

# Appendix W

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Pipeline development soil and  
land resources supplementary information

## Pipeline development soil and land resources supplementary information

This Appendix provides supporting information for the EIS Chapter 23 Soil and land resources. The technical and area details provided in the tables and figures below are summarised in Chapter 23 of the EIS.

### 1 Soil landscapes (EIS Section 23.2.1)

Table W.1 provides a summary of the soil landscapes in the pipeline corridor, comprising landscape characteristics, current land use, soils, vegetation, and erosion susceptibility and Table W.1 provides a summary for the pump stations and pressure reduction station.

Table W.1 Soil landscapes in the pipeline corridor

Soil Land-scape	Area (ha)	%	Location	General landscape	Land Use in the pipeline corridor area	Australian Soil Classification and vegetation	Erosion
Cullen Bullen – 8931cb	5.94	4.69	Angus Place, west of Coxs River, SCSO, MPPS	Rolling low hills and rises, Slopes 10 – 25%, local relief <50 m, elevation 550 – 1050 m. Localised rock outcrop occurs as small isolated low scarps (<5 m).	Grazing of sheep and beef cattle on freehold land. Small areas for State Forests, coalmining, power stations	Kurosols Extensively cleared open woodland with small isolated remnants of original vegetation	Moderate gully erosion. Minor sheet erosion common where cleared.
Lithgow – 8931-li	3.13	2.47	west of Angus Place but east of Coxs River, Pipers Flat Road	Flat to undulating rises and broad valley floors. Local relief to 20 m. Slopes <10%. Elevation approximately 800 – 1000 m. Rock outcrops.	Sheep and beef cattle grazing on freehold land. Coal and shale mines.	Kurosols Extensively cleared open woodland and forest.	Moderate gully erosion along some drainage lines. Some sheet erosion.
Long swamp – 8931ls	0.81	0.64	Coxs River	Level to very gently inclined swamps on recent alluvium. Local relief to 20 m, slopes mainly <3%, elevation 890 – 955 m. Watertable at <100 cm.	Freehold land for grazing of beef cattle and horses.	Hydrosols Largely uncleared closed sedgeland, closed heath and open forest. sedgeland	Minor stream bank erosion on some drainage lines.
Disturbed terrain - 8391xx	6.83	5.40	Castlereagh Highway, SCSO, MPPS	Disturbed by human activity to a depth of at least 100 cm, original soil removed, disturbed or buried.	Coal mines, coal stockpiles, power stations, landfills.	Not assessed. Extensively cleared	Varies according to site characteristics
Hassans Walls – 8931hw	0.73	0.58	forest area between SCSO and MPPS, transmission line south of MPPS	Cliffs derived from Narrabeen Group sandstones and steep colluvial talus sideslopes. Local relief >100 m, slopes mostly >40%, elevation 280 – 1000 m.	Most is undeveloped and in national Parks	Rudosols and Tenosols Open-forest and open-woodland	Severe sheet erosion and rock fall.
Pipers Flat – 8931pf	0.24	0.19	Pipers Flat Road	Level to very gently undulating drainage depressions and floodplains. Local relief <20 m, slopes <5%, elevation (approx..) 800 - 1000 m.	Mostly freehold grazing of sheep beef cattle and horses	Soloths Extensively cleared open-woodland.	Gully erosion <1.5m deep mostly along drainage lines with some severe bank erosion
Capertee – SI5508cp	3.93	3.10	Pipers Flat Road to Reservoir Road west of the cemetery	Undulating low hills ranging in elevation from 730–940 m with most slope lengths ranging from 1000–2000 m, but up to 3000 m. Slope angles are gentle, from 3–8%. Local relief is low, mainly from 60–80 m, but with a full range between 40–100 m. Drainage lines have variable spacings from 400–1000 m	Grazing on improved pastures	Kurosols, Sodosols and Kurosols / Natric Savannah woodland	After clearing and grazing drainage depressions are susceptible to gully erosion

Soil Land-scape	Area (ha)	%	Location	General landscape	Land Use in the pipeline corridor area	Australian Soil Classification and vegetation	Erosion
Sunny Corner – SI5508sc	11.98	9.46	West of Reservoir Road, through State Forest around Sunny Corner and Kirkconnell to north of Yetholme	Undulating to rolling low hills with elevations from 900–1240 m. Local relief from 40–120 m, with slope lengths from 600–1000 m. Slopes range from 4–20%. Drainage channels are fixed, ranging from 1000–1600 m apart.	State forest. Grazing on improved and unimproved pastures.	Kurosols Yellow box – Blakely’s red gum community	Some sheet erosion if cleared, moderate gully erosion
Turonfels – SI5508tu	2.28	1.80	North of Yetholme for small area through State Forest	Undulating to rolling low hills with elevations from 960–1250 m. Slopes range from 6–20%, with slope lengths from 600–1000 m. Local relief is from 50–90 m. Drainage lines are few and variably spaced	Native forest, grazing	Kandosols Broad-leaved peppermint-brittle gum-candlebark community	Minor gully erosion, and sheet erosion when cleared. Low to moderate
Yetholme – SI5508ye	4.74	3.74	North of Great Western Highway	Rolling to steep hills from 820–1020 m. Local relief ranges from 50–90 m, with some up to 150 m. Most slopes are between 8–22% with some to 30%. Slope lengths vary from 250–300 m. Drainage channels tend to be fixed and are spaced at 500 m apart	Native forest, grazing on improved and unimproved pastures	Sodosols Yellow box-Blakely’s red gum community generally	Moderate rilling and bullying
Mookerawa – SI5508mk	4.24	3.35	small section south of Great Western Highway	Rolling low and rolling hills, with some steep rocky slopes, range from 600–976 m. Slope range from 8–30%, but on average are 8–12%. Slope lengths are mainly in the 500–700 m range, but can 200 m-1000 m. Drainage depressions range from 8–18% in the upper reaches and 3–4% in the lower areas. Major streams have slopes of <1%. Local relief is from 50–70 m, up to 140 m on longer slopes. The fixed drainage channels have variable channel spacings, from 200–900 m.	Grazing with pasture development	Kurosols, Natric	Moderate in dispersible A2, otherwise minor sheet and rill erosion
Mullion Creek – SI5508mu	2.38	1.88	small area between Great Western Highway and Brewongle	Undulating low hills 560–980 m, with slopes generally between 3–6% but up to 12%. Slope lengths vary from 700–1500 m, with local relief from 40–60 m, occasionally up to 80 m. The drainage channels are spaced 200–500 m apart, with some up to 1500 m apart.	Grazing on improved and unimproved pastures	Sodosols Broad-leaved peppermint-scribbly gum community, candlebark and scribbly gum on slopes	Gully erosion. Moderate to high



Soil Land-scape	Area (ha)	%	Location	General landscape	Land Use in the pipeline corridor area	Australian Soil Classification and vegetation	Erosion
Bathurst – SI15508ba	36.53	28.84	patches near Brewongle, Tarana Road, between Whites Rock Road and O’Connell Road, Gormans Hill Road, Orton Park, large patches from Perthville to Mid Western Highway	Undulating to rolling hills, with elevations of 650–850 m and most slopes from 6–10%. Slope lengths vary from 400–800 m, but can range up to 2000 m. Drainage depressions slopes are from 4–7%, but range from 1–9%. Local relief is from 30–70 m. Erosional channels drain north into the major streams. Drainage pattern is convergent, with drainage lines from 500–1000 m apart	Grazing on unimproved pastures, some orcharding, cropping vegetables	Chromosols Savannah woodland with a yellow box community dominant	Severe sheeting and rilling when cultivated and severe gullying in drainage depressions
Raglan – SI5508ra	19.89	15.71	Brewongle, Tarana Road, O’Connells Road, east of Orton Park	Gently undulating to undulating rises, 680–780 m above sea level. Average slope angles range from 2–5%, with small pockets between 6–10%. Slope lengths are from 100–300 m, with some up to 2000 m. Drainage depressions have slopes of 1–2%. Local relief is from 20–30 m, with some up to 40 m. Drainage lines are fixed and are widely spaced at 400–500 m apart	Grazing on improved and unimproved pastures	Sodosols Savannah grassland with river she-oaks along main drainage channels	Gullies - high
Macquarie – SI5508mq	4.46	3.52	Salt Water Creek, Macquarie River, Queen Charlottes (Vale) Creek	Alluvial plains and terraces with local relief often <10 m. Other elements, including backplains, swamps, channel benches, relict stream channels, floodouts, ox-bows, levees and point bars, occur along the Macquarie River and on the Belubula River floodplain. The soil landscape varies from 100–1000 m wide, usually <300 m on smaller alluvial plains along creeks. Slopes are level to 3% and are steeper on the slopes of terraces. The alluvial channels tend to be slowly migrating, except on narrow alluvial plains.	Native grassland, vegetable crops	Dermosols Open savannah grassland	Low but streambank erosion
Pinnacle – SI5508pe	0.72	0.57	small area west of the bike park and PS4/5	Rolling to steep hills 760–840 m in elevation, with slopes between 20–40%. Local relief to 200 m, with slopes of 200–400 m in length.		Ferrosols Mountain gum	

Soil Land-scape	Area (ha)	%	Location	General landscape	Land Use in the pipeline corridor area	Australian Soil Classification and vegetation	Erosion
Panorama – SI5508pa	0.59	0.47	small area west of bike park	Narrow rolling to steep slopes and narrow level crests, 760–878 m above sea level. Slopes average 20% but range from 1–5% on crests to more than 40% on slopes. Drainage depressions in elevated areas have slopes from 18–30%. Local relief is from 80–120 m. Crests are 100–350 m wide. The drainage channels are fixed and generally steep and narrow.	Grazing on improved pastures	Ferrosols Mountain gums	Low
Rocks – SI5508ro	9.41	7.43	East of Evans Plains Creek	Rocks soil landscape has rolling to steep hills with 600–1037 m elevation. Slopes are from 11–15%, but can be up to 30% in the west. Slopes are from 1000–1500 m long. Local relief is from 100–200 m. Fixed drainage channels are from 300–500 m. However, some slopes run parallel and these result in drainage lines being very closely spaced at <100 m.	Grazing on pastures, some orcharding and cropping	Kurosols	Moderate to high Moderate sheet erosion, severe gullies
Evans Plains – SI5508ep	1.51	1.19	Evans Plains Creek	Level plains are from 50–500 m wide, with terraces. The major elements are backplains, relict channels, floodouts, point bars, and levees. Alluvial plains are 100 m wide. Elevation is from 650–700 m. Local relief is 10 m. The drainage pattern consists of slowly migrating deep alluvial channels, except in very narrow alluvial plains.	Grazing on improved pastures, some orcharding and cropping	Rudosols Open savannah grassland	Moderate – some stream bank erosion
Burrendong – SI5508bd	1.42	1.12	Fitzgeralds Mount	Rolling to steep hills with rocky slopes. Elevation ranges from 690–1100 m. Slopes range from 21–50% with lengths from 200–800 m, with most from 300–600m. Upper drainage lines have slopes of 18–22% and lower drainage lines are from 6–12%. Local relief ranges from 40–200 m, but is mostly between 90–130 m. The main drainage channels are fixed, and spaced from 250–800 m apart.	Grazing on improved and unimproved pastures, native bushland	Rudosols and Tenosols	Moderate sheet erosion. Moderate to high

Soil Land-scape	Area (ha)	%	Location	General landscape	Land Use in the pipeline corridor area	Australian Soil Classification and vegetation	Erosion
Vittoria-Blayney – SI5508vb	4.84	3.82	West of Fitzgeralds Mount to the Mine Site	Undulating to rolling hills with 800–1050 m elevation, and local relief from 30–80 m but most to 50–60 m. Slopes are from 6–10%, with lengths averaging 600 m but ranging from 200–1500 m. Fixed drainage channels are spaced from 800–1000 m apart. Upland drainage depressions have slopes from 4–5%, but in lower areas slopes are less than 2%. Broad drainage depressions (500 m wide) have plains with 1–2% slopes	Grazing on improved pastures	Kandosols Savannah woodlands with yellow box communities, Blakely's red gum, grey box, apple box, bastard box and broad-leaved peppermint on lower slopes	Moderate, minor to severe gullyng
Total	126.59	100.0					

*Source: Soil Landscapes of Central and Eastern NSW*

The pump station locations will be situated on the soil landscapes with soil characteristics as set out in Table W.2.

**Table W.2** Pumping station facility soil profiles

Pump Station	Area (ha)	Soil Landscape	Australian Soil Classification	Land and Soil Capability	Inherent Land Fertility
PS1 – Angus Place	0.56	Cullen Bullen	Kurosols	4	Moderately low
PS2 - SCSO	0.56	Disturbed	Not assessed	Not assessed	Not assessed
PS3 - MPPS	0.56	Cullen Bullen	Kurosols	4	Moderately low
		Hassans Walls	Rudosols and Tenosol	8	low
PS4 – Orton Park	0.17	Disturbed	Not assessed	Not assessed	Not assessed
Pressure Reducing Valve - Yetholme	0.04	Bathurst	Chromosols	5	Moderate
		Yetholme	Sodosols	5	Moderately low

## 2 Australian Soil Classification (EIS Section 23.2.2)

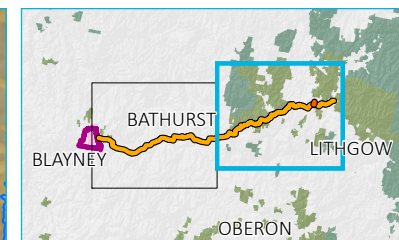
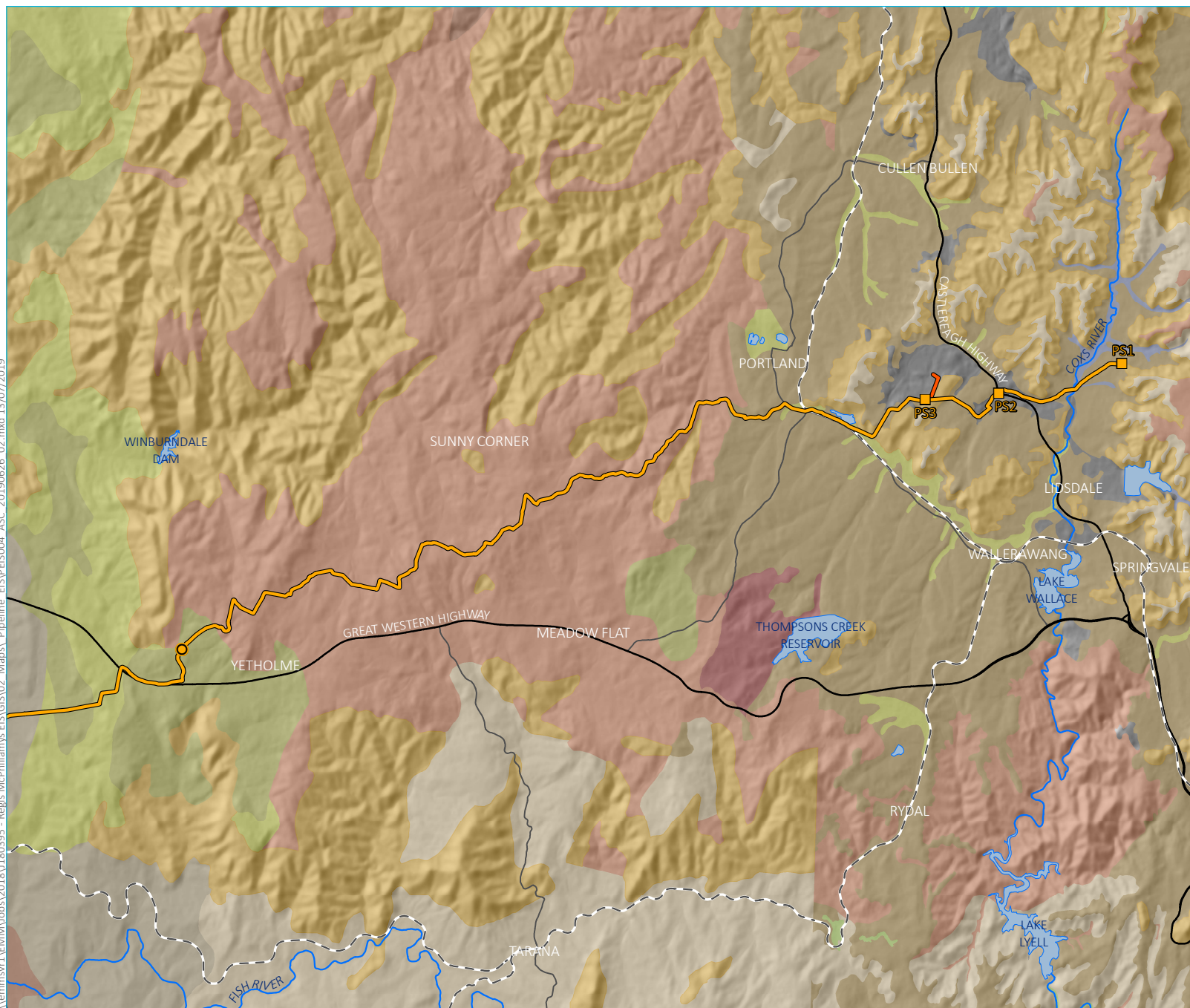
Figure W.1 illustrates the spatial distribution of the soil types in the pipeline corridor and Table W.3 provides a description of each ASC, and the extent of area covered within the pipeline corridor.

**Table W.3** Australian Soil Classification

Australian Soil Classification	Description	Total area of disturbance (ha)	Pump station area* (ha)	Under-bore pits (ha)*	%
Chromosols	Soils with strong texture contrast between A horizons and B horizons. The latter are not strongly acid and are not sodic.	36.53	PS4 - 0.17	0.12	28.84
Dermosols	Soils with structured B2 horizons and lacking strong texture contrast between A and B horizons.	4.46	-	0.12	3.53
Ferrosols	Soils with B2 horizons which are high in free iron oxide, and which lack strong texture contrast between A and B horizons	1.31	-	-	1.03
Hydrosols	Soils that are saturated for the greater part of the profile for prolonged periods (2-3 months) in most years, ie Wet soils.	0.81	-	-	0.64
Kandosols	Soils which lack strong texture contrast, have massive or only weakly structured B horizons, and are not calcareous throughout	19.1	-	-	15.08
Kurosols	Soils with strong texture contrast between A horizons and strongly acid B horizons	12.69	PS1 – 0.56 PS3 – 0.41	0.12	10.02
Kurosols, Natric	Kurosols: Soils with strong texture contrast between A horizons and strongly acid B horizons Natric: soils where the major part of the upper 0.2m of the B2 horizon is sodic.	4.79	-	0.08	3.78
Rudosols	Soils that have negligible pedologic organisation, ie Minimally developed soils	10.91	-	-	8.61
Rudosols and Tenosols	Rudosols: Soils that have negligible pedologic organisation, ie minimally developed soils. Tenosols: Soils with generally only weak pedologic organisation apart from the A horizons, ie slightly developed soils	2.15	PS3 – 0.05	-	1.70
Sodosols	Soils with strong texture contrast between A horizons and sodic B horizons which are not strongly acid.	27.00	Pressure Reducing Valve - 0.04	0.12	21.34
	Not Assessed	6.84	PS2 - 0.56 PS3 – 0.1	0.08	5.41
Total		126.59	1.89	0.64	100.00

Notes: \*: disturbance area is a component of the total surface area of disturbance

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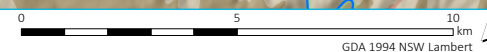
#### KEY

- Mine development project area (2,513.47 ha)
- Mining lease application area (1,812.99 ha)  
(Note: boundary offset for clarity)
- Pressure reducing system
- Pumping station facility
- Pipeline corridor
- Pipeline corridor (Blowdown Pond)
- Existing environment
  - Rail line
  - Primary road
  - Arterial road
  - River
  - Waterbody
  - NPWS reserve (refer to inset)
  - State forest (refer to inset)
- Australian soil classification
  - Chromosols
  - Dermosols
  - Ferrosols
  - Hydrosols
  - Kandosols
  - Kurosols
  - Kurosols, Natric
  - Rudosols
  - Rudosols (Alluvial)
  - Rudosols and Tenosols
  - Sodosols

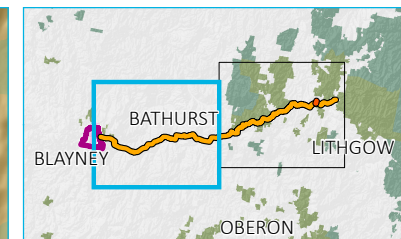
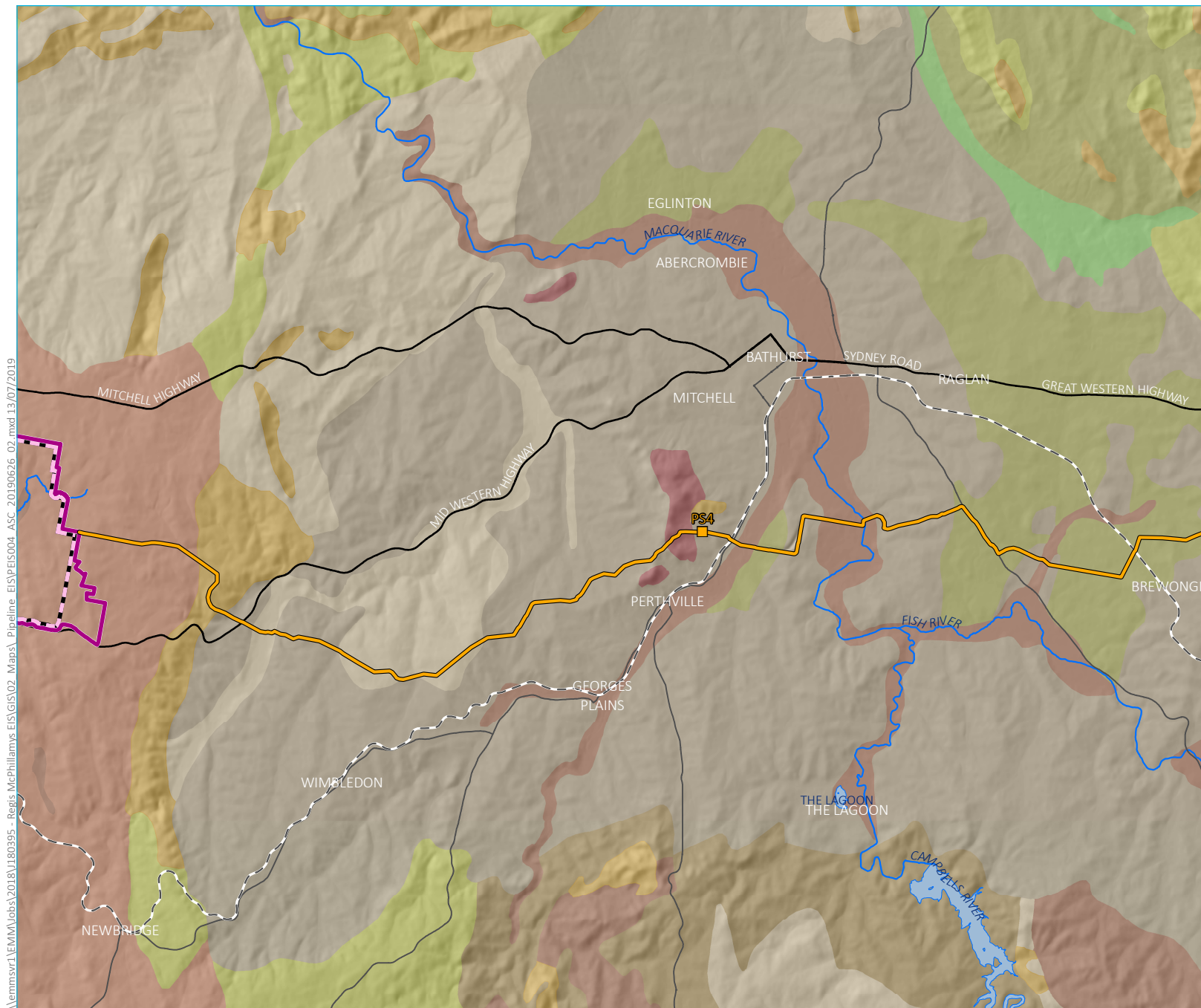
Soil types

McPhillamys Gold Project  
Environmental impact statement  
Figure W.1a

Source: EMM (2019); Regis Resources (2019); DFSI (2017); OEH (2017); GA (2011)







# KEY

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- Pumping station facility
- Pipeline corridor
- Pipeline corridor (Blowdown Pond)
- Existing environment
  - Rail line
  - Primary road
  - Arterial road
  - River
  - Waterbody
  - NPWS reserve (refer to inset)
  - State forest (refer to inset)
- Australian soil classification
  - Chromosols
  - Dermosols
  - Ferrosols
  - Kandosols
  - Kurosols
  - Kurosols, Natric
  - Rudosols
  - Rudosols and Tenosols
  - Sodosols
  - Tenosols (Alluvial)

Soil types

McPhillamys Gold Project  
Environmental impact statement  
Figure W.1b

### 3 Land and Soil Capability (EIS Section 23.2.3)

Figures W.2 show the spatial distribution of the land and soil capability classes along the pipeline corridor. The LSC class definitions are provided in Table W.4 along with the extent of each class mapped in the pipeline development.

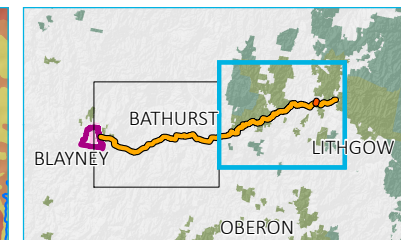
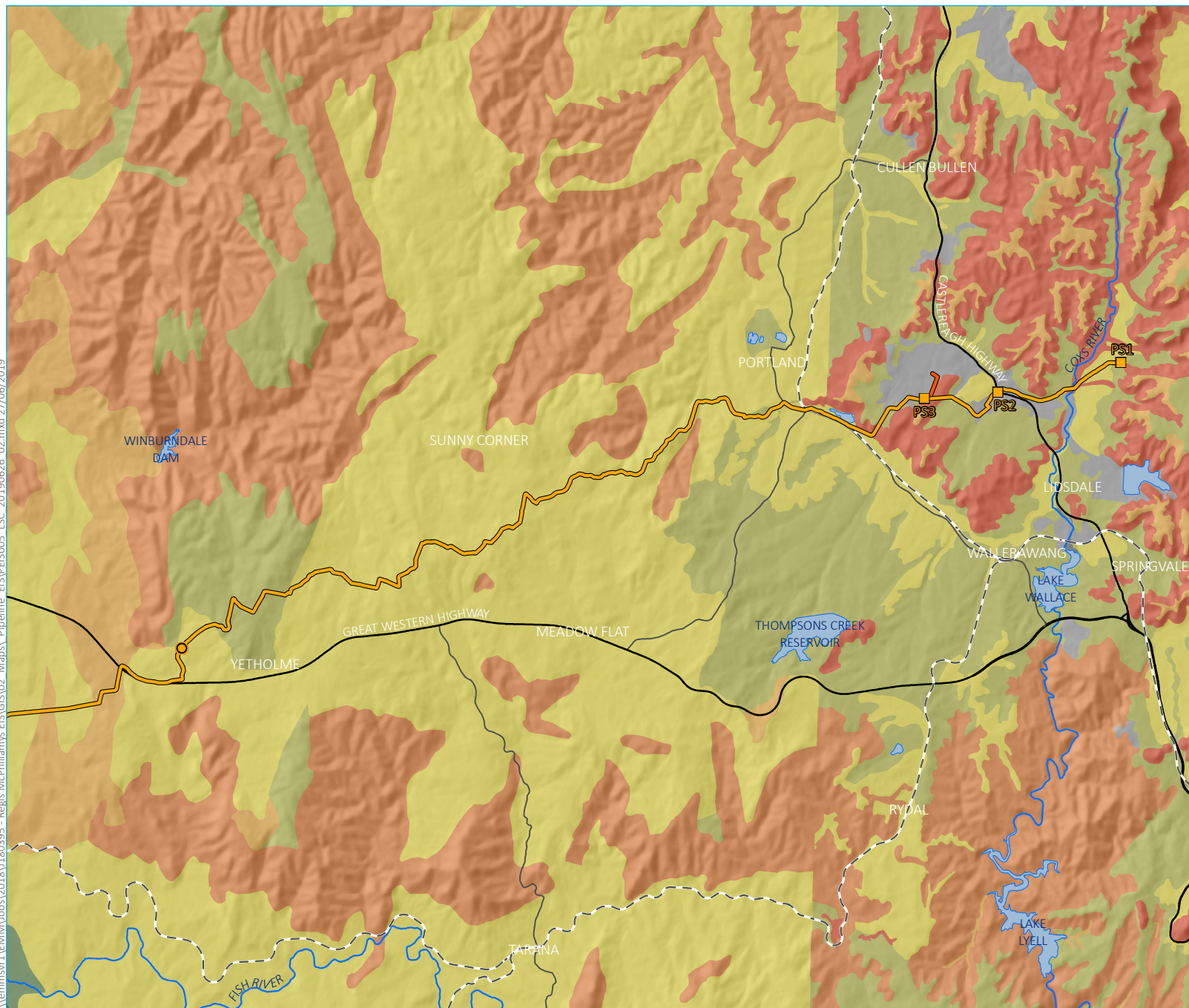
Table W.4 Land and soil capability classes in the pipeline corridor

LSC class	Description	Location	Area (m <sup>2</sup> )	Proportion of pipeline corridor Area (%)
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)				
1	<b>Extremely high capability land:</b> Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.	NA	-	0
2	<b>Very high capability land:</b> Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.	Saltwater Creek, Macquarie River, Queen Charlottes (Vale) Creek at Orton Park	4.46	3.52
3	<b>High capability land:</b> Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.	Brewongle, Tarana Road, O'Connell Road, near Gormans Hills Road at Orton Park	19.89	15.71
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)				
4	<b>Moderate capability land:</b> Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.	Angus Place, SCSO, Pipers Flat Creek, area of Forestry Commission land west of Kirkconnell Correctional Centre, west of PS 4/5, west of Fitzgeralds Mount to the mine site	14.27	11.27
5	<b>Moderate-low capability land:</b> Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.	Angus Place, Pipers Flat, Forestry Commission land, Great Western Highway area, east of Brewongle, east of Macquarie River, Gormans Hills Road, Montavella Road, west of Vale Road (PS 4/5), from Hen and Chicken Lane to Fitzgeralds Mount	73.22	57.84
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)				
6	<b>Low capability land:</b> Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation	South of Great Western Highway, west of PS 4/5	4.96	3.92
Land generally incapable of agricultural land use (selective forestry and nature conservation)				

LSC class	Description	Location	Area (m <sup>2</sup> )	Proportion of pipeline corridor Area (%)
7	<b>Very low capability land:</b> Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.	Fitzgeralds Mount/Bathampton	1.42	1.12
8	<b>Extremely low capability land:</b> Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.	Coxs River, south of MPPS	1.54	1.22
Not Assessed			6.83	5.40
			126.59	100.00



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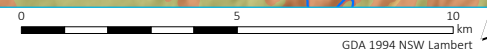


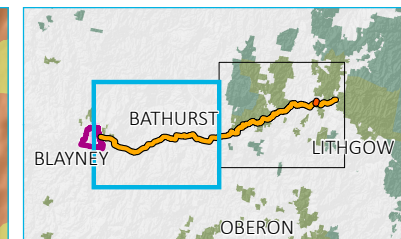
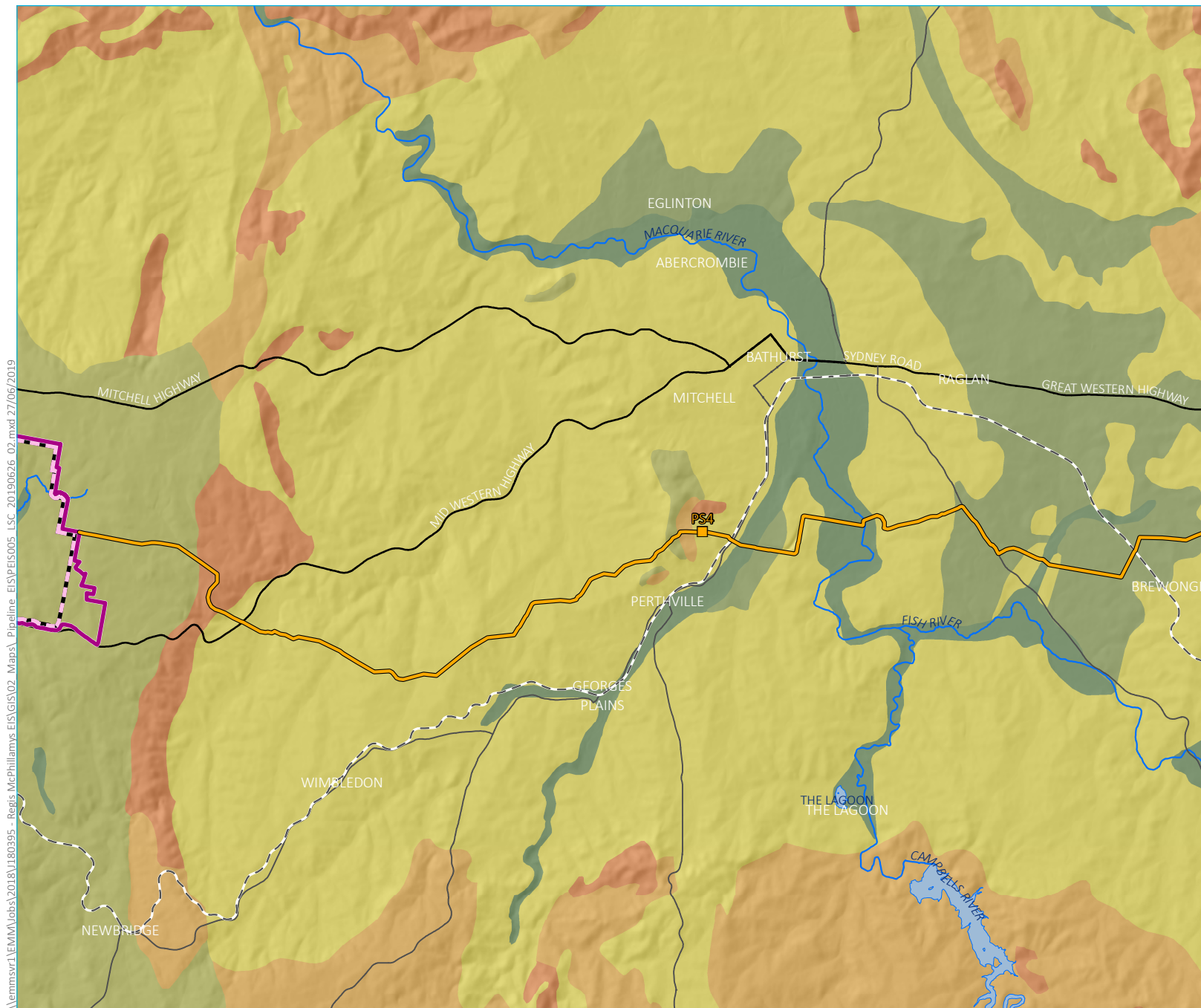
- KEY**
- Mine development project area (2,513.47 ha)
  - Mining lease application area (1,812.99 ha)  
(Note: boundary offset for clarity)
  - Pressure reducing system
  - Pumping station facility
  - Pipeline corridor
  - Pipeline corridor (Blowdown Pond)
  - Existing environment
    - Rail line
    - Primary road
    - Arterial road
    - River
    - Waterbody
    - NPWS reserve (refer to inset)
    - State forest (refer to inset)
  - Land and soil capability class
    - 2
    - 4
    - 5
    - 6
    - 7
    - 8
    - Disturbed Terrain

Land and soil capability classes

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Environmental impact statement  
Figure W.2a

Source: EMM (2019); Regis Resources (2019); DFSI (2017); DRE (2017); GA (2011)





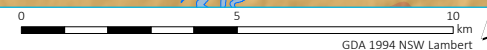
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- Existing environment
  - Rail line
  - Primary road
  - Arterial road
  - River
  - Waterbody
  - NPWS reserve (refer to inset)
  - State forest (refer to inset)
- Land and soil capability class
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7

Land and soil capability classes

McPhillamys Gold Project  
Environmental impact statement  
Figure W.2b

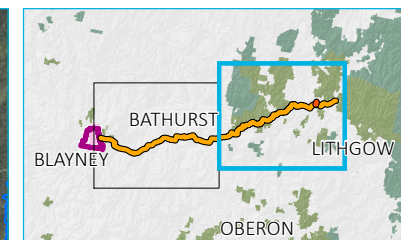
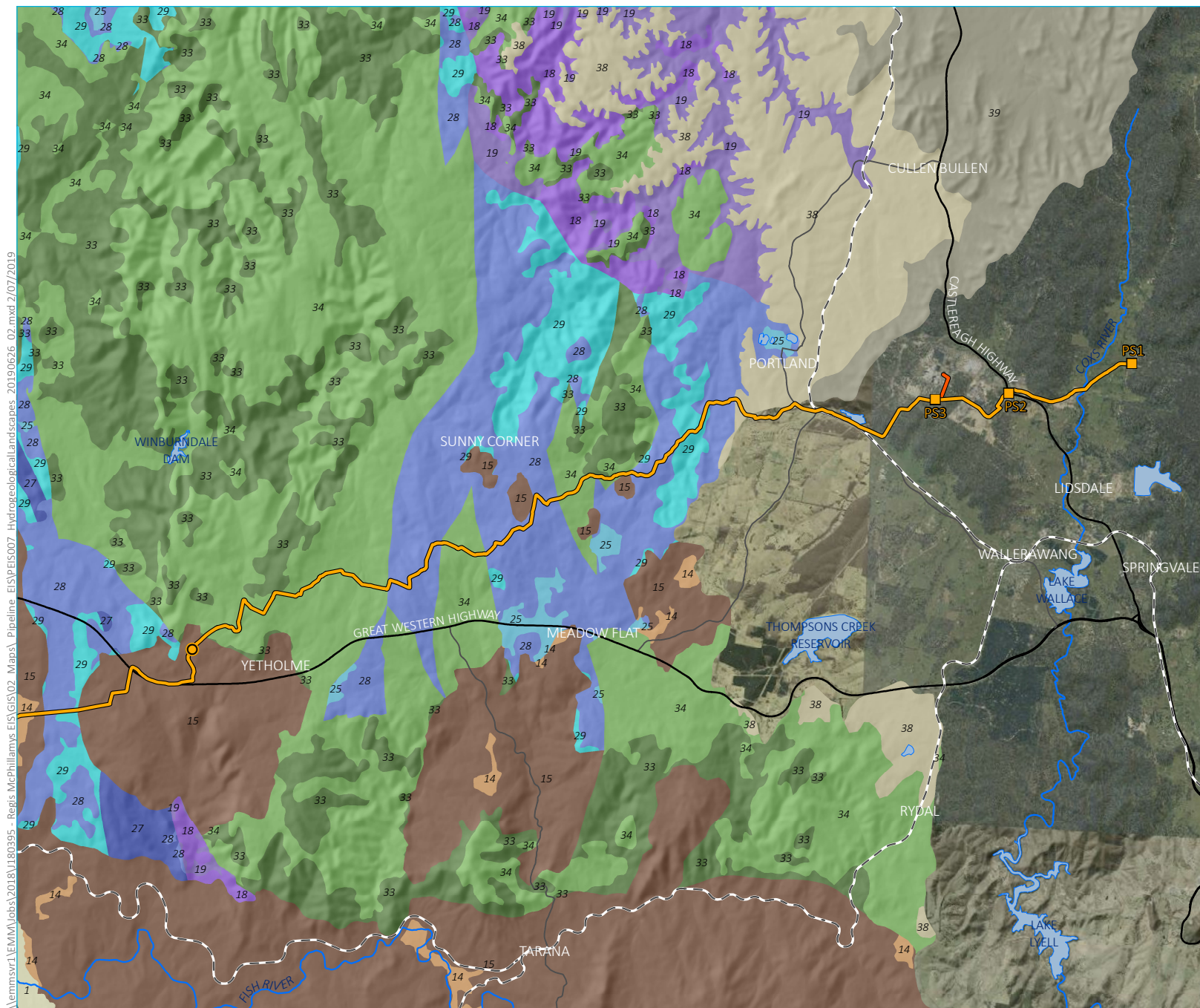
Source: EMM (2019); Regis Resources (2019); DFSI (2017); DRE (2017); GA (2011)



#### 4 Soil Salinity (EIS Section 23.2.4)

A summary of the data sheets relating to each hydrogeological landscape is set out in Table W.6. The hydrogeological landscapes indicative of land salinity are mapped in Figures W.3a and W.3b.



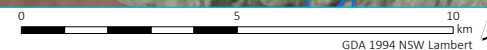


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    - Primary road
    - Arterial road
    - River
    - Waterbody
    - NPWS reserve (refer to inset)
    - State forest (refer to inset)
  - Hydrogeological landscape
    - 1 - Macquarie Alluvial Sediments
    - 14 - Glanmire
    - 15 - Dunkeld
    - 18 - Adaminaby (Sofala)
    - 19 - Adaminaby (Oberon)
    - 25 - Cumnock
    - 27 - Mullions Range
    - 28 - Goolma
    - 29 - Biranganbil
    - 33 - Euchareena
    - 34 - Stuart Town
    - 38 - Dunedoo
    - 39 - Rylstone – Sydney Basin Sediments

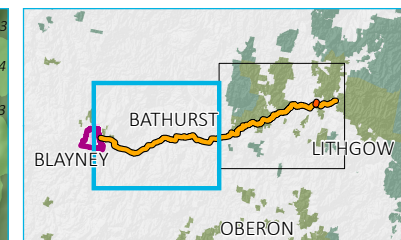
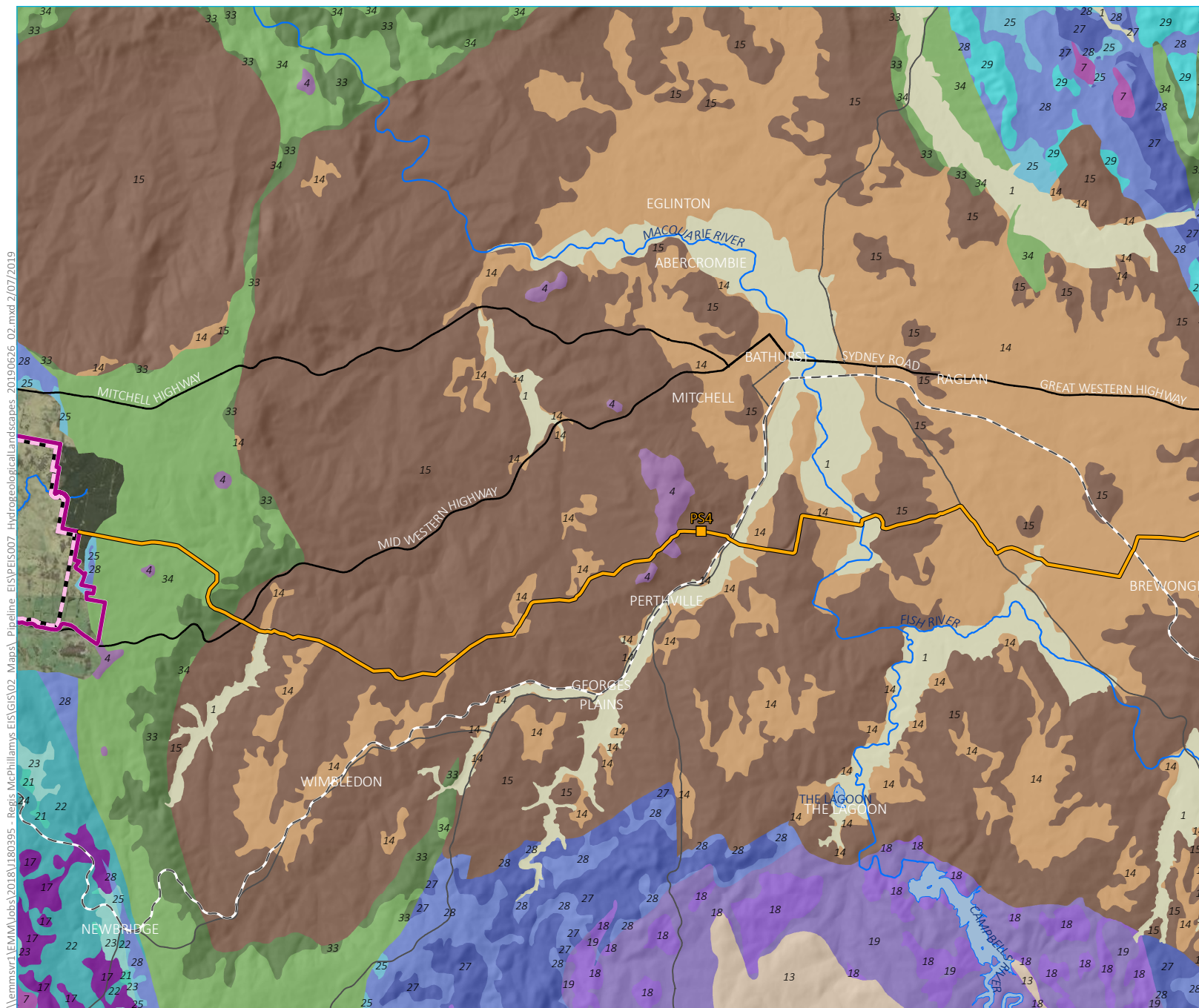
## Hydrogeological landscapes

McPhillamys Gold Project  
Environmental impact statement  
Figure W.3a

Source: EMM (2019); Regis Resources (2019); DFSI (2017); eSpade (2019); GA (2011)







- KEY**
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  - Pipeline corridor
  - Pipeline corridor (Blowdown Pond)
  - Existing environment**
    - Rail line
    - Primary road
    - Arterial road
    - River
    - Waterbody
    - NPWS reserve (refer to inset)
    - State forest (refer to inset)
  - Hydrogeological landscape**
    - 1 - Macquarie Alluvial Sediments
    - 4 - Dubbo Basalt (East)
    - 7 - Turtle
    - 13 - Obley
    - 14 - Glanmire
    - 15 - Dunkeld
    - 17 - Kabadah
    - 18 - Adaminaby (Sofala)
    - 19 - Adaminaby (Oberon)
    - 21 - Bodangora
    - 22 - Boomey Lane
    - 23 - Belgravia
    - 24 - Burranah
    - 25 - Cumnock
    - 27 - Mullions Range
    - 28 - Goolma
    - 29 - Biranganbil
    - 33 - Euchareena
    - 34 - Stuart Town
    - 38 - Dunedoo

Hydrogeological landscapes

McPhillamys Gold Project  
Environmental impact statement  
Figure W.3b

Source: EMM (2019); Regis Resources (2019); DFSI (2017); eSpade (2019); GA (2011)

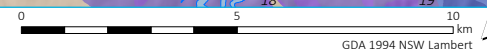


Table W.6 Land Salinity

Hydrogeological Landscape System	Area (ha)	Proportion of Pipeline Corridor (%)	Land salinity impacts	Salt export impacts	Water	Salt Store	Salt availability	Impact	Likelihood	Overall hazard	Source data reliability	Erodible
Angus Place HGL_LTH_2	0	0.00	Moderate	Low	EC Low	Low	High	Limited	Low	Very low	Medium	On steep slopes
Pipers Flat HGL_LTH_3	0	0.00	Moderate	Moderate	EC Low	Moderate	Moderate	Significant	Moderate	Moderate	Medium	Gully erosion
Dunedoo HGL_CW_38	0.93	0.73	High	High	Quality low	High	High	Severe	High	Very high	High	Topsoil moderate; Subsoil high; Erosion hazard high
Goolma HGL_CW_28	8.39	6.63	High	High	Quality low	High	High	Severe	High	Very high	High	Topsoil moderate; Subsoil high; Erosion hazard high
Biranganbil HGL_CW_29	1.29	1.02	Moderate	Moderate	Quality moderate	Moderate	Moderate	Significant	Moderate	Moderate	High	Topsoil high; Subsoil high; Erosion hazard high
Dunkeld HGL_CW_15	48.45	38.27	Low	Low	Quality high	Low	High	Limited	Low	Very low	High	Topsoil low; Subsoil moderate; Erosion hazard moderate
Stuart Town HGL_CW_34	11.72	9.26	Moderate	Moderate	Quality moderate	Moderate	High	Significant	High	High	Moderate	Topsoil moderate; subsoil high; Erosion hazard high



## 5 Biophysical Strategic Agricultural Land (EIS Section 23.2.5)

BSAL land within the pipeline corridor is illustrated in Figure W.4.

## 6 Contaminated soils (EIS Section 23.2.7)

### 6.1 Angus Place Colliery

Pumping station facility No.1 will be within lands associated with the Angus Place Colliery. In 2014 Centennial Coal lodged an EIS for the Angus Place Mine Extension Project (SSD 5602). The Director General's requirements for the EIS at the time required a detailed assessment of impacts to land contamination. The EIS indicates that Centennial Coal undertook a Phase 1 desktop assessment in December 2010 which indicated a low to moderate risk to human health and the environment. A phase 2 intrusive sampling and analysis programme was completed in February 2012, at which time Centennial Coal notified the former Department of Environment, Climate Change and Water (DECCW) – now OEH – of the contamination status of Angus Place Colliery. Notification was on the basis of visible evidence of limited soil contamination with potential for contamination in the fuel dispensing area adjacent to an above ground diesel storage tank and drum crushing area. These locations are not in the immediate vicinity of the pipeline corridor.

### 6.2 Mount Piper Extension Development Site

The pipeline corridor passes through land assessed as part of the Mt Piper Power Station Extension Concept Plan application, which involves construction of for a new baseload power station at 350 Boulder Road Portland. The project has been transitioned to state significant infrastructure. The extension application was approved in January 2010. Very little contamination investigation occurred as part of the concept approval.

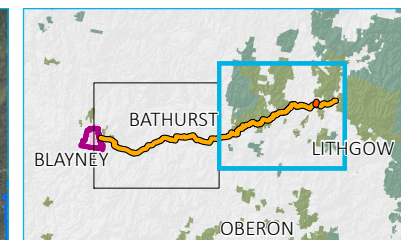
### 6.3 Western Coal Services Project

In April 2014 consent was granted by the Planning Assessment Commission to the application by Springvale Coal Pty Limited for the Western Coal Services Project SSD-5579. A phase 1 environmental site assessment (dated April 2013) was undertaken and lodged with the application. The assessment covered the that part of the pipeline corridor from pumping station facility No.2 on the Castlereagh Highway to the western boundary of MPPS.

Potential areas of concern were summarised and a qualitative risk assessment was conducted to quantify the risk at the phase 1 stage to human health and the environment. Table W.9 sets out the findings from that assessment which are relevant to the areas which the pipeline corridor intersects.



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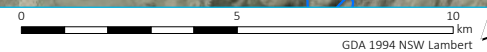


- KEY**
- Mine development project area (2,513.47 ha)
  - Mining lease application area (1,812.99 ha)  
(Note: boundary offset for clarity)
  - Pressure reducing system
  - Pumping station facility
  - Pipeline corridor
  - Pipeline corridor (Blowdown Pond)
  - Existing environment
    - Rail line
    - Primary road
    - Arterial road
    - River
    - Waterbody
    - NPWS reserve (refer to inset)
    - State forest (refer to inset)
    - Biophysical strategic agricultural land

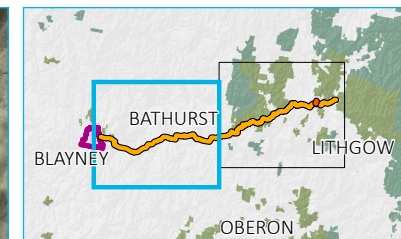
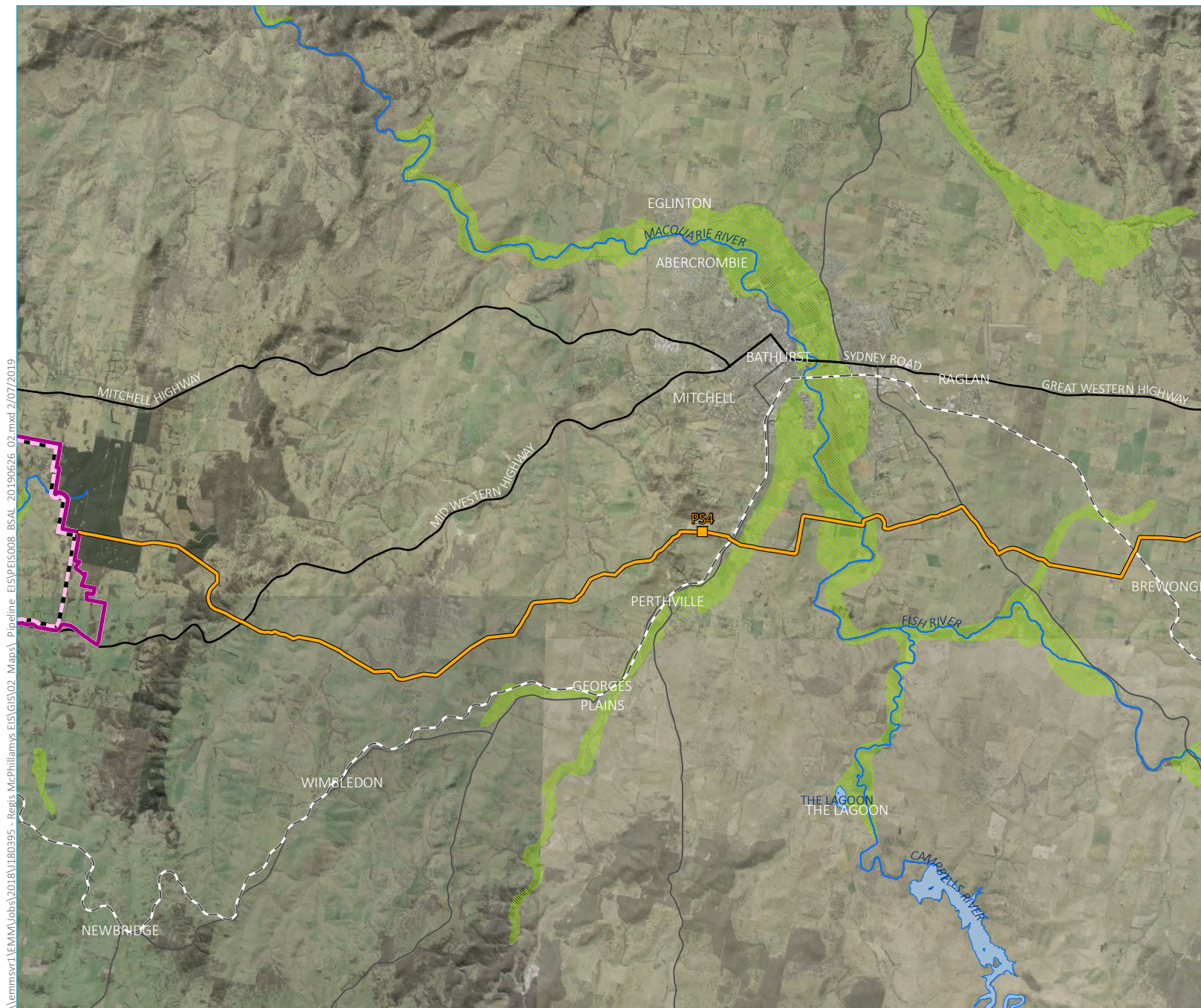
## Biophysical Strategic Agricultural Land (BSAL)

McPhillamys Gold Project  
Environmental impact statement  
Figure W.4a

Source: EMM (2019); Regis Resources (2019); DFSI (2017); OEH (2017); GA (2011)







- KEY**
- Mine development project area (2,513.47 ha)
  - Mining lease application area (1,812.99 ha)  
(Note: boundary offset for clarity)
  - Pumping station facility
  - Pipeline corridor
  - Pipeline corridor (Blowdown Pond)
  - Existing environment
  - Rail line
  - Primary road
  - Arterial road
  - River
  - Waterbody
  - NPWS reserve (refer to inset)
  - State forest (refer to inset)
  - Biophysical strategic agricultural land

## Biophysical Strategic Agricultural Land (BSAL)

McPhillamys Gold Project  
Environmental impact statement  
Figure W.4b

Source: EMM (2019); Regis Resources (2019); DFSI (2017); OEH (2017); GA (2011)

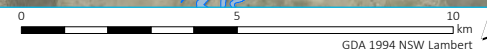


Table W.9 Phase 1 risk assessment for Western Coal Services Project by AECOM 2013

Activity	Washery, conveyors and transfer towers in the pit top area	LDP006 (PS2 area)	Former pit top area (near PS2)
Potentially contaminating activities	use of oils and grease in the transfer towers	Discharge waters entering WinCo Creek	<ul style="list-style-type: none"> <li>Storage and handling of petroleum hydrocarbons</li> <li>Former 5000 L underground storage tanks and workshop</li> <li>Potential former transformers</li> <li>Building materials of unknown origin</li> <li>Use and storage of oils and solvents</li> <li>Potential spills</li> <li>Storage and handling of diesel</li> </ul>
Observations/ anecdotal information	No observations of contamination	No observations of contamination. Water quality monitoring data indicated metals impact in discharge and creek waters.	No observations of contamination nor structures other than sediment and retention ponds. Polychlorinated biphenyls (PCBs) were formerly used. Underground storage tanks likely removed for construction of ponds. Former workshop areas likely mined and reinstated with overburden.
Potential contaminants of concern	TPH/BTEX, PAHs, heavy metals		TPH/BTEX, PAHs, heavy metals, VOCs, PCBs and explosives.
Summary of Risk	Very low risk	Moderate risk	Moderate risk

The phase 1 environmental site assessment concluded that past and current use of the site has resulted in potential soil, sediment and surface water contamination, and potentially groundwater impact in some areas of the site, however, no significant contamination was identified.

MOD1 Residuals Emplacement for the Western Coal Services Project SSD5579 was lodged in around November 2016. The EIS section 5.4.4 of the EIS noted that a Phase 2 environmental site assessment undertaken by AECOM in 2014 included drilling soil boreholes, collection and testing of sediment and the collection and testing of water samples from LDP006 and Wangcol Creek.

Based on the AECOM findings the EIS noted that the site was suitable for ongoing commercial / industrial land use. A targeted Phase 3 assessment and remediation would be required at mine closure and at particular sites. These areas are not associated with any areas occupied by the pipeline corridor.

## 6.4 Springvale water treatment plant

On 19 June 2017 the Planning Assessment Commission granted consent to the Springvale water treatment plant (SSD 7592). This project proposes to transfer mine water from the Springvale Coal Mine and Angus Place Coal Mine to the Mt Piper Power Station for use in its cooling towers.

GHD undertook a preliminary contamination investigation dated August 2016 which was included in the EIS for the application – *Springvale Coal Pty Ltd: Springvale Water Treatment Project Contamination Assessment* (GHD 2016). They reviewed previous contamination reports from ERM dated April 2013 and August 2014.

### i. ERM reports

The *NSW Treasury Mt Piper Power Station, Preliminary Environmental Site Assessment, Ref: 0194708RP03* (ERM 2013) report targeted specific identified sections within MPPS.

The *Delta Electricity, Project Symphony – Mt Piper, Stage 2 Environmental Site Assessment, Ref 0207423RP01* (ERM 2014) report was a stage 2 environmental site assessment, the main conclusions from which were that there were no impacts identified in soil, sediment and groundwater that represent a risk to human health and/or the environment based on continued use of the area as a power station. The area assessed by ERM



covering the WTP area was called ML – non-operational areas and stated that the area proposed for the WTP had been extensively mined and partly or fully backfilled within mine overburden. One groundwater well in the WTP area (ML-MW05) was drilled and installed and the results showed:

- no asbestos was detected; and
- TRH, BTEX, PAHs, metals, phenols, VOCs, and PCBs were all below the nominated screening criteria.

## ii. GHD report

GHD undertook sampling including in two locations at the location of the proposed WTP which is very close to pumping station facility 3 at MPPS for the pipeline development.

GHD used published National Environment Protection Measure (NEPM) screening criteria which include health-based investigation levels (HILs) and health screening levels (HSLs). They provide for a range of different exposure settings, which are based on the nature of the use(s) for which the land is currently used and/or its approved use(s). The site is currently zoned for energy generation in an SP2 infrastructure zoning. Therefore, GHD based their assessment on exposure setting D (commercial/industrial) (referred to as HIL D or HSL D in the following paragraph). Soil samples have a laboratory practical quantification limit (PQL) which is the minimum concentration of a substance which can be measured with a high degree of confidence.

A summary of GHD's soil testing results indicates:

- Heavy metals: most samples reported concentrations; however all were below the applicable guidelines for risk to human health.
- TRH and BTEX: all samples were below the PQL for BTEX. Some TRH concentrations were above the PQL; however none exceeded the applicable guidelines for HSL D.
- PAHs: all samples reported concentrations less than the applicable HIL-D and HSL D guideline criteria.
- OCP/OPP/PCB, VOCs, phenols: all samples reported concentrations less than the laboratory PQL.
- Asbestos: eight near surface fill material samples were submitted for analysis however no detectable asbestos fragments or fibres were detected in the soil.

The two samples in the WTP area fell below the applicable criteria for general solid waste and any fill material if required to be removed from site from areas near those pits should be disposed of to a waste facility licensed to accept general solid waste. Further sampling would be required if material is to be removed off site.

GHD considered that based on the site investigation data there is limited risk to human health during construction of the WTP. Notwithstanding, site safety or environmental management plans for the construction works should include an unexpected finds protocol.