

3 Location and setting

3.1 Regional setting

The preferred project is located approximately 34 km south and southeast of Canberra. The preferred project area is bounded by the Murrumbidgee River in the west (at Angle Crossing) and the western edge of the Burra Creek arm of the Googong Foreshores in the east (refer to Figure 3.1). Approximately 2.8 km of the proposed pipeline is within the ACT and approximately 9.2 km of the proposed pipeline is within NSW (in the Palerang local government area).

Key features of the surrounding region are described in the following section.

3.1.1 Key regional features

Water features

The intake/low lift pump station is located on the bank of the Murrumbidgee River upstream of Angle Crossing within the ACT (refer to figures 3.3 and 3.5). Angle Crossing is a causeway where Angle Crossing Road crosses the Murrumbidgee River. An area just upstream of the crossing is used as an informal recreation area.

The Murrumbidgee River is a major river located in NSW and the ACT. A major tributary of the Murray River, the Murrumbidgee travels 900 km from the Fiery Range of the Snowy Mountains, through the ACT, and to a confluence with the Murray. Approximately 66 km of the Murrumbidgee River, from Angle Crossing in the south to Uriarra Crossing in the north, lies within the ACT. This section of the river, along with a narrow strip of land either side of the river, is managed as the Murrumbidgee River Corridor, which is a collection of nature reserves, recreation reserves, a European heritage conservation zone and rural leases along the Murrumbidgee River.

The outlet structure for the preferred project is located upstream of Williamsdale Road (refer to Figure 3.10). Burra Creek is a tributary of the Queanbeyan River. The Queanbeyan River and its tributaries are impounded by the Googong Dam to form the Googong Reservoir. The primary purpose of the reservoir is to supply potable water to the ACT and Queanbeyan.

Reserves

The pipeline corridor starts within the Gigerline Nature Reserve in the ACT, which includes the Murrumbidgee River and a strip of land either side of it from Angle Crossing to the junction with the Gudgenby River. The Gigerline Nature Reserve covers an area of approximately 130 ha and is part of the Murrumbidgee River Corridor.

The pipeline corridor does not pass through another nature reserve. Other distant reserves in the surrounding region include Burra Creek Nature Reserve, Googong Foreshores, Ingledene State Forest (ACT), Namadgi National Park (ACT) and Tinderry Nature Reserve (NSW).

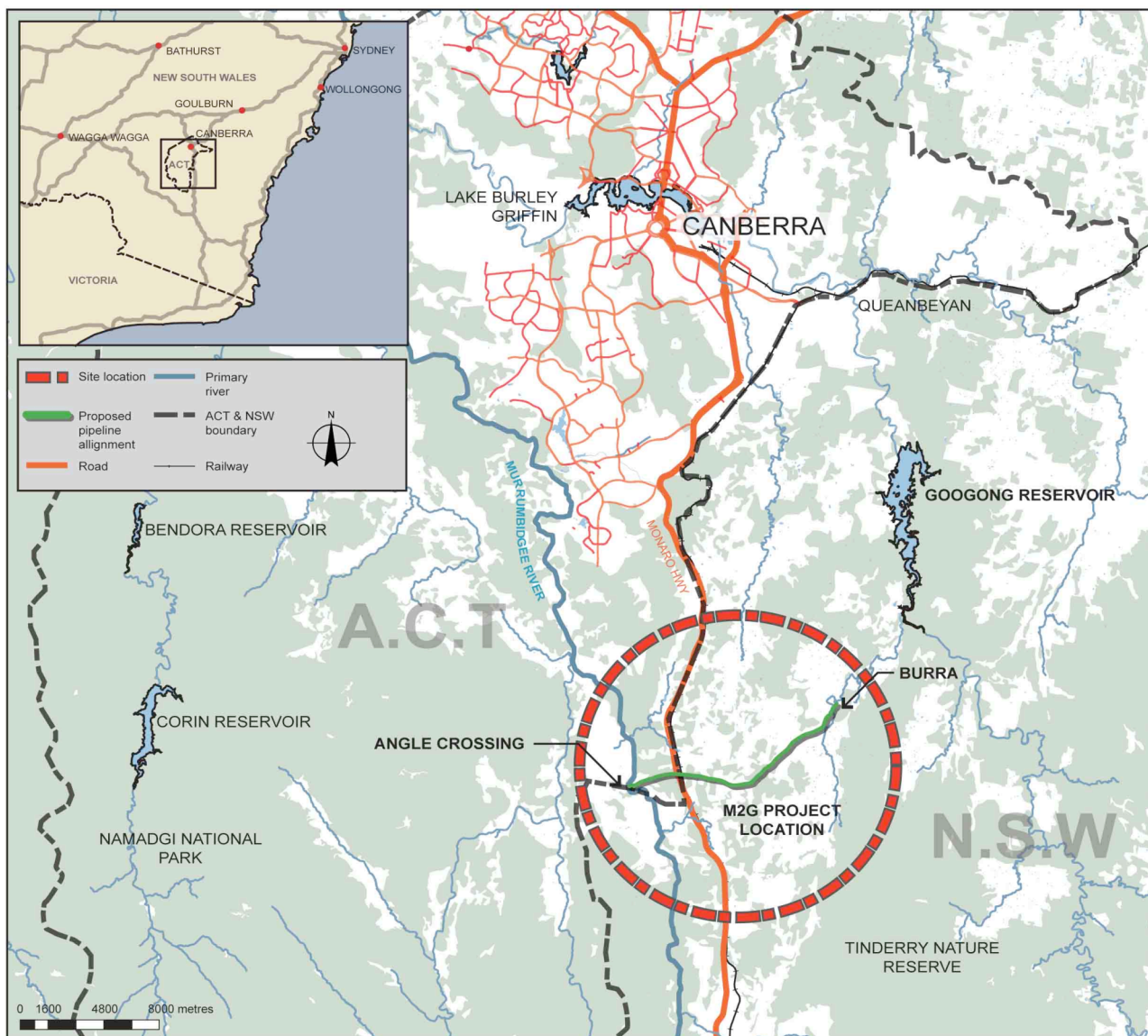


Figure 3.1 Regional setting of the preferred project

3.1.2 Canberra's water supply system

The ACT's and Queanbeyan's water supply is sourced from three river catchments located in the vicinity of the ACT, these catchments are the:

- Cotter River Catchment;
- Googong System (built on the Queanbeyan River); and
- Murrumbidgee River Catchment.

A schematic representation of the ACT's water supply and treatment system is presented in Figure 3.2.

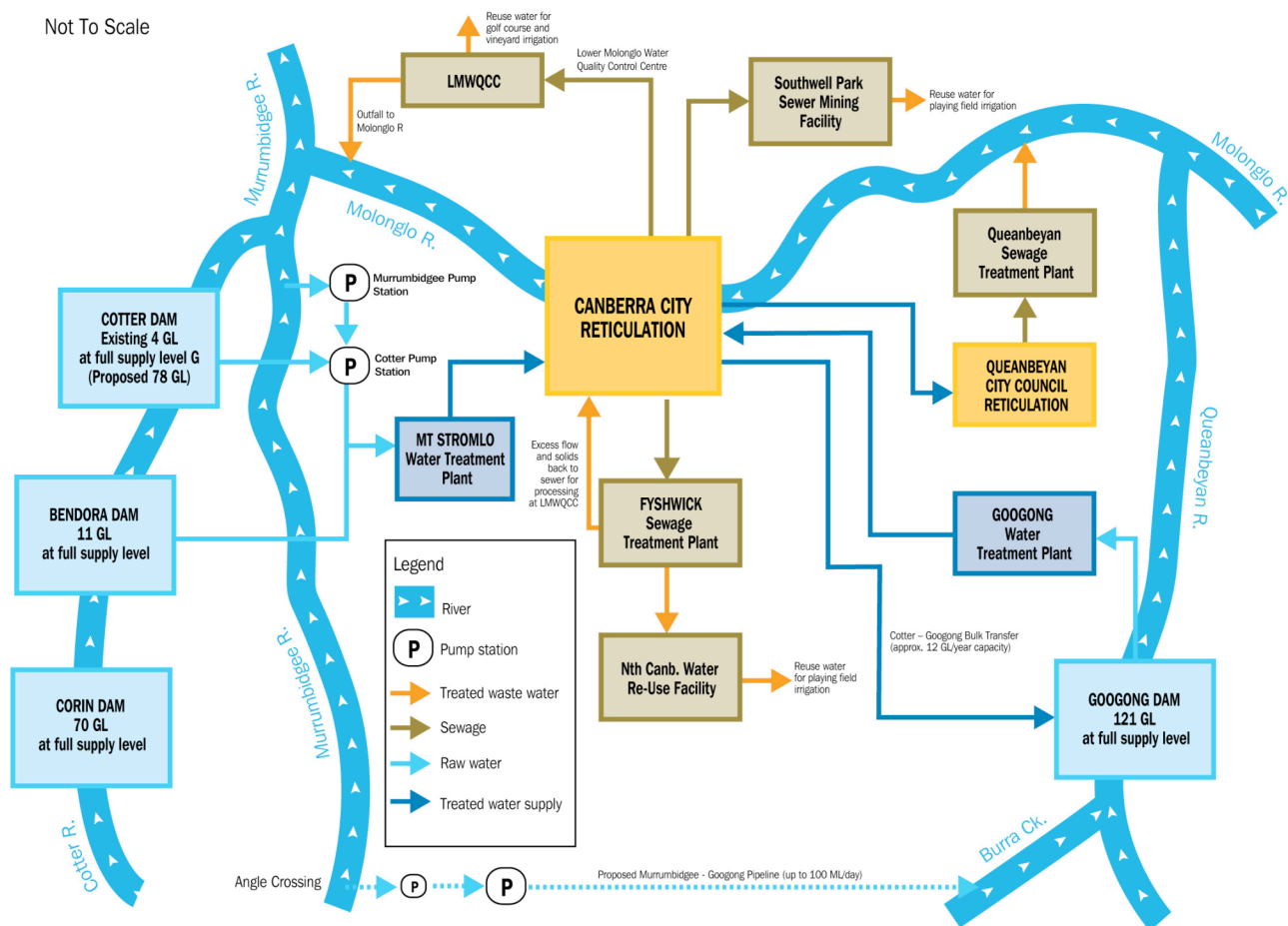


Figure 3.2 Schematic representation of the ACT's water supply and treatment system

The Cotter River Catchment consists of a series of three dams located on the Cotter River; these dams are Corin Dam, Bendora Dam and Cotter Dam. Water is gravity fed from Bendora Dam to the Mount Stromlo Water Treatment Plant for treatment and distribution throughout Canberra and Queanbeyan. Water is pumped from Cotter Dam via Cotter Pump Station to the Mount Stromlo Water Treatment Plant. ACT and Commonwealth Government approval exists for the enlargement of the Cotter Reservoir from 4 GL to 78 GL by constructing a new dam wall down stream of the existing Cotter Dam.

The Murrumbidgee Catchment is located on the Murrumbidgee River. Water from this catchment is pumped from the river at the Murrumbidgee Pump Station, which is located adjacent to the Cotter Pump Station. The water is then pumped to the Mount Stromlo Water Treatment Plant, where the water is treated before it is released into the Canberra City and Queanbeyan system.

Another component of Canberra's water distribution network is the Cotter to Googong Bulk Transfer Scheme. This scheme involves the capacity to transfer water from the Cotter Pump Station via Canberra's reticulated network to Googong Dam for storage. This system has the potential to transfer up to 12 GL per year to the Googong Dam. Further discussion of the Cotter to Googong Bulk Transfer Scheme, including its limitations is provided in section 7.2.2.

The Googong System is located on the Queanbeyan River in NSW and includes Googong Dam. Googong Dam has a storage capacity of 121 GL. Water from Googong Dam is pumped to the Googong Water Treatment Plant where it is treated before being pumped into Canberra City and Queanbeyan reticulation systems.

Sewage from the ACT is treated at the Lower Molonglo Water Quality Control Centre and Fyshwick Sewage Treatment Plant in order to make the water safe to be discharged back into the Murrumbidgee River via the Molonglo River.

3.2 Preferred project location

The location of the key features of the preferred project are described below and shown in Figure 3.5 to Figure 3.11.

3.2.1 Intake/low lift pump station

The intake/low lift pump station will be located within the ACT, on the east bank of the Murrumbidgee River approximately 15 m south (upstream) of the Angle Crossing causeway (refer to figures 3.3 and 3.5). The Angle Crossing causeway is located where Angle Crossing Road crosses the Murrumbidgee River.

Angle Crossing Road is an unsealed road that provides access to rural properties from the Monaro Highway and Tharwa. Angle Crossing Road also provides access to a natural beach/swimming area, which is located immediately south (upstream) of the proposed intake/low lift pump station location. It also allows access to the Gigerline Nature Reserve, of which Angle Crossing is located in the southern most extremity.

A car park to service the recreational activities in the area, along with a toilet block, is located approximately 25 m northeast of the proposed location of intake/low lift pump station on the opposite side of Angle Crossing Road (refer to Figure 3.3).



Figure 3.3 Looking west towards Angle Crossing and the intake/low lift pump station site, from the high lift pump station site

3.2.2 High lift pump station

The high lift pump station will also be located within the ACT, approximately 300 m east of the intake/low lift pump station on the northern side of Angle Crossing Road (refer to Figure 3.6). The site of the proposed high lift pump station is on unsealed elevated ground, which is used informally as an overflow parking area to service recreational activities.

3.2.3 Pipeline

The pipeline is approximately 12 km long, and extends from Angle Crossing to Burra Creek. The construction impact zone for the pipeline will generally include a 40 m corridor around the pipeline location (referred to as the pipeline corridor). The actual construction impact will vary in width from 15 m to 40 m and will be determined by considering a number of drivers including occurrences of critical habitats for endangered species and communities, vegetation sensitivity and quality, constructability, construction management and safety considerations, land form, slopes and anticipated sub-soil structures. The actual construction impacts will be minimised based on the influence of these characteristics.

The pipeline corridor starts at the proposed intake location on the banks of the Murrumbidgee River and continues in an easterly direction for approximately 2.8 km before crossing the Monaro Highway and the ACT/NSW border into the Palerang local government area south of Williamsdale (refer to Figure 3.7).

The pipeline corridor then continues in an easterly direction for approximately 4 km where it meets Williamsdale Road. The pipeline corridor then follows the route of Williamsdale Road in a northeast direction to Burra before continuing north through Burra and on to the outlet point on Burra Creek (refer to Figure 3.8).

3.2.4 Outlet structure

The outlet structure will be located on the west bank of Burra Creek approximately 60 m upstream from the low level crossing on Williamsdale Road, near the junction of Burra and Williamsdale roads (refer to figures 3.4 and 3.10).

3.2.5 Mini-hydro power generator

The mini-hydro power generator will be located near the outlet structure within the pipeline construction corridor away from the immediate environs of the Burra Creek bank to minimise local impacts and to protect the infrastructure from flooding.

The power will be transferred to the high lift pump station via an underground cable in the same trench as the water transfer pipeline.

3.2.6 Power supply

A substation will be located approximately 700 m from the Monaro Highway and approximately 1.5 km east of the high lift pump station. The power supply will consist of an 11 kV underground cable route from the substation to Angle Crossing Road. The 11 kV cable will then continue to the substation (transformers) at the high lift pump station. Most of the 11 kV cable route will be located within Angle Crossing Road reserve. This is shown in Figure 3.11.



Figure 3.4 Looking north across Burra Creek towards Williamsdale Road

3.3 Land leases/ownership

Land within the pipeline corridor is predominantly privately held rural residential land. There are also a small number of allotments that are Commonwealth land and Crown land.

The proponent is currently in the process of negotiating with landowners over access to their land for the purposes of construction, including land rehabilitation and the establishment of easements required for the operation of the pipeline.

The location (lot reference and ownership) of the intake, pump stations and outlet structures are shown in Table 3.1.

Table 3.1 Location of structures

Structure	Lot (NSW) Block (ACT)	DP (NSW) Division (ACT)	Land status/ownership
Intake/low lift pump station	1611	Tuggeranong	ACT TAMS – environmental
High lift pump station	1572	Tuggeranong	ACT TAMS – environmental
Outlet structure/mini-hydro power generator	Lot 7	DP 592796	Commonwealth land leased to ACT and managed by ACT TAMS

Land leases and ownership in the vicinity of the preferred project are shown in Table 3.2 and Figure 3.12.

Table 3.2 Blocks of land affected by the preferred project

District	Block	Land status	Lessee/Custodian
Tuggeranong	1653	Leased/rural lands	TransGrid
Tuggeranong	1470	Leased/rural lands	ACTEW Corporation
Tuggeranong	1471	Leased/rural lands	ACTEW Corporation
Tuggeranong	119	Leased/rural lands	Stephen Locke

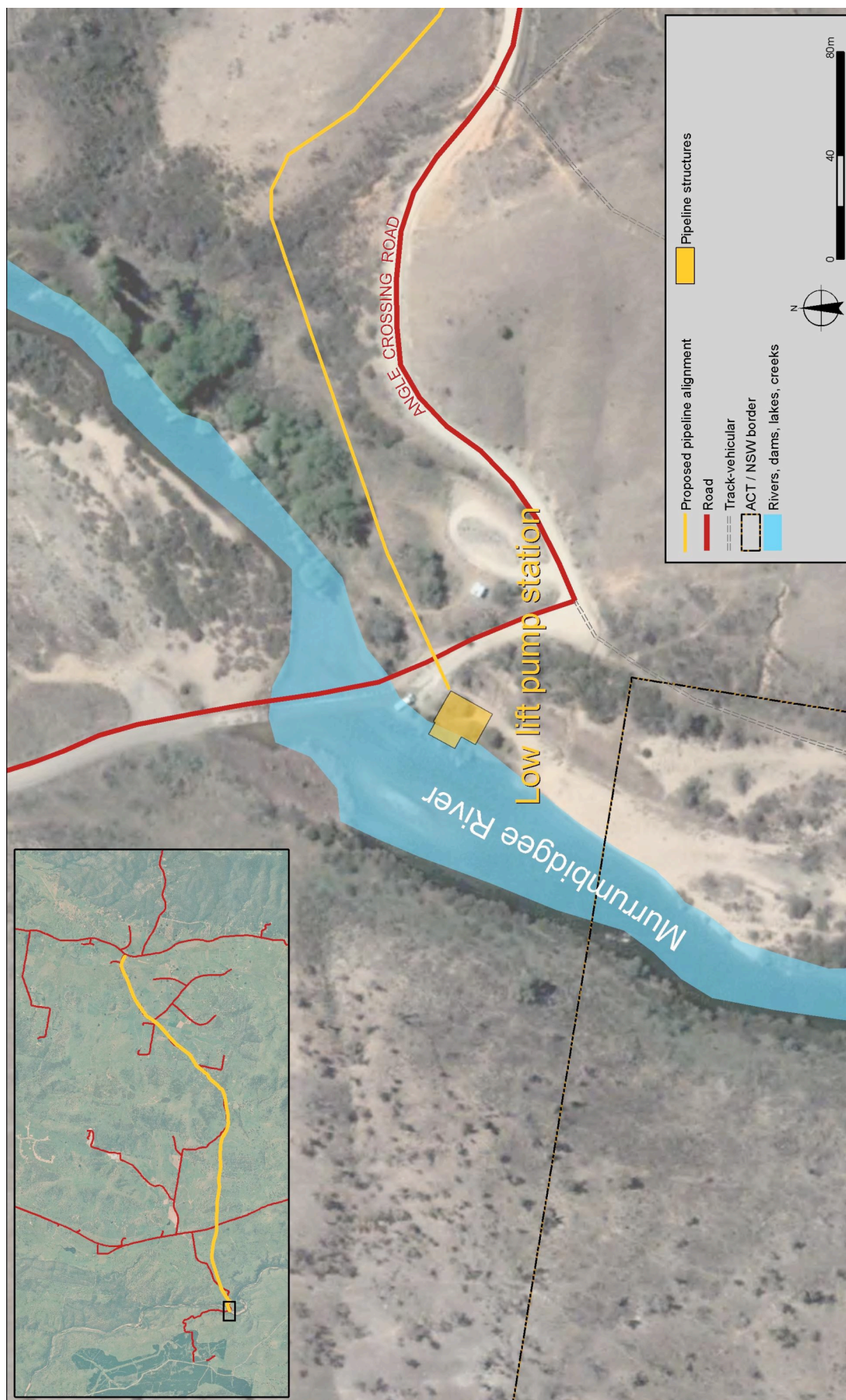


Figure 3.5 Location of the intake/low lift pump station

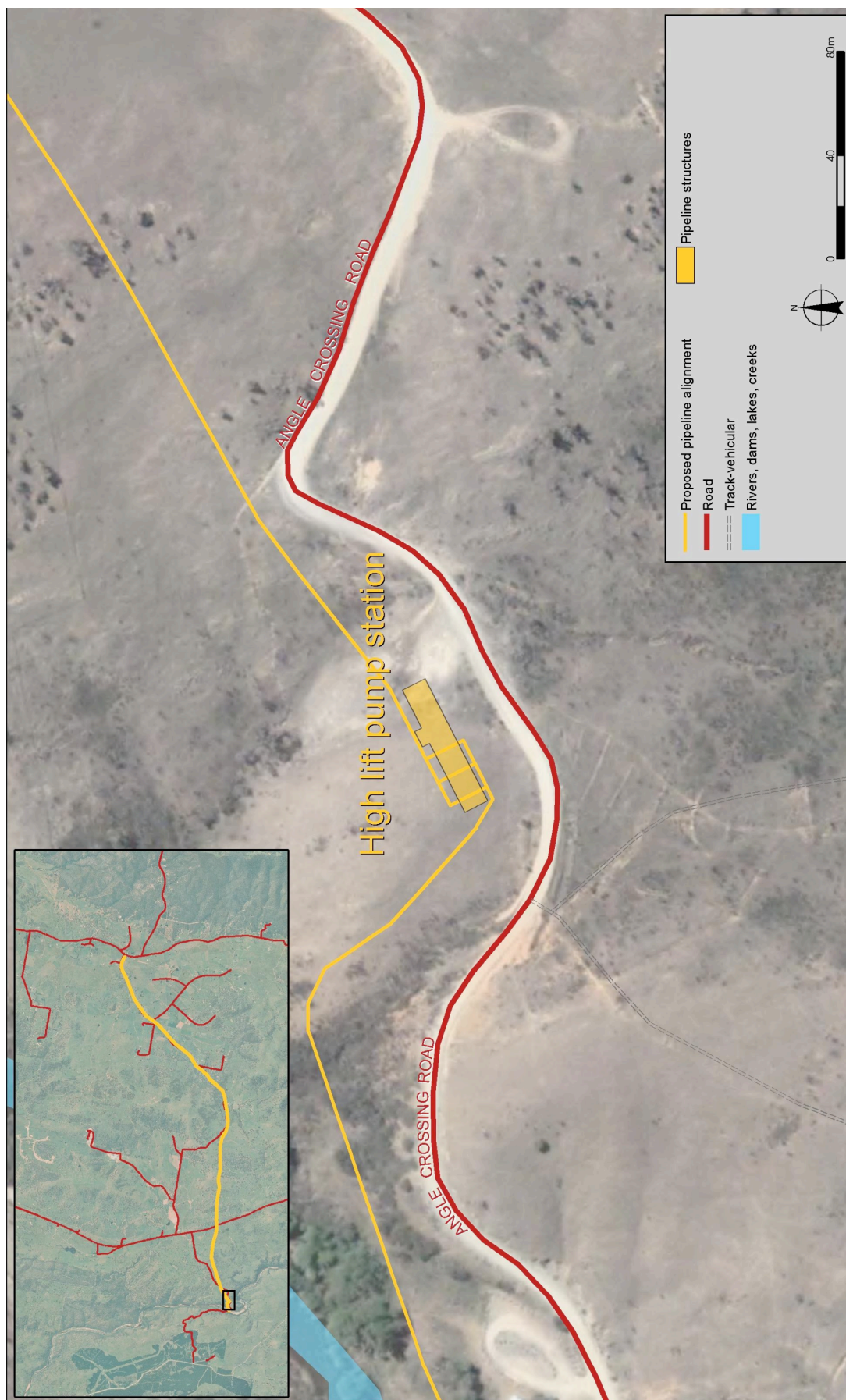


Figure 3.6 Location of the high lift pump station

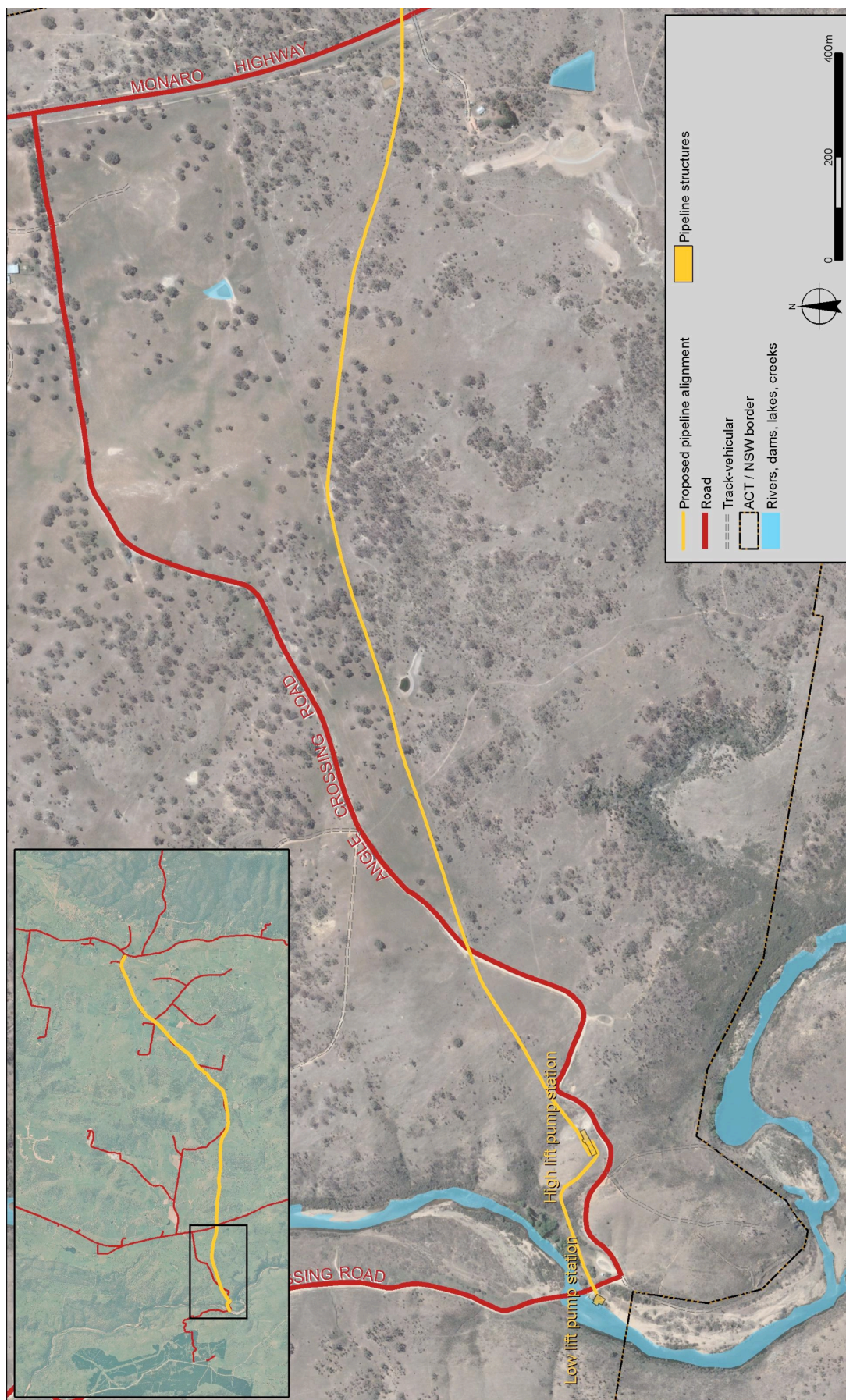


Figure 3.7 Location of the pipeline (ACT section)

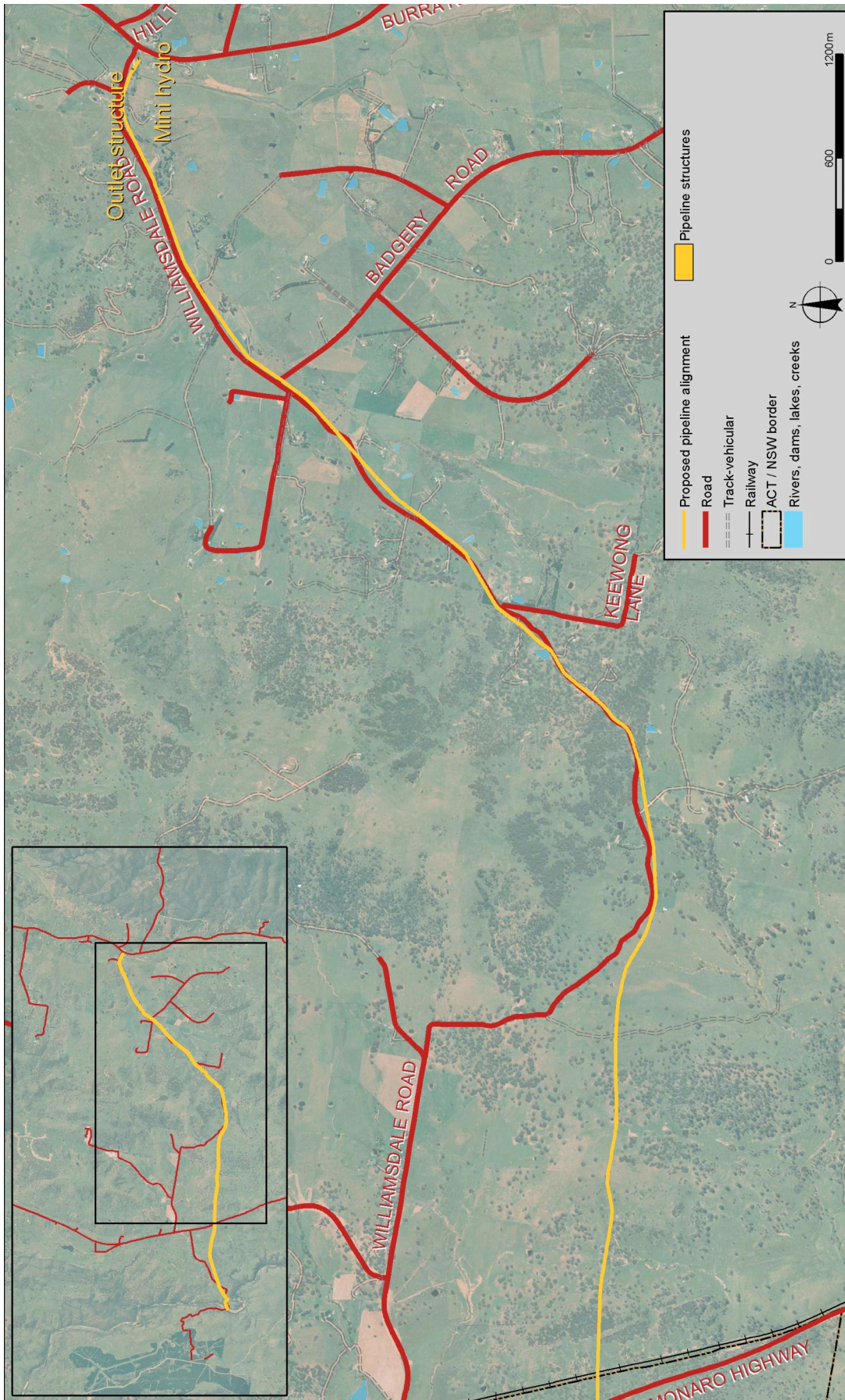


Figure 3.8 Location of the pipeline (NSW section)

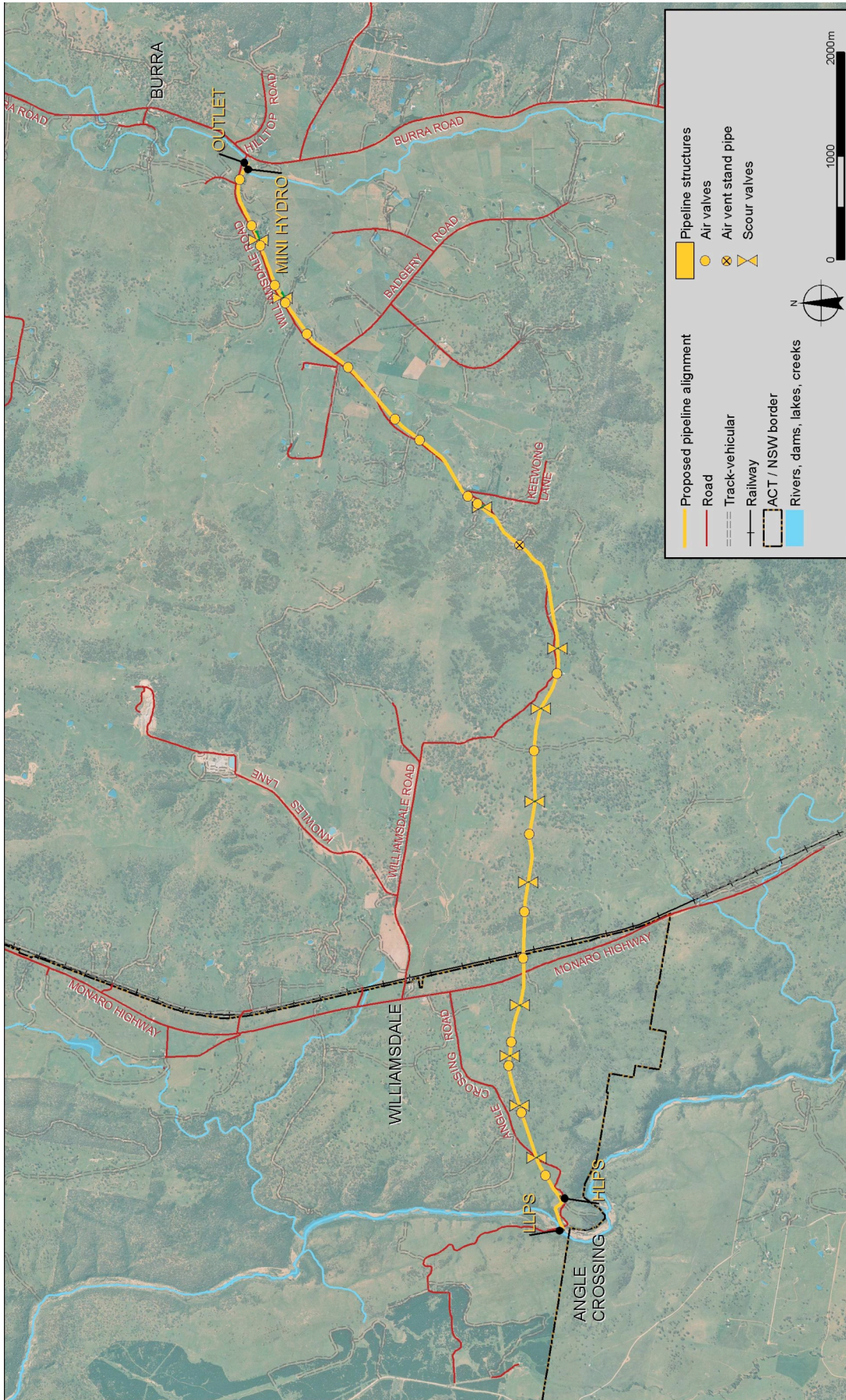


Figure 3.9 Location of air and scour valves

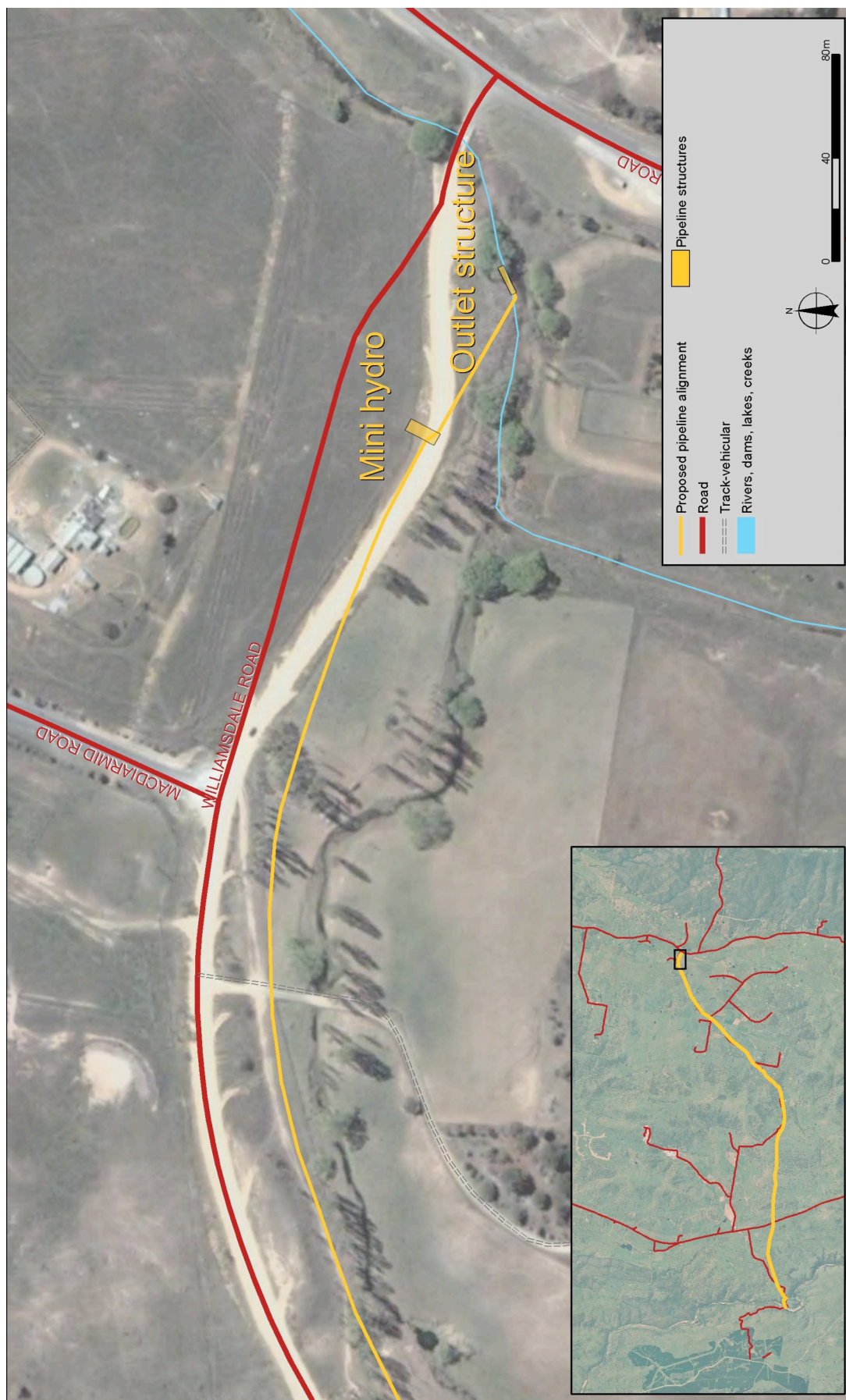


Figure 3.10 Location of the mini-hydro power generator/outlet structure

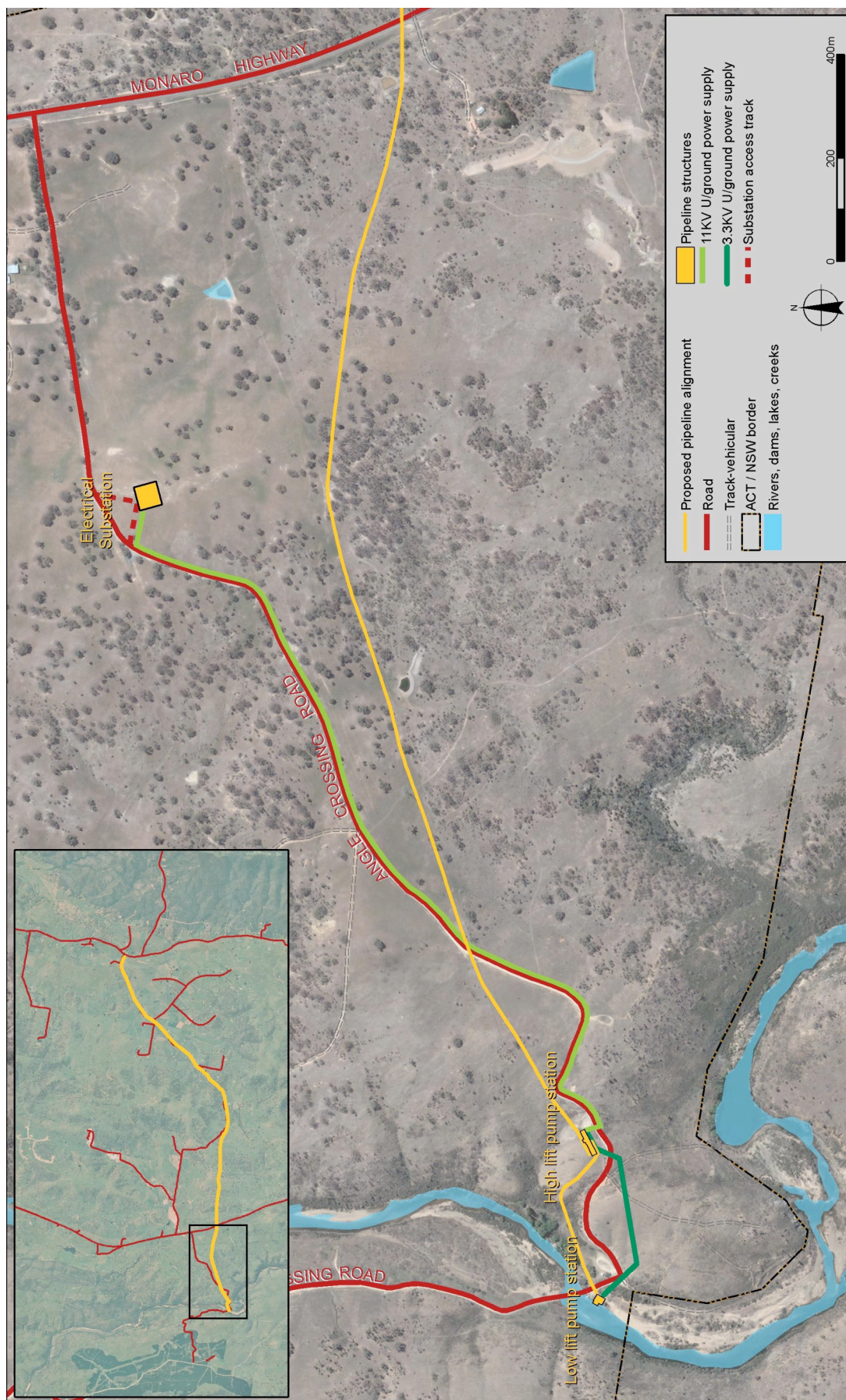


Figure 3.11 Location of the power supply

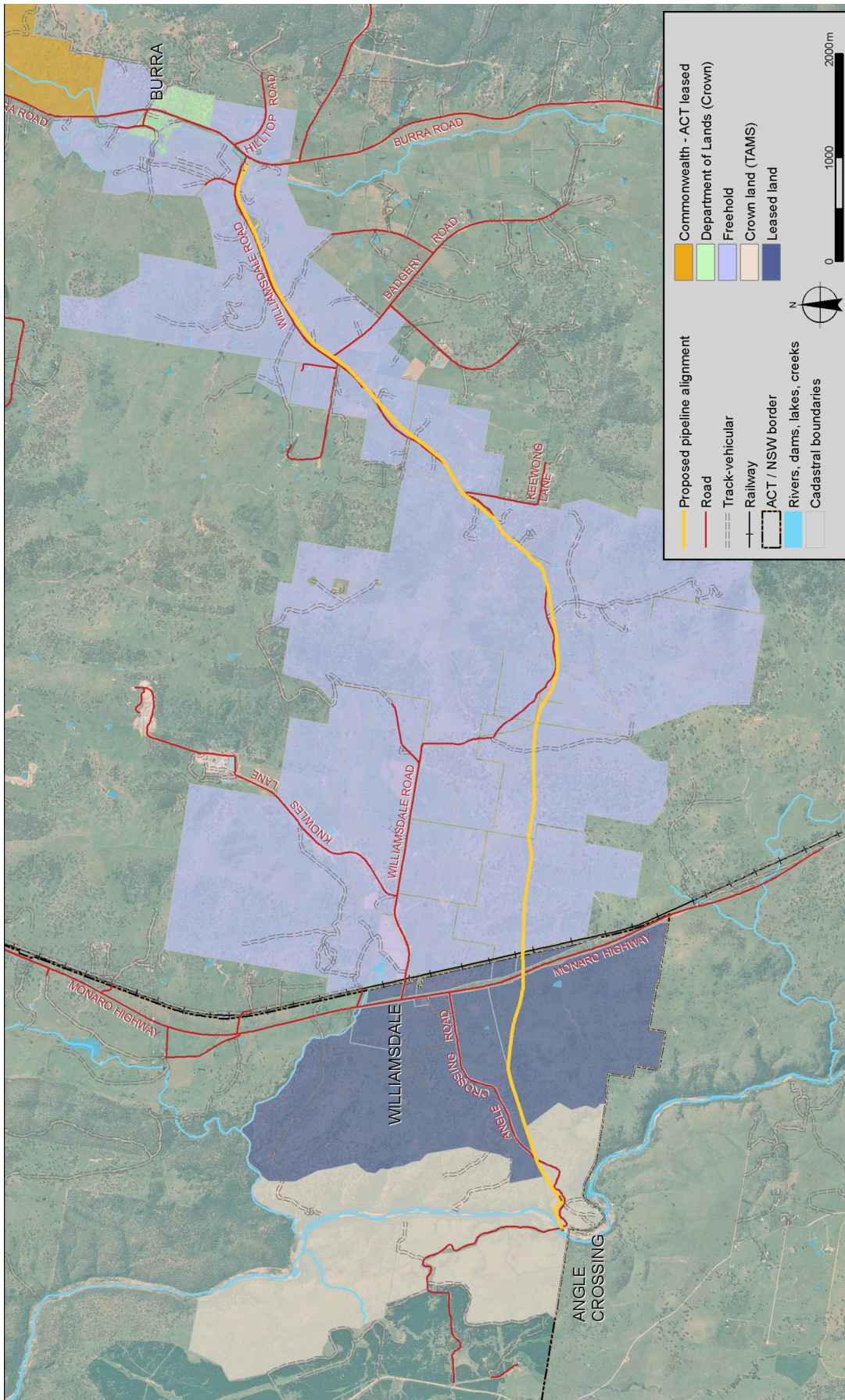


Figure 3.12 Land leases and ownership

3.4 Local setting – key features of the existing environment

The sections below provide a summary of the elements of the existing environment surrounding the pipeline corridor, which may be impacted by the preferred project. More detail on each element of the environment is provided in Part C.

3.4.1 Landscape and topography

The study area is generally located within a rural landscape characterised by large and small rural landholdings, State Forests and small townships. The nearest townships and urban residential areas are located in Queanbeyan (approximately 10 km distance). The corridor falls under two local landscape units as used by Fallding (2002). These are Tharwa and Royalla units.

Topography along the route changes considerably. Elevation in the corridor varies from 600 m at Angle Crossing to 1,120 m at Gibraltar Hill.

The topography surrounding the western end of the pipeline corridor, around Angle Crossing, is characterised by deeply incised hills and gorges along the Murrumbidgee River Corridor. The land sharply rises towards the Monaro Highway to broad, elevated, flat to undulating plains before dropping away to the east of the Highway where the land is characterised by the broad low lying plains of the Jerrabomberra and Tuggeranong Valleys and smaller flood plains associated with Jerrabomberra Creek.

The central part of the pipeline corridor then passes through the Gibraltar Range, which is an abruptly rising ridge line with the peak of Gibraltar Hill to the north of the proposed pipeline at an elevation of 1,120 m. The land surrounding the eastern extent of the pipeline corridor then falls back down to the broad low lying plains of the Jerrabomberra and Tuggeranong Valleys and smaller flood plains associated with Jerrabomberra Creek, Burra Creek and local drainage lines. These landforms continue to the Burra township and the conclusion of the pipeline corridor at Burra Creek.

Further information is provided in Chapter 16.

3.4.2 Geology and soils

The proposed pipeline is within the Cowra-Yass Synclinal Zone, bounded to the west by the Murrumbidgee Fault and to the east by the Foxlow Beds. The pipeline corridor appears to traverse six geological units, predominantly sourcing from Silurian period geological material of the Palaeozoic era.

There are three soil landscapes in the vicinity of the pipeline corridor: the Burra; Campbell; and Williamsdale. It is also considered likely that the Murrumbidgee Gorge soil landscape may occur locally at Angle Crossing. All the above soil landscapes are characterised by moderate erodibility at the surface, and high to moderate erodibility below the topsoil.

Further information is provided in Chapter 16.

3.4.3 Water and hydrology

The preferred project falls within the Murrumbidgee catchment, which is a major sub-catchment of the Murray Darling Basin, covering approximately 87,348 km² or 8.2 % of the Murray Darling Basin. Drainage in the vicinity of the pipeline corridor to the west of Gibraltar Range enters the Murrumbidgee River either directly or through one of many minor tributaries including Waterhole Creek, Lobb's Hole Creek, Deep Creek, Guises Creek, Dunn's Creek and Tuggeranong Creek.

The eastern section of the pipeline corridor (to the east of the Gibraltar Range) falls within the Molonglo River sub-catchment. Drainage in this area flows into the Queanbeyan River system via Burra Creek and other tributaries such as Dog Trap Gully, Jerrabomberra Creek, Four Mile Creek and Barracks Creek. The Queanbeyan River and its tributaries are impounded by Googong Dam to form the Googong Reservoir. The primary purpose of the Googong Reservoir is to supply potable water to the ACT and Queanbeyan in NSW. The Queanbeyan River continues to the north of Googong Reservoir and joins the Molongolo River on the outskirts of Queanbeyan. The Molongolo River then flows to Canberra where it has been dammed to form Lake Burley Griffin prior to joining with the Murrumbidgee River to the northwest of Canberra, in the ACT.

The catchment area boundaries have been shown in Figure 3.13. Further information is provided in chapters 9 to 11.

3.4.4 Flora and fauna

Aquatic ecology

The major waterways in the study area provide habitat for several native and exotic fish species. The Murrumbidgee River is likely to provide known and potential habitat for three threatened aquatic species: Trout Cod (stocked population); Macquarie Perch; and Murray River Crayfish. A further two threatened species are known to occur in the Googong Reservoir and the Murrumbidgee River downstream of Tharwa Sandwash: Murray Cod and Silver Perch. However, both these fish are only present in the Googong Reservoir as a stocked population.

The Murrumbidgee River provides habitat for other aquatic or semi-aquatic plants, mammals, reptiles, amphibians, crustaceans, Murray River crayfish and aquatic invertebrates including Eastern Water Dragons, Eastern Water Rat and Long-necked Turtle. There have also been reports of Platypus sightings, however none were observed during the field surveys conducted for this assessment.

Burra Creek also provides habitat for a diverse range of other aquatic animals including macroinvertebrates, Long-necked Turtle, frog species and the Eastern Water Rat.

Further information is provided in Chapter 12.

Terrestrial ecology

Remnant vegetation across the study area ranges from non-native pastures to native grasslands, grassy woodlands on the undulating lowland hills and dry grassy/shrubby sclerophyll forest elevated rocky parts of Gibraltar Hill and Mount Burra and on the 'saddle' that links the two. The condition of vegetation west of the 'saddle' ranges from poor to good with some smaller components in very good condition. The 'saddle' area contains mostly intact dry grassy/shrubby sclerophyll forest, which grades to grassy forest/woodland on the intermediate and lower slopes. Vegetation on the lower flats east of the 'saddle' contains variable quality grassy woodland/forest. However, most of the paddocks along Williamsdale Road to the east contain highly modified vegetation, such as low diversity native pasture and non-native pasture. Road-side vegetation is mostly exotic and in poor condition as were the nearby drainage channels. In contrast, vegetation of good quality was noted along some sections of Burra Road and at Burra Creek, east of Burra Road.

Main fauna habitats included grassland, woodland, open forest, rock outcrops, tree hollows and wet areas that ranged from major river systems to farm dams. Hollow-bearing trees occurred widely within many woodland and forest habitats, and occasionally as isolated paddock trees or stags. Extensive areas of rock outcrop were encountered in the Murrumbidgee River corridor, along Burra Creek and to a lesser extent on the Gibraltar 'saddle'. Smaller outcrops were associated with low hills and knolls, mainly in the western sections of the study area.

Further information is provided in Chapter 13.

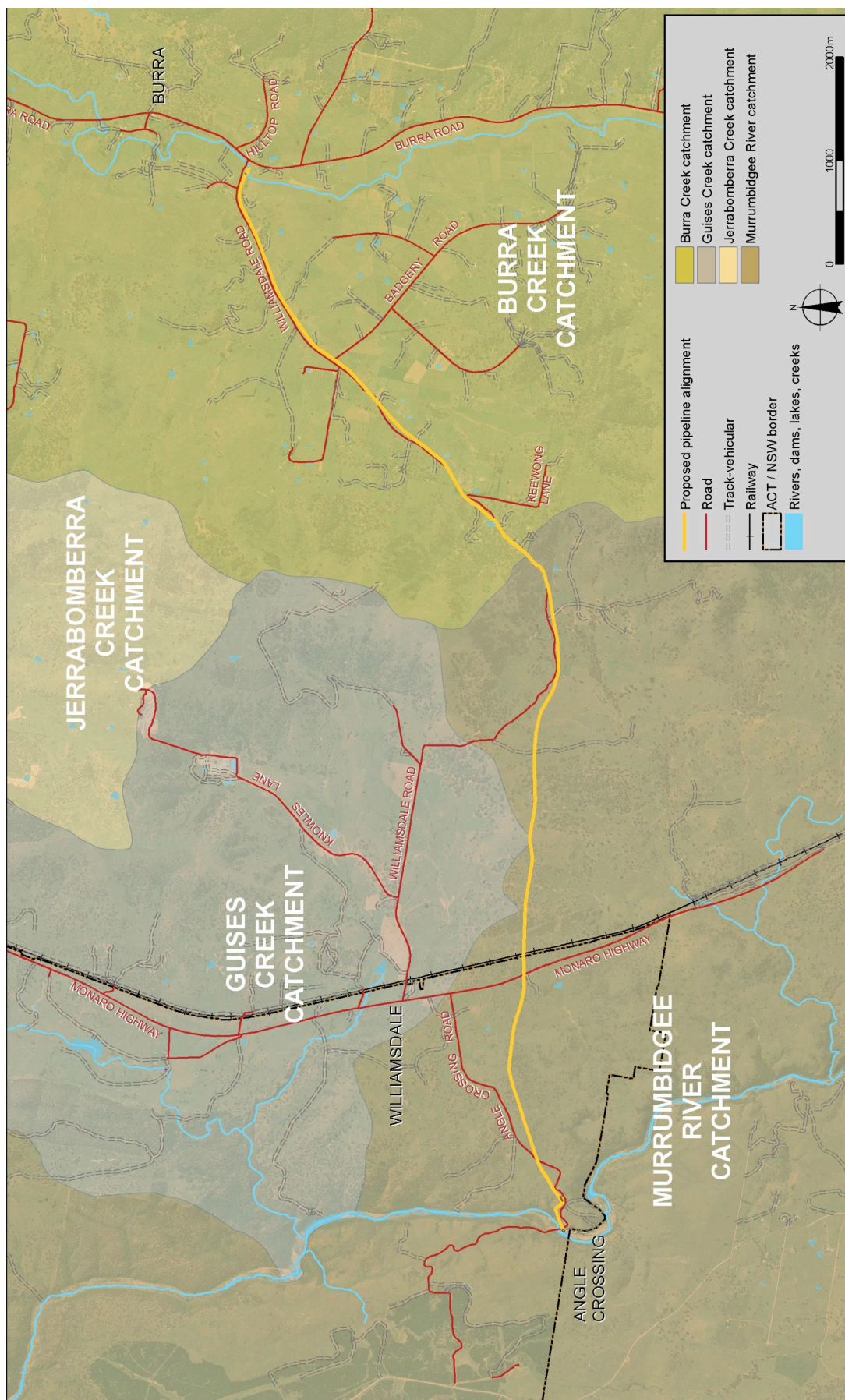


Figure 3.13 Catchment area boundaries

3.4.5 Cultural (Aboriginal and European) heritage

In the ACT, the study area includes Angle Crossing and adjacent lands which affects the four Aboriginal groups listed as Representative Aboriginal Organisations with the ACT Government under the ACT *Heritage Act 2004*. These groups are:

- The Buru Ngunawal Aboriginal Corporation;
- The Consultative Body Aboriginal Corporation;
- The Little Gudgenby River Tribal Council; and
- The Ngarigu Currawong Clan.

The NSW section of the study area falls within the boundaries of the Mogo Local Aboriginal Land Council, based in Mogo on the NSW south coast.

Aboriginal recordings, inclusive of previously recorded sites, identified within the study area comprise:

- Isolated finds;
- Artefact scatters;
- Rockshelter/cave sites;
- Potential archaeological deposits; and
- Possible scarred tree.

Historical (European) sites, inclusive of previously recorded sites, identified within the study area comprise:

- A former schoolhouse site;
- London Bridge Homestead;
- The Goulburn to Cooma railway;
- A cadastral boundary marker;
- A refuse dump;
- The site of a former homestead; and
- A line of trees.

One natural site, London Bridge Natural Arch, is located in the study area. This site has cultural and archaeological significance.

Subsurface testing undertaken during the investigation recovered numerous stone artefacts. Overall, the artefact assemblages retain high research potential in a regional context due to intactness and potential to inform about land use and manufacturing technology, but no individual sites yielded assemblages dense enough or rich enough to warrant especially high significance or preservation.

Further information is provided in chapters 14 and 15.

3.4.6 Land use

The main land uses in the vicinity of the preferred project are:

- River corridor/water catchment;
- Agriculture;
- Rural residential development; and
- Transport, power, water and communications easements.

River corridor/water catchment

The intake/low lift pump station for the pipeline will be located in the vicinity of the low level crossing on Williamsdale Road near the junction of Burra and Williamsdale Roads within the Murrumbidgee River Corridor and the Gigerline Nature Reserve.

The Murrumbidgee River Corridor is partly managed as an area for nature-based recreation and, in particular, water-based activities such as swimming, fishing and canoeing. The Gigerline Nature Reserve provides opportunities for bushwalking and wildlife watching.

The primary purpose of the Googong Foreshores is for the protection of the raw water supply to Googong Dam. The Googong Foreshores is also partly managed as a recreation area and is a significant Wildlife Refuge. The heritage-listed items of London Bridge Arch and London Bridge Homestead are located within the Foreshores to the northwest of the proposed discharge location.

Agriculture

The majority of the pipeline corridor traverses a highly modified agricultural landscape. Traditional farming practices operate in the area from the Monaro Highway to the Gibraltar Range. These activities include sheep and cattle grazing, small-sale cropping, pasture improvement and equine farming. Non-traditional farming and hobby farming practices mostly operate to the east of the Gibraltar Range within rural residential properties in the Burra Rural District.

Rural residential development

Rural residential development is present along most of the pipeline corridor but is predominantly concentrated to the east of the Gibraltar Range.

The eastern extreme of the pipeline corridor passes through the rural locality of Burra. At the western end, the corridor passes approximately 900 m south of the rural locality of Williamsdale.

Transport, power, water and communications easements

The corridor will traverse several roads including Angle Crossing Road, the Monaro Highway, Williamsdale Rd as well as three Crown road reserves ('paper roads') that are marked on plans but are not formed on the ground. The pipeline corridor will follow the Williamsdale Road corridor for approximately 5.5 km and will cross the disused Goulburn to Cooma Railway Line.

Utilities exist in the vicinity of the Monaro Highway. Traffic use in the area of the proposed pipeline development consists mainly of rural traffic, with the exception of the Monaro Highway. Associated noise levels are therefore generally low.

The section of the disused Goulburn-Bombala Railway Line (including the local Michelago Railway Reserve) is mostly closed, with the nearest local station (Williamsdale Railway Platform/Station) closed since 1975.

Further information is provided in Chapter 17.

3.4.7 Air quality and climate

Air quality throughout the study area is considered to be good, and consistent with that of a rural environment.

Climatic information has been derived from the Bureau of Meteorology Records (Bureau of Meteorology 2008) sourced from the nearest automated weather station located at Canberra Airport, approximately 38 km from the pipeline corridor. The pipeline corridor is located within a temperate climate, distinctively characterised by mild/warm summers and cold winters. Mean temperatures are within the range of 13–27°C during summer and between 0–12°C in winter. The average annual rainfall is 620 mm.

Further information is provided in Chapter 21.