,573	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Not observed	Widespread	Localised	Not observed
TOWRANG	ROAD 63	UNNAMED ROAD 63	65,686	Trenched	Towrang Beds (St)	Erosional	Not observed	Localised	Widespread	Widespread	Localised
TOWRANG	ROAD 64	MURRAYS FLAT ROAD	68,097	Trenched	Lambie Group (Duc)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
MURRAY FLAT	ROAD 65	UNNAMED ROAD 65	68,345	Trenched	Lambie Group (Duc)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
MURRAY FLAT	ROAD 66	UNNAMED ROAD 66	69,607	Trenched	Lambie Group (Duc)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
MURRAY FLAT	ROAD 67	UNNAMED ROAD 67	70,414	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
MURRAY FLAT	ROAD 68	TARALGA ROAD	71,737	Trenched	Alluvial deposits (Cza)	Alluvial	Not observed	Localised	Widespread	Widespread	Not observed
GOULBURN	ROAD 69	UNNAMED ROAD 69	72,738	Trenched	Undifferentiated Limestone (Su)	Erosional	Not observed	Localised	Localised	Localised	Not observed
GOULBURN	ROAD 70	MIDDLE ARM ROAD	74,016	Trenched	Undifferentiated Limestone (Su)	Erosional	Not observed	Localised	Localised	Localised	Not observed
GOULBURN	ROAD 71	CROOKWELL ROAD	76,715	Thrust boring	Undifferentiated Limestone (Su)	Transferral	Not observed	Not observed	Not observed	Not observed	Not observed
GOULBURN	ROAD 72	CHINAMANS LANE	77,805	Trenched	Undifferentiated Limestone (Su)	Erosional	Not observed	Localised	Localised	Localised	Not observed
GOULBURN	ROAD 73	CLINTON STREET	80,461	Trenched	Undifferentiated Limestone (Su)	Erosional	Not observed	Localised	Localised	Localised	Not observed

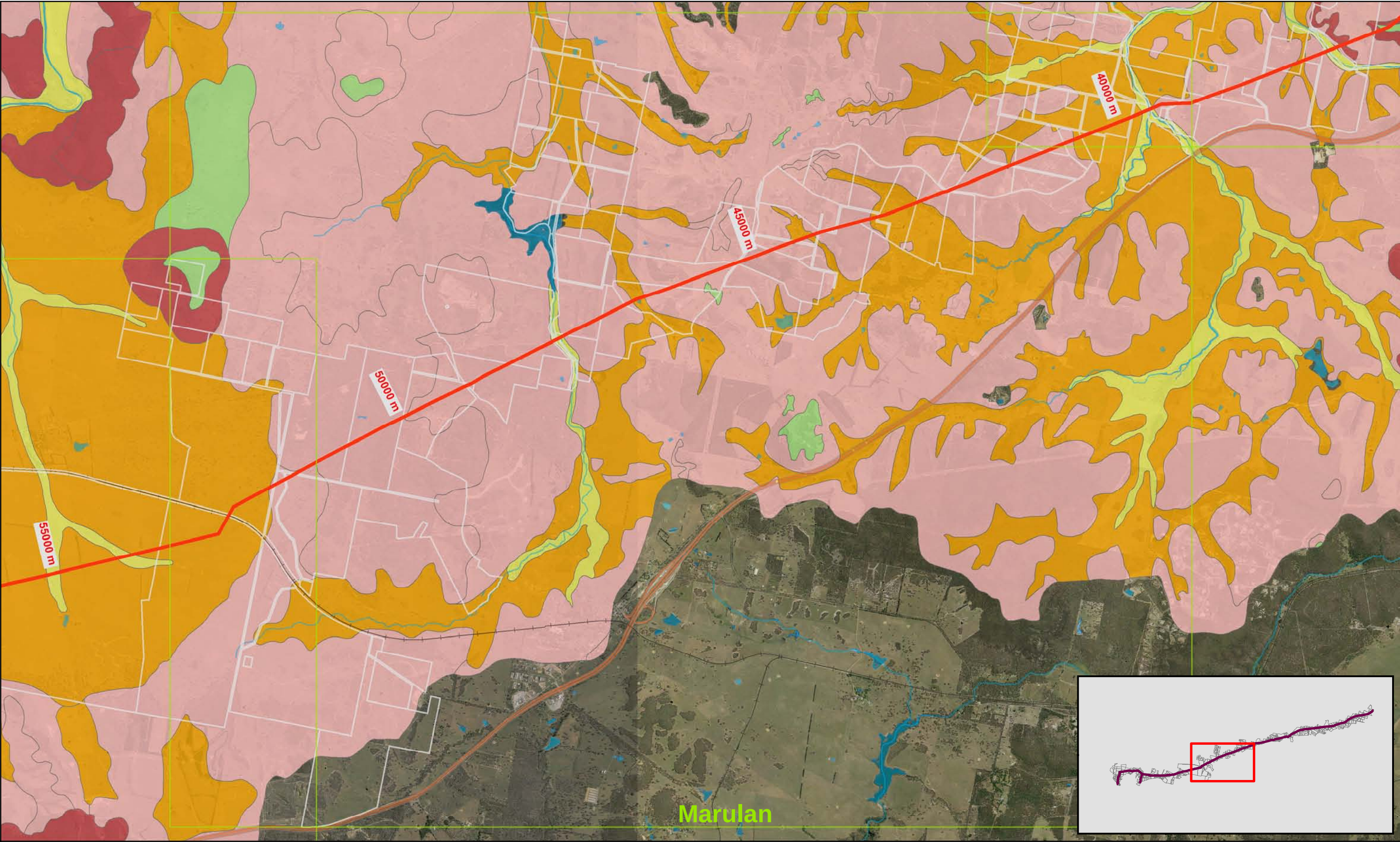
RAILWAY LINES CROSSINGS

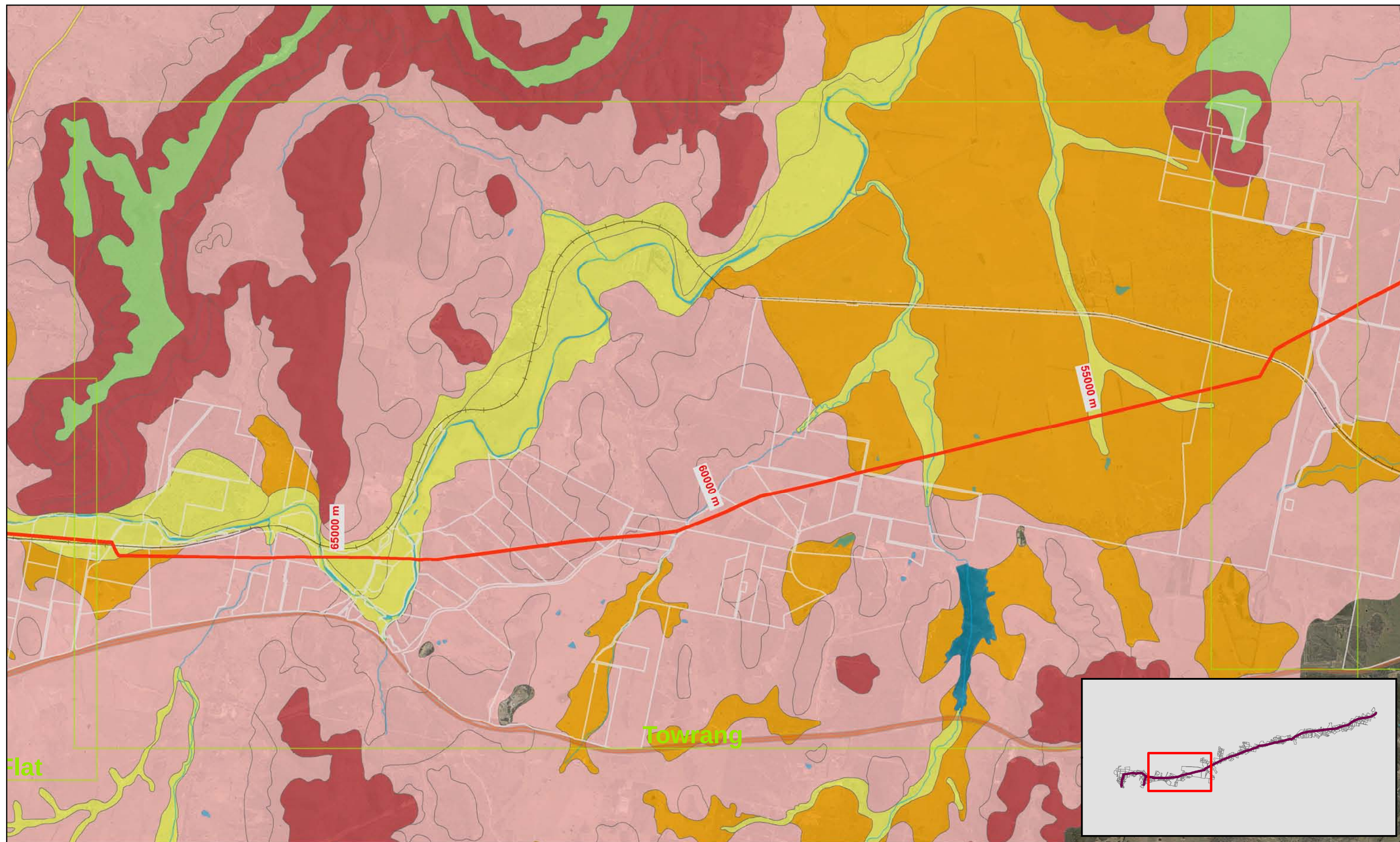
Sector	Ref No.	Name	Chainage (m)	Proposed construction method	Geology	Soils	Steep slopes / Mass movement hazard	Salinity hazard	Sheet erosion	Sodicity	Shallow soils
GLENQUARRY	RAIL 1	MOSS VALE UNANDERRA RAILWAY	4,566	Thrust boring	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
WERAI - MOSS VALE	RAIL 2	MAIN SOUTHERN RAILWAY	13,873	Thrust boring	Wianamatta Group Shales (Rw)	Transferral	Not observed	Not observed	Localised	Not observed	Not observed
MARULAN	RAIL 3	MAIN SOUTHERN RAILWAY	52,626	Thrust boring	Lockersleigh Adamellite (Cgb)	Transferral	Not observed	Not observed	Widespread	Widespread	Localised
TOWRANG	RAIL 4	MAIN SOUTHERN RAILWAY	68,034	Thrust boring	Lambie Group (Duc)	Alluvial	Not observed	Localised	Widespread	Localised	Not observed
GOULBURN	RAIL 5	GOULBURN CROOKWELL RAILWAY	72,798	Thrust boring	Undifferentiated Limestone (Su)	Erosional	Not observed	Localised	Localised	Localised	Not observed



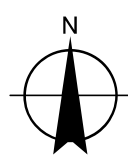








1:45,000 (at A3)
0 500 1,000 1,500 2,000
Metres



Legend

- Proposed Pipeline Alignment
- (Raw Water)
- (Treated Water)
- Sector boundary

- Primary Road
- Arterial Road
- Railway
- Lakes, Dams
- Rivers, Creeks

- Soil Landscape
- ALLUVIAL
- COLLUVIAL
- EROSIONAL
- RESIDUAL
- TRANSFERRAL



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Goulburn Mulwaree Council
Highlands Source Project

Job Number 23-13312-15
Revision 0
Date 14 JAN 2010

Soil Landscapes
Sector: Towrang

Figure C2(e)

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Data Source: NSW Lands Dept: crownlands, roadsegments, railways, hydroarea, hydroline, localgovernmentarea, npwreserve, stateforest - 2007. Created by: ccharalambou, trbellwood

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