

Appendix I

Results of the Protected Matters Search



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 28/07/21 11:12:37

[Summary](#)

[Details](#)

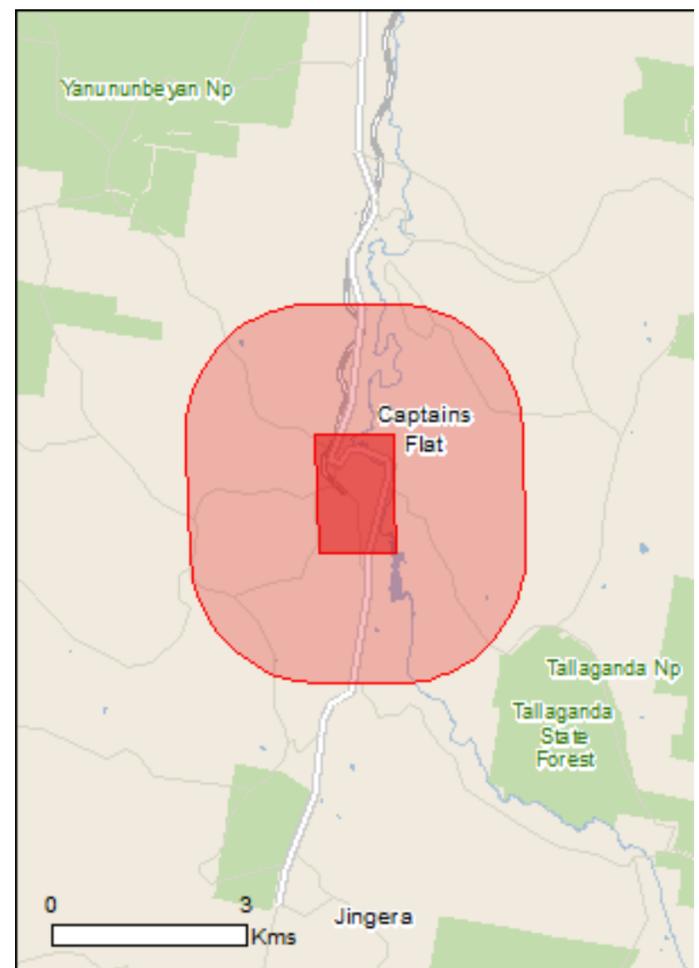
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

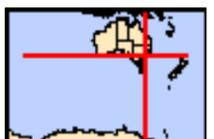
[Acknowledgements](#)



This map may contain data which are
©Commonwealth of Australia
(Geoscience Australia), ©PSMA 2015

[Coordinates](#)

[Buffer: 2.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	33
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	27
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	800 - 900km upstream
Hattah-kulkyne lakes	600 - 700km upstream
Riverland	700 - 800km upstream
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream

Listed Threatened Ecological Communities

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence area
Fish		
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	Critically Endangered	Species or species habitat likely to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat may occur within area
Calotis glandulosa Mauve Burr-daisy [7842]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus aggregata Black Gum [20890]	Vulnerable	Species or species habitat likely to occur within area
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species

Name	Status	Type of Presence
Pomaderris pallida Pale Pomaderris [13684]	Vulnerable	habitat likely to occur within area Species or species habitat likely to occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat known to occur within area
Senecio macrocarpus Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat may occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		habitat may occur within area Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur

Name	Threatened	Type of Presence within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Regional Forest Agreements [\[Resource Information \]](#)

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
<p>Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Genista sp. X Genista monspessulana Broom [67538]</p>		<p>Species or species habitat may occur within area</p>
<p>Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]</p>		<p>Species or species habitat may occur within area</p>
<p>Rubus fruticosus aggregate Blackberry, European Blackberry [68406]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]</p>		<p>Species or species habitat likely to occur within area</p>
<p>Ulex europaeus Gorse, Furze [7693]</p>		<p>Species or species habitat likely to occur within area</p>

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.584973 149.435557,-35.584938 149.446372,-35.598373 149.446758,-35.598234 149.436244,-35.584973 149.4356,-35.584973 149.435557

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

© Commonwealth of Australia

Department of Agriculture Water and the Environment

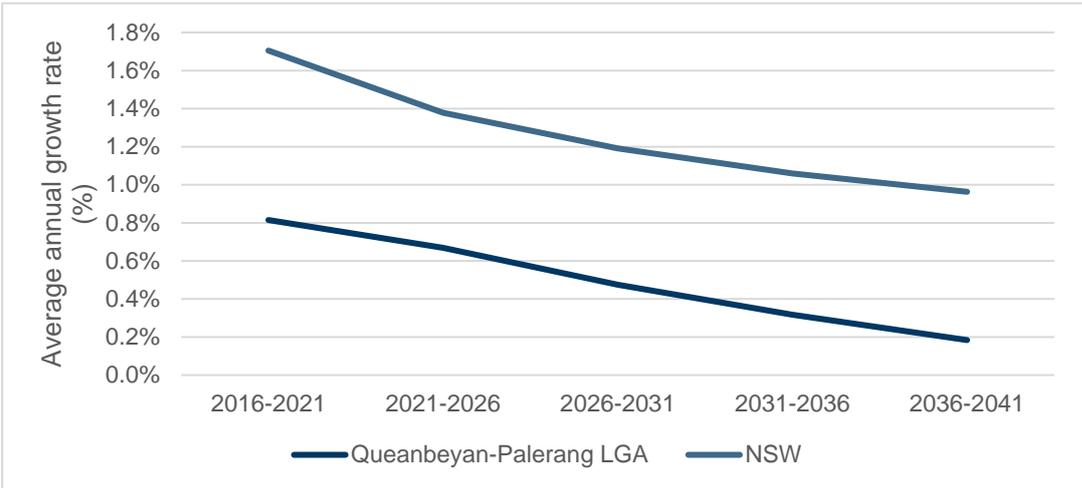
GPO Box 858

Canberra City ACT 2601 Australia

+61 2 6274 1111

Appendix J

Social baseline

Key indicator	Description															
Demographic profile																
Population	At the time of the 2016 Census, Captains Flat had a population of 610 people, decreasing by 17.9% since 2011, this decrease is due to the change of statistical areas between the 2011 and 2016 Census periods. The population of Queanbeyan-Palerang LGA was 56,027 people in 2016, representing a 7.0% growth from 2011.															
Indigenous population	<p>Table J.1 provides a profile of the Indigenous population within the social locality. Captains Flat had a higher proportion of Indigenous people at 3.6%, compared to Queanbeyan-Palerang LGA at 3.1%.</p> <p><i>Table J.1 Indigenous population, 2016</i></p> <table border="1"> <thead> <tr> <th>Statistical area</th> <th>Total number</th> <th>Proportion of the population</th> </tr> </thead> <tbody> <tr> <td>Captains Flat</td> <td>22</td> <td>3.6%</td> </tr> <tr> <td>Queanbeyan-Palerang LGA</td> <td>1,722</td> <td>3.1%</td> </tr> <tr> <td>Capital Region</td> <td>7,875</td> <td>3.6%</td> </tr> <tr> <td>NSW</td> <td>216,176</td> <td>2.9%</td> </tr> </tbody> </table> <p>Source: Australian Bureau of Statistics (ABS) (2016). Census of Population and Housing (Catalogue number 2001.0)</p>	Statistical area	Total number	Proportion of the population	Captains Flat	22	3.6%	Queanbeyan-Palerang LGA	1,722	3.1%	Capital Region	7,875	3.6%	NSW	216,176	2.9%
Statistical area	Total number	Proportion of the population														
Captains Flat	22	3.6%														
Queanbeyan-Palerang LGA	1,722	3.1%														
Capital Region	7,875	3.6%														
NSW	216,176	2.9%														
Population projections	<p>Figure J.1 outlines the projected average annual population growth rate from 2016 to 2041 at the LGA level for Queanbeyan-Palerang LGA, compared to NSW.</p> <p>Queanbeyan-Palerang LGA is expected to grow to 65,329 people in 2041, at an annual average growth rate of 0.5%, amounting to an overall population increase of 13.0%.</p>  <p>Source: DPIE. (2019). Population Projections. <i>Figure J.1 Population projections, 2016</i></p>															
Age profile	<p>Captains Flat had a median age of 38 years, consistent with the median age of Queanbeyan-Palerang LGA of 38 and younger than the median age for Capital Region at 44.</p> <p>Captains Flat had a higher proportion of younger age groups with 0-11 year old's comprising 18.2% of the population compared to Capital Region (14.1%), this is consistent with Queanbeyan-Palerang LGA.</p> <p>Captains Flat had a lower proportion of residents over the age of 65 (10.8%) compared to Queanbeyan-Palerang LGA (12.2%) and Capital Region (20.6%).</p>															
Sex profile	<p>The social locality has the following sex profile:</p> <p>Captains Flat had a higher proportion of males, 53.4%, compared to females, 45.9%, resulting in a sex ratio of 1.2.</p> <p>Queanbeyan-Palerang LGA had a relatively balanced sex profile with males comprising 50.2% and females comprising 49.8% of the population, resulting in a sex ratio of 1.0.</p> <p>Capital Region had a relatively balanced sex profile with males comprising 49.9% and females comprising 50.1% of the population, resulting in a sex ratio of 1.0.</p>															

Key indicator	Description																									
Cultural diversity	<p>Table J.2 provides a profile of the country of birth within the social locality. In 2016, Captains Flat had a high proportion of people born in Australia at 77.4%, which is consistent with Queanbeyan-Palerang LGA at 75.0%. The proportion of the population born in Non-English speaking countries was 4.6% in Captains Flat, compared to 11.0% for Queanbeyan-Palerang LGA.</p> <p><i>Table J.2 Cultural diversity, 2016</i></p> <table border="1"> <thead> <tr> <th></th> <th>Captains Flat</th> <th>Queanbeyan Palerang LGA</th> <th>Capital Region</th> <th>NSW</th> </tr> </thead> <tbody> <tr> <td>Persons born in Australia</td> <td>77.4%</td> <td>75.0%</td> <td>79.1%</td> <td>65.5%</td> </tr> <tr> <td>Persons born in English Speaking countries</td> <td>8.0%</td> <td>6.2%</td> <td>6.1%</td> <td>5.8%</td> </tr> <tr> <td>Persons born in Non-English speaking countries</td> <td>4.6%</td> <td>11.0%</td> <td>6.4%</td> <td>21.9%</td> </tr> <tr> <td>Country of birth not stated</td> <td>10.0%</td> <td>7.8%</td> <td>8.4%</td> <td>6.8%</td> </tr> </tbody> </table> <p>Source: Australian Bureau of Statistics (ABS). (2016). Census of Population and Housing (Catalogue number 2001.0)</p>		Captains Flat	Queanbeyan Palerang LGA	Capital Region	NSW	Persons born in Australia	77.4%	75.0%	79.1%	65.5%	Persons born in English Speaking countries	8.0%	6.2%	6.1%	5.8%	Persons born in Non-English speaking countries	4.6%	11.0%	6.4%	21.9%	Country of birth not stated	10.0%	7.8%	8.4%	6.8%
	Captains Flat	Queanbeyan Palerang LGA	Capital Region	NSW																						
Persons born in Australia	77.4%	75.0%	79.1%	65.5%																						
Persons born in English Speaking countries	8.0%	6.2%	6.1%	5.8%																						
Persons born in Non-English speaking countries	4.6%	11.0%	6.4%	21.9%																						
Country of birth not stated	10.0%	7.8%	8.4%	6.8%																						
Family composition	<p>Captains Flat had a lower proportion of couple families with children (41.8%), compared to Queanbeyan-Palerang LGA (48.2%), and a higher proportion of families without children (41.2%) compared to Queanbeyan-Palerang LGA (36.8%).</p>																									
Economic profile																										
Labour force	<p>Table J.3 shows labour force and employment statistics for the social locality as at the 2016 Census. As detailed, the proportion of the population employed (93.2%) in Captains Flat was lower than that of Queanbeyan-Palerang LGA (96.0%). The proportion of unemployed persons (6.5%) in Captains Flat were higher with that of Queanbeyan-Palerang LGA (4.0%). It should be noted that Captains Flat had a higher proportion of the population who did not state their employment status (9.4%) compared to Queanbeyan-Palerang LGA (7.3%).</p> <p>Captains Flat had a low labour force participation of 64.4%, compared to Queanbeyan-Palerang LGA (68.0%).</p> <p><i>Table J.3 Labour force, 2016</i></p> <table border="1"> <thead> <tr> <th></th> <th>Captains Flat</th> <th>Capital Region</th> <th>Queanbeyan Palerang LGA</th> <th>NSW</th> </tr> </thead> <tbody> <tr> <td>Total employed</td> <td>93.2%</td> <td>95.1%</td> <td>96.0%</td> <td>93.7%</td> </tr> <tr> <td>Unemployed</td> <td>6.5%</td> <td>4.9%</td> <td>4.0%</td> <td>6.3%</td> </tr> <tr> <td>Labour force status not stated</td> <td>9.4%</td> <td>7.8%</td> <td>7.3%</td> <td>6.6%</td> </tr> <tr> <td>Labour force participation</td> <td>64.4%</td> <td>56.8%</td> <td>68.0%</td> <td>59.2%</td> </tr> </tbody> </table> <p>Source: Australian Bureau of Statistics (ABS). (2016). Census of Population and Housing (Catalogue number 2001.0)</p>		Captains Flat	Capital Region	Queanbeyan Palerang LGA	NSW	Total employed	93.2%	95.1%	96.0%	93.7%	Unemployed	6.5%	4.9%	4.0%	6.3%	Labour force status not stated	9.4%	7.8%	7.3%	6.6%	Labour force participation	64.4%	56.8%	68.0%	59.2%
	Captains Flat	Capital Region	Queanbeyan Palerang LGA	NSW																						
Total employed	93.2%	95.1%	96.0%	93.7%																						
Unemployed	6.5%	4.9%	4.0%	6.3%																						
Labour force status not stated	9.4%	7.8%	7.3%	6.6%																						
Labour force participation	64.4%	56.8%	68.0%	59.2%																						
Unemployment rate	<p>Figure J.2 shows the quarterly unemployment rate for Queanbeyan-Palerang LGA level compared to Capital Region SA4 and NSW. Generally, in the last 10 years, the unemployment rate in Queanbeyan-Palerang LGA has been below that of the State. However, there are a number of years where unemployment rose above that of the State, including between 2017 and 2018.</p>																									

Key indicator	Description																																																							
	<p>Source: Department of Education, Skills and Employment. (2021). Small Area Labour Markets publication</p> <p>Figure J.2 Unemployment rate, 2010-2021</p>																																																							
Industry of employment	<p>Within the social locality, the predominant industry of employment was public administration and safety, representing 22.0% of the workforce in Captains Flat, consistent with the broader Queanbeyan-Palerang LGA (14.1%) and Capital Region (25.4%). Construction is also a significant industry in the area, comprising 15.5% of the labour force, higher than the broader Queanbeyan-Palerang LGA (9.4%) and Capital Region (10.1%).</p> <table border="1"> <thead> <tr> <th>Industry</th> <th>Captains Flat</th> <th>Queanbeyan-Palerang LGA</th> <th>Capital Region</th> <th>NSW</th> </tr> </thead> <tbody> <tr> <td>Agriculture, Forestry and Fishing</td> <td>3.8%</td> <td>6.5%</td> <td>1.7%</td> <td>2.1%</td> </tr> <tr> <td>Manufacturing</td> <td>4.8%</td> <td>4.4%</td> <td>3.6%</td> <td>5.8%</td> </tr> <tr> <td>Construction</td> <td>15.5%</td> <td>9.4%</td> <td>10.1%</td> <td>8.4%</td> </tr> <tr> <td>Retail Trade</td> <td>7.2%</td> <td>9.8%</td> <td>8.1%</td> <td>9.7%</td> </tr> <tr> <td>Accommodation and Food Services</td> <td>5.5%</td> <td>8.1%</td> <td>5.3%</td> <td>7.1%</td> </tr> <tr> <td>Transport, Postal and Warehousing</td> <td>3.8%</td> <td>3.6%</td> <td>3.4%</td> <td>4.7%</td> </tr> <tr> <td>Professional, Scientific and Technical Services</td> <td>3.8%</td> <td>5.1%</td> <td>6.7%</td> <td>8.1%</td> </tr> <tr> <td>Public Administration and Safety</td> <td>22.0%</td> <td>14.1%</td> <td>25.4%</td> <td>6.0%</td> </tr> <tr> <td>Education and Training</td> <td>7.6%</td> <td>7.5%</td> <td>7.2%</td> <td>8.4%</td> </tr> <tr> <td>Health Care and Social Assistance</td> <td>7.6%</td> <td>11.6%</td> <td>9.6%</td> <td>12.5%</td> </tr> </tbody> </table> <p>Source: Australian Bureau of Statistics (ABS). (2016). Census of Population and Housing (Catalogue number 2001.0)</p> <p>Figure J.3 Industry of employment, 2016</p>	Industry	Captains Flat	Queanbeyan-Palerang LGA	Capital Region	NSW	Agriculture, Forestry and Fishing	3.8%	6.5%	1.7%	2.1%	Manufacturing	4.8%	4.4%	3.6%	5.8%	Construction	15.5%	9.4%	10.1%	8.4%	Retail Trade	7.2%	9.8%	8.1%	9.7%	Accommodation and Food Services	5.5%	8.1%	5.3%	7.1%	Transport, Postal and Warehousing	3.8%	3.6%	3.4%	4.7%	Professional, Scientific and Technical Services	3.8%	5.1%	6.7%	8.1%	Public Administration and Safety	22.0%	14.1%	25.4%	6.0%	Education and Training	7.6%	7.5%	7.2%	8.4%	Health Care and Social Assistance	7.6%	11.6%	9.6%	12.5%
Industry	Captains Flat	Queanbeyan-Palerang LGA	Capital Region	NSW																																																				
Agriculture, Forestry and Fishing	3.8%	6.5%	1.7%	2.1%																																																				
Manufacturing	4.8%	4.4%	3.6%	5.8%																																																				
Construction	15.5%	9.4%	10.1%	8.4%																																																				
Retail Trade	7.2%	9.8%	8.1%	9.7%																																																				
Accommodation and Food Services	5.5%	8.1%	5.3%	7.1%																																																				
Transport, Postal and Warehousing	3.8%	3.6%	3.4%	4.7%																																																				
Professional, Scientific and Technical Services	3.8%	5.1%	6.7%	8.1%																																																				
Public Administration and Safety	22.0%	14.1%	25.4%	6.0%																																																				
Education and Training	7.6%	7.5%	7.2%	8.4%																																																				
Health Care and Social Assistance	7.6%	11.6%	9.6%	12.5%																																																				
Income	<p>In 2016, the median weekly individual income in Captains Flat was \$827. This was slightly lower in comparison to the broader Queanbeyan-Palerang LGA which had a median weekly individual income of \$933.</p> <p>Captains Flat had a median weekly household income of \$1,388, slightly lower than that of Queanbeyan-Palerang LGA at \$1,882.</p>																																																							
Housing profile																																																								
Dwellings	<p>There is little variety in housing choice within Captains Flat, with separate houses representing 94.9% of private dwellings, compared to 73.2% in Queanbeyan-Palerang LGA. This is representative of the low density nature of the locality. The broader Queanbeyan-Palerang LGA has a higher variety of dwelling types with 14.9% of private dwellings being classified as semi-detached and 11.9% unit/apartments.</p>																																																							
Community vulnerability profile																																																								
Socio-economic disadvantage	<p>The ABS produces four socio-economic indices for areas (SEIFA) based on Census data, which identify areas of relative advantage and disadvantage. The Index of Relative Socio-Economic Advantage/Disadvantage (IRSAD) was examined for the social locality.</p> <p>The IRSAD divides a population into ten equal groups, called a decile. The lowest scoring 10% of these groups are given a decile number of 1, which indicates the highest level of disadvantage, and the highest scoring 10% of areas are given a decile of 10, which indicates the highest level of advantage.</p>																																																							

Key indicator	Description
	<p>Within the social locality, the statistical areas are ranked within the state as follows: Captains Flat had moderate disadvantage and was placed within decile 4. Queanbeyan-Palerang LGA had low disadvantage and was placed within decile 9.</p>
Need for assistance	<p>In 2016, the proportion of the population in Captains Flat who required assistance was 3.4%, compared to 5.9% in Queanbeyan-Palerang LGA and 5.5% in Capital Region. This variable measures the proportion of the population with a profound or severe disability and who need assistance in their day to day lives (ABS, 2016).</p>
Mobility	<p>In 2016, 79.6% of the population in Captains Flat lived at same address one year ago. This is higher than the broader Queanbeyan-Palerang LGA and Capital Region where 76.6% and 77.5% of the population lived at same address one year ago. 56.8% of the population in Captains Flat lived at the same address five years ago. This is higher the broader Queanbeyan-Palerang LGA at 53.1%.</p>

Appendix K

Results of AHIMS searches



Alistair Grinbergs

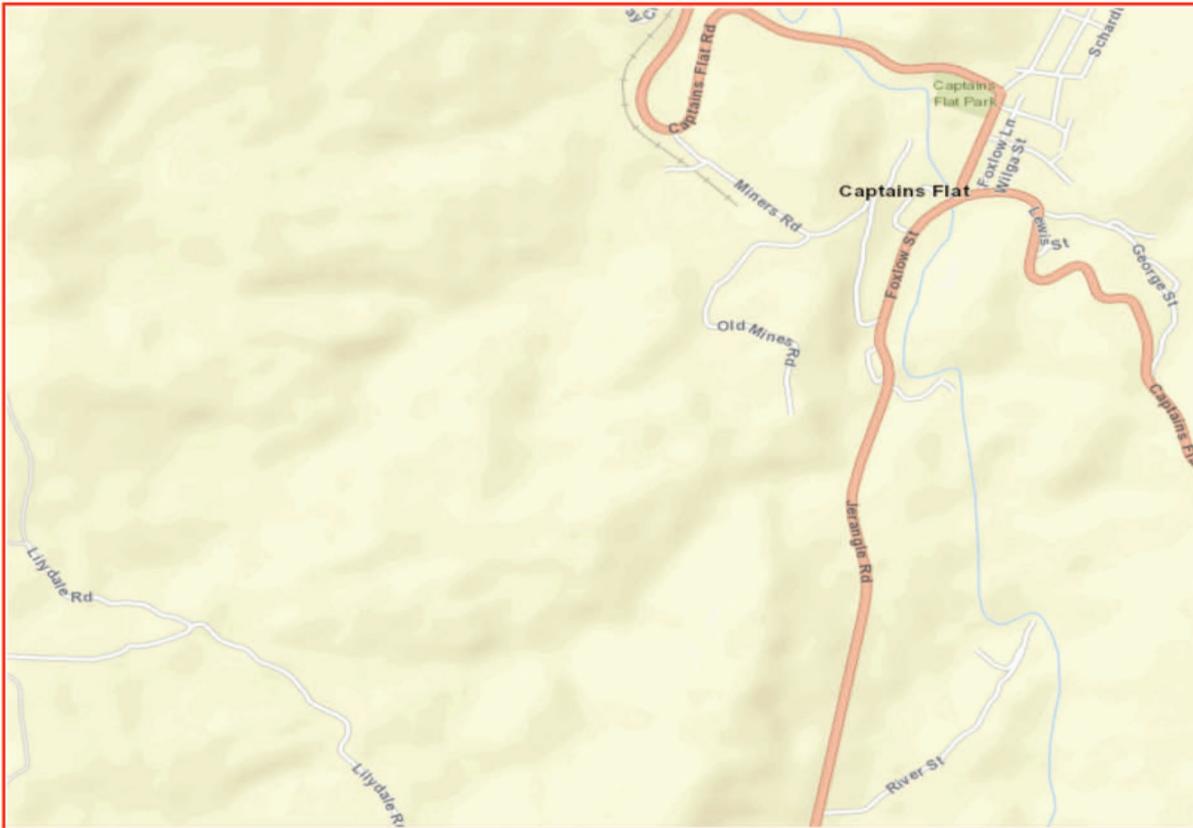
Date: 01 August 2021

6 Caffyn Place
Garran Australian Capital Territory 2605
Attention: Alistair Grinbergs
Email: alistair.grinbergs@gmail.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -35.61, 149.42 - Lat, Long To : -35.59, 149.45, conducted by Alistair Grinbergs on 01 August 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Appendix L

Aboriginal heritage impact assessment



Aboriginal Heritage Impact Assessment

PREPARED FOR THE LAKE GEORGE MINE REMEDIATION
REVIEW OF ENVIRONMENTAL FACTORS

GHD

MARCH 2022

Table of Contents

1	The proposed activity	4
2	Legislative framework for due diligence.....	7
3	Purpose and aims of the due diligence assessment.....	7
4	Landscape context	7
5	Previously recorded Aboriginal heritage sites.....	8
6	Previous Aboriginal heritage Assessments	8
6.1	Regional archaeological context	8
6.2	Archaeological investigations of the immediate and surrounding area.....	9
6.3	Archaeological sensitivity predictive model.....	9
7	Site assessment	10
7.1	Assessment methods	10
7.2	Assessment results	11
8	Due diligence assessment process.....	11
9	Conclusion	12
10	Recommendations	12
	References	13
	Appendix A.....	14

Abbreviations

Abbreviation	Description
ACHA	Aboriginal Cultural Heritage Assessment
AHD	Australian Heritage Database
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BP	Before Present
DECCW	Department of Environment, Climate Change, and Water, New South Wales
EP&A	<i>Environmental Planning and Assessment Act 1979</i> , New South Wales
LMP	Legacy Mines Project
NPW Act	<i>National Parks and Wildlife Act 1974</i> , New South Wales
NSW DPI	New South Wales Department of Primary Industries
OEH	Office of Environment and Heritage, New South Wales
PAD	Potential Archaeological Deposit
SHI	State Heritage Inventory, New South Wales

Authorship

The report was prepared by GHD's heritage consultant, Alistair Grinbergs BA (Hons.). Grad. Dip. App. Science. Alistair is a qualified archaeologist with 28 years' experience in Aboriginal archaeology and cultural heritage management.

Scope and limitations

This report has been prepared by GHD for Department of Regional NSW and may only be used and relied on by Department of Regional NSW for the purpose agreed between GHD and Department of Regional NSW as set out in section 3 of this report.

GHD otherwise disclaims responsibility to any person other than Department of Regional NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report. The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Department of Regional NSW and others who provided information to GHD, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Executive summary

The Legacy Mines Program (LMP) within the Department of Regional NSW propose to undertake capping remediation works at the legacy Lake George Mine, located immediately to the west of the township of Captains Flat, New South Wales (NSW).

This Aboriginal heritage due diligence assessment has been prepared in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (Department of Environment, Climate Change, and Water 2010) and the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010). It includes:

- An assessment of the landscape where the proposed remediation activities are to take place;
- Searches of the Australian Heritage Database, State Heritage Inventory (New South Wales), and Aboriginal Heritage Information Management System registers;
- A review of the relevant archaeological context and prior archaeological investigations of the immediate study area and surrounding regions;
- An archaeological sensitivity predictive model, to indicate where Aboriginal heritage sites may be located in the study area; and
- Recommendations.

Aboriginal heritage sites and objects in New South Wales are afforded protection under the *National Parks and Wildlife Act 1974* (NPW Act), irrespective of whether they are registered on the Aboriginal Heritage Information Management System (AHIMS). As defined by the NPW Act, Aboriginal heritage sites and objects are:

- Any lands dedicated as an Aboriginal area under the NPW Act;
- Any deposit, object, or material evidence (not being a handcraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.

Strict penalties apply for engaging in activities that inflict harm to an Aboriginal heritage site or object without consent for activities under the NPW Act. Under Part 6 of the NPW Act, consent or authorisation for harmful activities may be given under an Aboriginal Heritage Impact Permit (AHIP).

No Aboriginal heritage sites are located within, or in proximity to, the area of proposed works. The past history of extensive disturbance associated with mining activity and previous subsequent mine rehabilitation works preclude the possibility of unrecorded Aboriginal heritage sites and objects being located within the proposed works area, either on the surface or in a subsurface context.

The following recommendation is made with respect to the proposed remediation works:

No Requirement for further Aboriginal Cultural Heritage Assessment

The proposed activities would take place within, and be confined to, a landscape that has already sustained significant disturbance. As a result, there is no potential for previously unidentified Aboriginal sites and/or objects to be present in the proposed activity area. No further archaeological investigation or assessment is therefore warranted.

1 The proposed activity

The LMP within the Department of Regional NSW propose to undertake capping remediation works at the legacy Lake George Mine, located immediately to the west of the township of Captains Flat, NSW.

The purpose of the proposed remediation works is to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent environmental and human health risks to people accessing the site, to residents on-site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.

The proposed remediation works include those described in the *Lake George Mine, Captains Flat Detailed Design Report* (GHD 2020). The proposed remediation works broadly include:

- Site preparatory early works
- Fencing historic mining structures
- Strategic structural works
- Remediation earthworks
- Augmentation of drainage
- Revegetation.

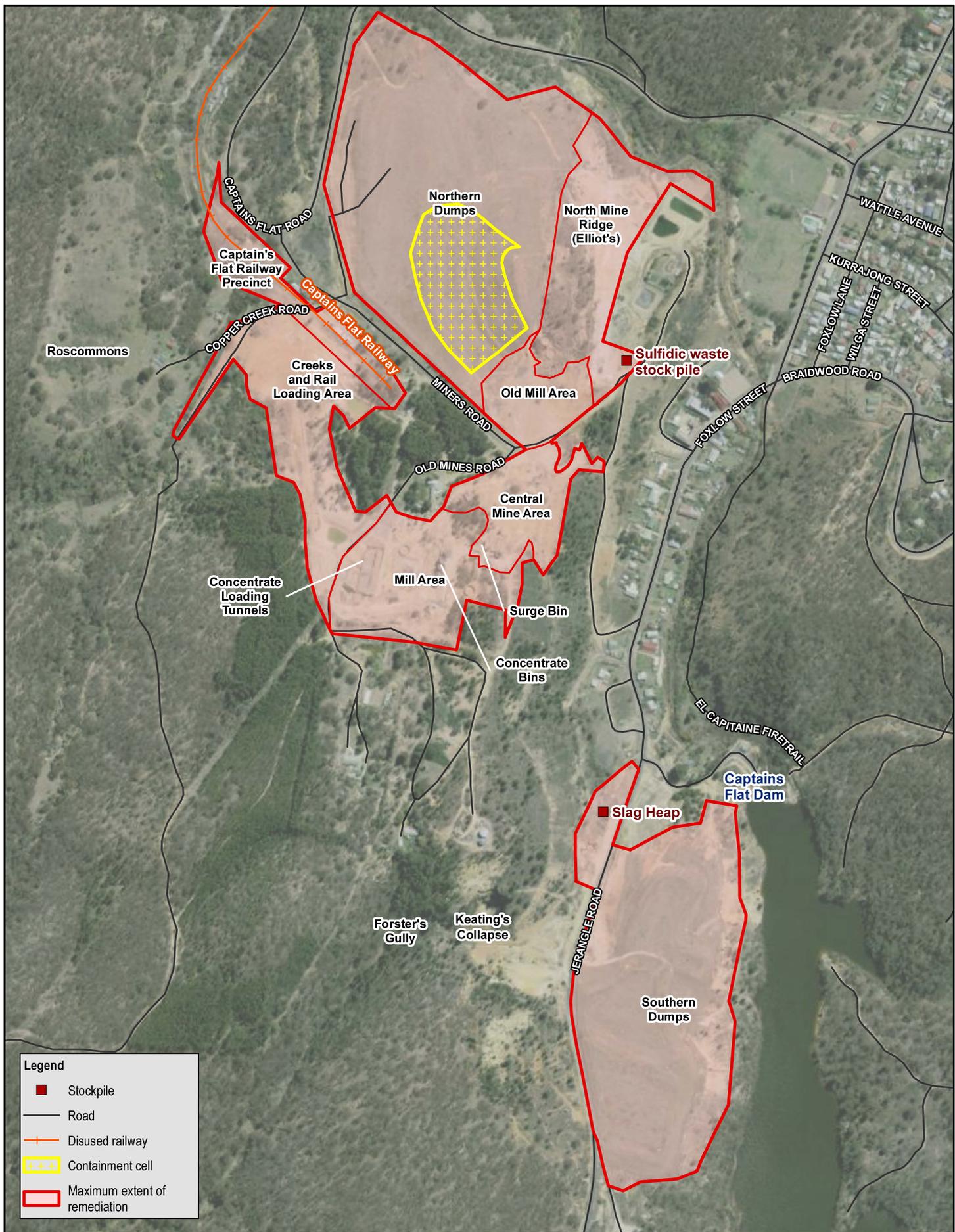
The proposed remediation works would be undertaken across several key domains, predominantly in the northern portion of Lake George Mine. These areas are:

- North Mine Ridge/Elliot's
- Old Mill
- Mill Area (west of the Central Mine Area)
- Central Mine Area
- Creeks Area
- Rail Loading Area
- Minor areas of eroded capping on the Northern and Southern Dumps.

In addition, several smaller stockpiles of mine waste are proposed to be relocated to the containment cell that would be located on the Northern Dumps. These include:

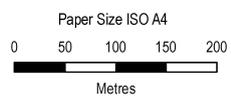
- A sulfidic waste stockpile located on the junction of Miners Road and the Council wastewater treatment plant access road.
- A slag heap located on the western side of Jerangle Road, adjacent to the northern end of the Southern Dumps.
- TfNSW lead contamination from within the Captains Flat Railway Precinct
- Crown Land / QPRC land within the Captains Flat township. i.e., The Captains Flat Lead Management Taskforce is currently undertaking an assessment of the Captains Flat township with the aim to prepare abatement plans for the higher risk public spaces. One option being investigated is moving up to 20,000 tonnes of contaminated soil from these Crown Land / QPRC-owned abatement areas into the containment cell on the Northern Dumps. These remediation works would be subject to a separate approval under the NSW *Planning and Assessment Act 1979*.

The areas listed above, and the approximate boundary of the proposed remediation works are shown on Figure 1.



Legend

- Stockpile
- Road
- +— Disused railway
- ▭ Containment cell
- ▭ Maximum extent of remediation



Department of Regional NSW
Lake George Mine Remediation

Project No. 12551771
Revision No. A
Date 23/03/2022

Key site domains and features including the maximum spatial extent of remediation

FIGURE 1

\\ghdnetg\hdi\AU\Sydney\Projects\2112551771\GIS\Maps\Deliverables\12551771_Z024_AH_SiteLayout.mxd
Print date: 23 Mar 2022 - 09:20
Whilst every care has been taken to prepare this map, GHD (and Nearmap) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.
Data source: General topography - Sixmaps via SSNSW © Department of Customer Service 2020. Created by: eibbertson

2 Legislative framework for due diligence

Aboriginal heritage sites and objects in New South Wales are afforded protection under the *National Parks and Wildlife Act 1974* (the NPW Act), irrespective of whether they are registered on the Aboriginal Heritage Information Management System (AHIMS). As defined by the NPW Act, Aboriginal heritage sites and objects are:

- Any lands dedicated as an Aboriginal area under the NPW Act;
- Any deposit, object, or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.

Strict penalties apply for engaging in activities that inflict harm to an Aboriginal heritage site or object without consent for activities under the NPW Act. Under Part 6 of the NPW Act, consent can be sought for activities that impact upon Aboriginal objects via an application for an Aboriginal Heritage Impact Permit (AHIP).

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010) provides a set of guidelines to aid land users in understanding how proposed activities could impact upon Aboriginal heritage places and values and provides heritage management practitioners with guidance on best practice baseline assessment of Aboriginal heritage sites.

3 Purpose and aims of the due diligence assessment

The purpose and aims of this Aboriginal heritage site due diligence assessment are to:

- Undertake a search of the AHIMS, Australian Heritage Database (AHD), and State Heritage Inventory (SHI) registers to establish if there are any previously recorded Aboriginal heritage sites or objects within the activity area;
- Undertake a desktop review of relevant previous archaeological assessments to understand the local archaeological context and assist in predicting the likely occurrence of unrecorded Aboriginal heritage sites or objects in the proposed activity area;
- Consider the geological and topographical characteristics and the history of past land use disturbance within the proposed activity area;
- Undertake an assessment of the proposed activity area to verify past land use disturbance and identify whether any previously undisturbed landforms are present and consider their archaeological potential; and
- Report on the above and provide advice on whether any further assessment is required.

4 Landscape context

The soil profile for the activity area is described as: hillslope under unknown on fill lithology and used for quarry / mining, imperfectly drained, with very high erosion hazard (Jenkins 1999).

More broadly beyond the activity area, the Captains Flat soil profile is described as comprising of: shallow, well-drained Lithosols on gossan rises and rise crests of interbedded siltstone, slate, and tuffs; moderately deep, moderately well-drained Podzolic soils on rise mid-slopes of interbedded siltstone, slate, and tuffs; and moderately deep, moderately well-drained Euchrozems on limestones (Jenkins 2000:146).

Elevation ranges from 840m through to 920m and the site has a broadly western to north-western aspect.

The native vegetation in the activity area has long been cleared. Pine species have been planted at some locations and there are a number of self-set eucalypts of various species. Outside the proposed activity area, the native vegetation is characterised by dry sclerophyll forest containing scribbly gum (*Eucalyptus rossii*), brittle gum (*Eucalyptus mannifera*), broad-leaved peppermint (*Eucalyptus dives*), apple box (*Eucalyptus bridgesiana*), silver wattle (*Acacia dealbata*), and red-stemmed wattle (*Acacia rubida*) (Jenkins 2000: 99, 146). Several grass species are also found on the Captains Flat soil profile, including snow grass (*Poa* spp.), kangaroo grass (*Themeda triandra*), wallaby grass (*Danthonia* spp.), sedge (*Carex* spp.), and rush (*Juncus* spp.) (Jenkins 2000: 99, 146).

5 Previously recorded Aboriginal heritage sites

A search of the NSW State Heritage Inventory undertaken on Tuesday 20th July 2021 did not identify any sites or places within or near the proposed activity area that were declared Aboriginal Places.

A search of the Australian Heritage Database undertaken on Tuesday 20th July 2021 did not identify any Aboriginal objects, sites or places within or near the proposed activity area that were included on the:

- National Heritage List;
- Commonwealth Heritage List; or
- Register of the National Estate.

A review of the *Palerang Local Environment Plan 2014* - Schedule 5 did not identify any Aboriginal objects, sites or places within or near the proposed activity area.

An AHIMS Web Service search conducted on the 1st August 2021 using the following coordinate parameters: Lat, Long from: -35.61, 149.42 - Lat, Long to: -35.59, 149.45, did not identify any Aboriginal objects, sites or places within or near the proposed activity area (see Appendix A).

6 Previous Aboriginal heritage Assessments

6.1 Regional archaeological context

Lampert's (1971) excavation of the Burrill Lake, South Coast, rock shelter has provided some of the earliest evidence for the occupation of south-eastern coastal New South Wales. Radiocarbon dates derived from wood charcoal present in the lowest occupation layers of the rock shelter yielded dates of $20,820 \pm 810$ and $20,760 \pm 800$ years B.P. (Lampert 1971:9). At the time of publication, the coastal location of Burrill Lake and its apparent age of occupation led researchers to suggest that initial subsistence strategies of Aboriginal people were focused on coastal economies (Bowdler 1977:205). Movement to 'montane economies' in highland areas of Australia was, consequently, assumed to have occurred relatively later (Bowdler 1977:205).

Much of this assumption was derived from the belief that highland areas provided a much harsher climatic niche to adapt to, being near inaccessible during winter and providing only relatively poor resources (Bowdler 1981). Extensive archaeological investigations conducted by Flood (1973) in the Southern Highlands of New South Wales identified evidence of occupational camps at 900m to 1500m elevation. These were suggested to be the result of groups moving into the Highlands specifically for hunting Bogong moths, which were available in prolific quantities in the summer months (Flood 1980:82). The hypothesis of the late-arrival into the Southern Highlands was supported by the radiocarbon dates obtained by rock shelters in the Canberra region. In the late twentieth century, some of the oldest radiocarbon-dated sites were Caddigat Shelter, Adaminaby, at $1,600 \pm 600$ B.P., and Bogong Shelter, Namadgi, at $1,000 \pm 60$ B.P. (Bowdler 1981).

Argue's (1995) study countered this argument, stating that the Southern Highlands were likely to have been rich in both floral and faunal resources, and the lower altitudes accessible almost year-round. At the time of publication, radiocarbon analysis of Birrigai rock shelter, Tharwa, had yielded a date of 21,000 ± 220 B.P., demonstrating that the Southern Highlands were occupied much earlier than hypothesised by Flood (1973, 1980) and Bowdler (1977, 1981). Further research by Theden-Ringl (2016) has indicated that the Southern Highlands area was likely occupied permanently from at least 8,000 B.P., although the span and intensity of occupation at specific sites varied throughout this time and may be the reason for varying radiocarbon dates.

6.2 Archaeological investigations of the immediate and surrounding area

No record could be found of a previous assessment of Aboriginal heritage values within the proposed activity area. Despite the lack of prior archaeological investigations in the immediate study area, archaeological investigations have occurred in the surrounding region and the results of these studies can be used to develop a model for the potential archaeological sensitivity of the proposed activity area.

There have been several archaeological investigations of properties on Wanna Road, Yarrow, north of the present study area. Saunders (2001) identified a numerically small artefact scatter and two isolated artefacts during a surface survey of a proposed subdivision. The artefact scatter was located on an exposed, low gradient basal slope approximately 100m from a minor creek. The artefactual assemblage consisted of quartz, volcanic, and a fine-grained siliceous stone. During a surface survey of the 'Taliesin' property, Saunders (2004a) identified three numerically small artefact scatters, two on spur crests and one near a minor tributary of Deep Creek. The artefactual assemblages comprised of chert, quartz, and silcrete. In a survey of additional area within the 'Taliesin' property, Saunders (2006) identified a further ten numerically small artefact scatters and five isolated finds. These sites were located on low gradient slopes and spur crests in the vicinity of water sources, open valley floor, and steep, elevated areas away from water sources. The artefactual assemblage was dominated by quartz, but also included silcrete, quartzites, and hornfels. Hughes (2004) identified an isolated artefact and a numerically small artefact scatter during a surface survey of a proposed subdivision. Both artefactual assemblages comprised of quartz. The isolated artefact was located on the crest of a very broad, flat ridge, with a small rock outcrop. The artefact scatter was located on the bare, eroded bank of a tributary creek of Jumping Valley Creek.

On a proposed subdivision at the corner of Wanna Road and Captains Flat Road, Saunders (2008) identified three numerically small artefact scatters and five isolated artefacts. Four of the sites were located on low gradient, basal slopes, two on mid- and lower slopes, and two on spur crests. Only two of the identified sites did not occur within 130m of a water source. The artefactual assemblage comprised of chert, volcanic, quartz, silcrete, basalt, and greenstone. Also on Captains Flat Road, Saunders (2004b) identified a Potential Archaeological Deposit (PAD) on a spur crest overlooking a tributary of Molonglo River.

Navin Officer Heritage Consultants (2003, 2015, 2017) have identified a total of ninety Aboriginal heritage sites in the Googong area, northwest of the present study area. In addition to twenty-four PADs, there were twenty-two isolated artefacts, thirty-eight artefact scatters (including both surface and subsurface), and three possibly culturally modified trees. The majority of the artefact scatters and isolated artefacts were located in proximity to a water source or open valley floor.

6.3 Archaeological sensitivity predictive model

Based on the examination of the regional Aboriginal archaeological context, the following predictive model has been designed for the study area.

Table 1: Predictive model for Aboriginal heritage sites in the study area

Site type	Description
<p>Flaked stone artefact scatters / Isolated artefacts</p>	<p>Flaked stone artefact scatters have been interpreted as being associated with Aboriginal subsistence and stone knapping activities and may include archaeological remains such as stone artefacts and hearths. This site type usually appears as surface artefact scatters in areas where vegetation is limited, and ground surface visibility is high. They are also often exposed by erosion, agricultural events such as ploughing, and the creation of informal, unsealed vehicle access tracks and walking paths. Open campsites are often located on dry, relatively flat land along or adjacent to rivers and creeks. Sites that contain surface or subsurface deposits resulting from repeated or continuous occupation are more likely to occur on elevated ground near permanent, reliable water sources. Flat, open areas associated with creeks and their resource-rich environments would have offered ideal camping areas to the Aboriginal inhabitants of the local area.</p> <p>Isolated artefacts may represent a single item discard event or the result of limited stone knapping activity. The identification of isolated artefacts may indicate the presence of a more extensive, subsurface <i>in situ</i> archaeological deposit, or a larger deposit obscured by low ground visibility. Isolated artefacts are likely to be located on landforms associated with a range of activities, such as ridge lines that would have provided ease of movement through the area and level areas with access to a water source. Artefact scatters and isolated artefacts are the most common site types found in association with fresh water and/or food resource gathering areas.</p> <p>Artefact scatters and isolated artefacts are reported as the most common Aboriginal heritage site type in the surrounding region, with quartz, silcrete, and siliceous stone the dominant raw material type.</p>

7 Site assessment

7.1 Assessment methods

A physical assessment of the study area was not considered necessary given that the proposed disturbance would be restricted to locations that have already sustained repeated significant disturbance associated with the past activities at the site including:

- Mining;
- Construction, operation and maintenance of mining infrastructure;
- Removal and relocation of contaminated deposits; and
- Ongoing surface erosion and deflation.

The assessment, therefore, consisted of the detailed review of the most recent aerial photography of the proposed impact area (See Figure 1) and available historic images of the site (see Plate 1 through Plate 4).



Plate 1: Lake George Mine. 1890s smelter and waste dump. Image courtesy of NSW DPI - Derelict Mines



Plate 2: Lake George Mine. 1890s Ore Processing site. Image courtesy of NSW DPI - Derelict Mines

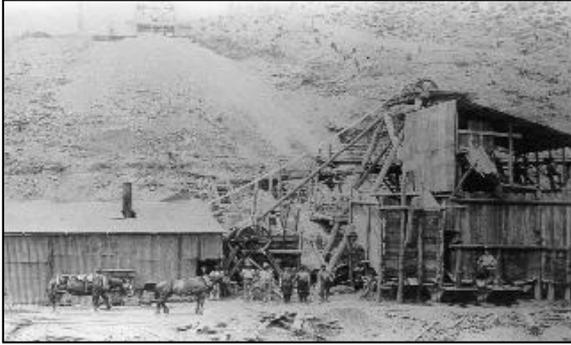


Plate 3: Lake George Mine. 1890s mining operation. Image courtesy of NSW DPI - Derelict Mines



Plate 4: Lake George Mine. 1960s Decommissioning of the mine. Image courtesy of NSW DPI - Derelict Mines

7.2 Assessment results

The Lake George Mine site at Captains Flat and the proposed activity area within the site have sustained significant past disturbance associated with a 70-year history of mining and mineral ore processing that has resulted in removal or significant modification of the natural landforms at the site. The already extensive disturbance has been augmented by a series of mine rehabilitation programs over the past 50 years that has included stripping and relocation of contaminated soils, re-working of surface water drainage and the construction of sediment traps and dams. No portion of the proposed activity footprint has been undisturbed.

8 Due diligence assessment process

In the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010b:18), due diligence is defined as “taking reasonable and practical steps to determine whether a person’s actions will harm an Aboriginal [heritage site] and, if so, what measures can be taken to avoid that harm”. What follows below is an application of the recommended due diligence assessment questions as applied to the proposed remediation works within the study area.

Will the activity disturb the ground surface or any culturally modified trees?

The proposed works will disturb the ground. This disturbance will be restricted to areas that have already sustained considerable past disturbance. The original ground surface has already been heavily modified or removed completely.

No culturally modified trees are present within the proposed activity area.

Are there any: a) relevant confirmed site records or other associated landscape feature information on AHIMS, b) any other sources of information of which a person is already aware, or c) landscape features that are likely to indicate presence of Aboriginal objects?

No Aboriginal heritage sites are located within or in proximity to the proposed activity area.

Consideration of prior archaeological investigations in the surrounding region indicates that Aboriginal heritage sites including artefact scatters and isolated artefacts are likely to be found on low gradient slopes in proximity to water sources. These landforms are not present within the proposed activity area. The landforms within the proposed activity area are not considered to be archaeologically sensitive.

Can you avoid harm to the object or disturbance of the landscape feature?

No Aboriginal objects or potentially archaeologically sensitive landforms exist within the proposed activity area.

Does a desktop survey and visual inspection confirm that there are Aboriginal objects or that they are likely?

A physical assessment of the study area was not considered necessary given that the proposed disturbance would be restricted to locations that have already sustained repeated significant disturbance associated with the past mining activities at the site.

It is extremely unlikely – with a very high degree of confidence - that unidentified Aboriginal sites and objects could be present in the proposed activity area.

9 Conclusion

The Aboriginal heritage due diligence assessment is a tool for determining whether further assessment of a proposed activity area is required. This includes whether approval under Part 6 of the NPW Act will be required for the proposed activity to proceed.

An extensive search of the relevant heritage registers and review of the available archaeological literature has enabled the development of a predictive model for the study area. It has identified that drainage lines and elevated level to gently sloping landforms above drainage lines are potentially archaeologically sensitive. These landforms are not present within the proposed activity area. A physical assessment of the study area was not undertaken because the proposed disturbance activities would be restricted to locations that have already sustained repeated significant disturbance associated with the past activities at the site. It is extremely unlikely – with a very high degree of confidence - that unidentified Aboriginal sites and objects could be present in the proposed activity area.

10 Recommendations

Based on the findings of this due diligence assessment and the requirements of the NPW Act, the following recommendation is made:

No Requirement for further Aboriginal Cultural Heritage Assessment

The proposed activities would take place within, and be confined to, a landscape that has already sustained significant disturbance. As a result, there is no potential for previously unidentified Aboriginal sites and objects to be present in the proposed activity area. No further archaeological investigation or assessment is therefore warranted.

References

- Argue, D. 1995. 'Aboriginal occupation of the Southern Highlands: Was it really seasonal?'. *Australian Archaeology*, 41:30-36.
- Bowdler, S. 1977. 'The coastal colonisation of Australia'. In Allen, J., Golson, J. and Jones, R. (eds.) *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia, and Australia*. London, United Kingdom: Academic Press.
- Bowdler, S. 1981. 'Hunters in the highlands: Aboriginal adaptations in the Eastern Australian Uplands'. *Archaeology in Oceania*, 16(2):99-111.
- Department of Environment, Climate Change, and Water. 2010a. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.
- Department of Environment, Climate Change, and Water. 2010b. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*.
- Flood, J.M. 1973. *The Moth-Hunters*. PhD Thesis. Australian National University.
- Flood, J.M. 1980. *The Moth-Hunters*. Canberra, Australia: Australian Institute of Aboriginal Studies.
- Hughes, P. 2004. *An Archaeological Assessment of the Proposed Wanna Road Stage 1 Rural Subdivision, Lot 10 DP 261221 and Lot 18 DP 614734, Wanna Road via Queanbeyan, NSW*. Report to Hall Pastoral Pty Ltd.
- Jenkins, B.R. 2000. *Soil Landscapes of the Canberra, 1:100,000 Sheet*. Sydney, Australia: Department of Land and Water Conservation.
- Lampert, R.J. 1971. *Burrill Lake and Currarong*. Canberra, Australia: Department of Prehistory, Research School of Pacific and Asian Studies, Australian National University.
- Navin Officer Heritage Consultants. 2003. *Googong Local Environmental Study Cultural Heritage Component*. Report to Willana Associates Pty Ltd.
- Navin Officer Heritage Consultants. 2015. *Mt Pleasant, Burra Road, NSW, Archaeological Assessment and Aboriginal Cultural Heritage Assessment Report*. Report to Canberra Investment Corporation Limited.
- Navin Officer Heritage Consultants. 2017. *Googong, NSW, Neighbourhood 1A Stage 7, Archaeological Assessment and Aboriginal Cultural Heritage Assessment*. Report to Googong Township Pty Ltd.
- NSW Minerals Council. 2010. *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects*.
- Saunders, P. 2001. *Wanna Road Portion 125, Archaeological Survey*. Report to Canberra Investment Corporation Limited.
- Saunders, P. 2004a. *Proposed Subdivision of Pt Lot 2 DP 821751, Capital Hill Estate, Wanna Road, Queanbeyan, NSW, Aboriginal Archaeological Assessment*. Report to Land Planning Solutions.
- Saunders, P. 2004b. *Lot 1 DP 562997, 1177 Captains Flat Road, Carwoola, Two Lot Rural Subdivision, Archaeological Assessment*. Report to Land Planning Solutions.
- Saunders, P. 2006. *Proposed Rural Subdivision, 'Taliesin', Wanna Road, Queanbeyan, NSW, Aboriginal Archaeological Assessment*. Report to Country Landmark (Taliesin) Pty Ltd.
- Saunders, P. 2008. *Proposed Rural Residential Subdivision Lot 4 DP 261221, 25 Wanna Road, Queanbeyan, NSW, Archaeological Assessment*. Report to Land Planning Solutions.
- Theden-Ringl, F. 2016. 'Aboriginal presence in the high country: New dates from the Namadgi Ranges in the Australian Capital Territory'. *Australian Archaeology*, 82(1):25-42.

Appendix A

Results of Aboriginal Heritage Information Management System search

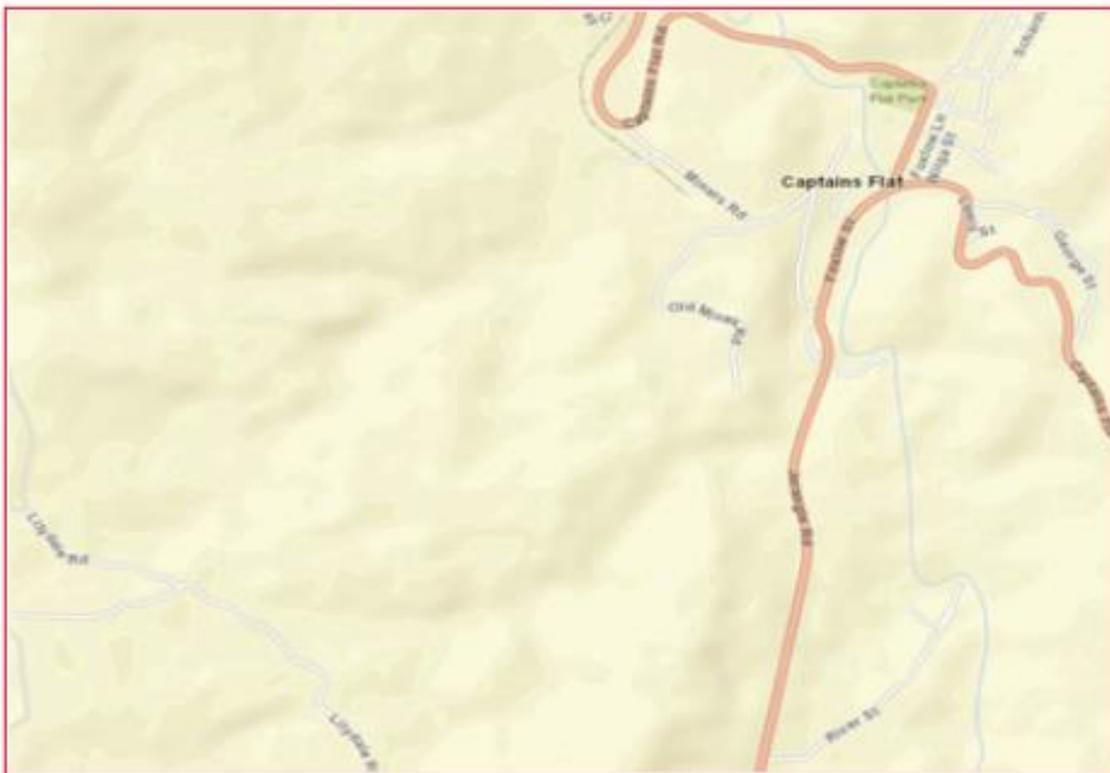
Alistair Grinbergs
6 Caffyn Place
Garran Australian Capital Territory 2605
Attention: Alistair Grinbergs
Email: alistair.grinbergs@gmail.com

Date: 01 August 2021

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -35.61, 149.42 - Lat, Long To : -35.59, 149.45, conducted by Alistair Grinbergs on 01 August 2021.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0 Aboriginal sites are recorded in or near the above location.
0 Aboriginal places have been declared in or near the above location. *

Appendix M

Traffic Impact Assessment



Lake George Mine Remediation

Traffic and Transport Assessment

Department of Regional NSW (Legacy Mines Program)

May 2022



GHD Pty Ltd | ABN 39 008 488 373

133 Castlereagh Street, Level 15

Sydney, New South Wales 2000, Australia

T +61 2 9239 7100 | F +61 2 9239 7199 | E sydmal@ghd.com | ghd.com

File name	12551771_REP_Lake George Mine Remediation_Traffic Impact Assessment
Author	Minique Aranas
Project manager	Karen Yale
Client name	Department of Regional NSW (Legacy Mines Program)
Project name	Lake George Mine Remediation REF
Document title	Lake George Mine Remediation Traffic and Transport Assessment
Revision version	Rev 1
Project number	12551771

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	M Aranas	Jayme Akstein	On file	Dr Stuart Winchester		25/03/2022
S4	1	M Aranas	Jayme Akstein	On file	Dr Stuart Winchester		27/05/2022

© GHD 2022

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Contents

Abbreviations		i
1. Introduction		1
1.1	Background	1
1.2	Mining and site remediation history	3
1.3	Overview of the proposal	4
1.4	Document Purpose and Structure	6
1.5	Scope and limitations	8
1.6	Assumptions	8
2. Existing environment		9
2.1	Road network	9
2.2	Public and active transport	16
2.3	Crash review	17
3. The proposed activity		19
3.1	Proposed remediation works	19
3.2	Equipment	19
3.3	Workforce	20
3.4	Work hours	20
3.5	Duration of works	20
3.6	Source and quantity of materials	20
3.7	Access	20
3.8	Parking	21
4. Impact assessment		22
4.1	Traffic generation	22
4.2	Access and haulage routes	22
4.3	Traffic impact	24
4.4	Public and active transport	25
4.5	Parking impacts	25
4.6	Property access	25
5. Mitigation and management measures		26
5.1	Traffic Management Plan	26
5.2	Traffic management measures	26
6. Summary and Conclusions		28
6.1	Overview	28
6.2	Key findings	28
6.3	Conclusion	29
7. References		30

Table index

Table 1.1	Summary of proposed remediation works	4
Table 1.2	Location of key site domains subject to proposed remediation works in MGA94	5
Table 1.3	Structure and content of the TIA	6
Table 2.1	Captains Flat Road key features	11
Table 2.2	Foxlow Street key features	12
Table 2.3	Jerangle Road key features	12
Table 2.4	Miners Road key features	13
Table 2.5	Existing traffic volume	14
Table 2.6	Two-way peak hour flow on two-lane rural roads (veh/hr)	15
Table 2.7	Mid-block review of roads within study area	15
Table 2.8	Road crash incidents within a two-kilometre radius	17
Table 3.1	Imported material sources	20
Table 4.1	Estimated truck movements for imported material	22
Table 4.2	Peak hour traffic generation (vehicle movements)	24
Table 4.3	Mid-block review of affected roads	25

Figure index

Figure 1.1	Regional location and maximum spatial extent of remediation	2
Figure 1.2	Key site domains and features including the maximum spatial extent of proposed remediation	7
Figure 2.1	Road classification within study area	10
Figure 2.2	Captains Flat Road	10
Figure 2.3	School bus stops along Captains Flat Road	11
Figure 2.4	Foxlow Street	12
Figure 2.5	Jerangle Road	13
Figure 2.6	Miners Road (western sections)	13
Figure 2.7	Existing traffic volume	14
Figure 2.8	Location of bus stops	16
Figure 2.9	Walking and cycling facilities	17
Figure 2.10	Road crashes within site vicinity	18
Figure 3.1	Site access during remediation	21
Figure 4.1	Proposed access routes	23
Figure 4.2	GML Routes (19 B-double Routes)	23
Figure 4.3	HML Routes (19 B-double Routes) (25 / 26m B-double Routes)	24

Abbreviations

Abbreviation	Definition
ACT	Australian Capital Territory
ADT	Average Daily Traffic
DCP	Development Control Plan
DECC	Department of Environment and Climate Change (NSW)
GAV	General Access Vehicle
GML	General Mass Limit
HML	Higher Mass Limit
HV	Heavy Vehicles
LGA	Local Government Area
LMP	Legacy Mines Program
LoS	Level of Service
LV	Light Vehicles
MGA	Map Grid of Australia
NSW	New South Wales
QPRC	Queanbeyan-Palerang Regional Council
REF	Review of Environmental Factors
RMS	Roads and Maritime Services
RTA	Roads and Traffic Authority
RUM	Road User Movement
SPV	Special Purpose Vehicle
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan

1. Introduction

1.1 Background

The Legacy Mines Program (LMP) within the Department of Regional NSW propose to undertake remediation works at the legacy Lake George Mine, located immediately to the west of the township of Captains Flat, New South Wales (NSW) (refer to Figure 1.1).

Mining operations (for silver, gold, copper, lead and zinc) in the area commenced in the early 1880s with several small operations amalgamating to form Lake George Mine. Mining continued until 1962, when the Lake George Mine officially closed. The site is heavily contaminated with metals and metalloids (including lead, arsenic, copper, and zinc) and sulfur and has undergone a succession of remediation works since 1972.

In 2017, the LMP commissioned a review of previous remediation works, and an additional site contamination delineation assessment, to establish the current situation at Lake George Mine. The purpose of the work was to formulate a way forward to reduce the environmental impacts from the Lake George Mine. The work was documented in *Lake George Captains Flat Mine Review: Assessment of Remediation Options* (GHD 2018), which reported that the most significant contributors to ongoing contamination from the Lake George Mine were:

- The Main Adit Spring, which as a point source, contributes around 80 to 90 per cent of dissolved zinc and some 99 per cent of dissolved lead loads into the Molonglo River under dry weather conditions
- Exposed, or partly vegetated, contaminated soil in the Rail Loading and Mill Areas within the Copper Creek sub-catchment
- Exposed waste rock and mineralised *in situ* rock in the Central and Elliot's Mine Area within the Molonglo River catchment and Copper Creek sub-catchment.

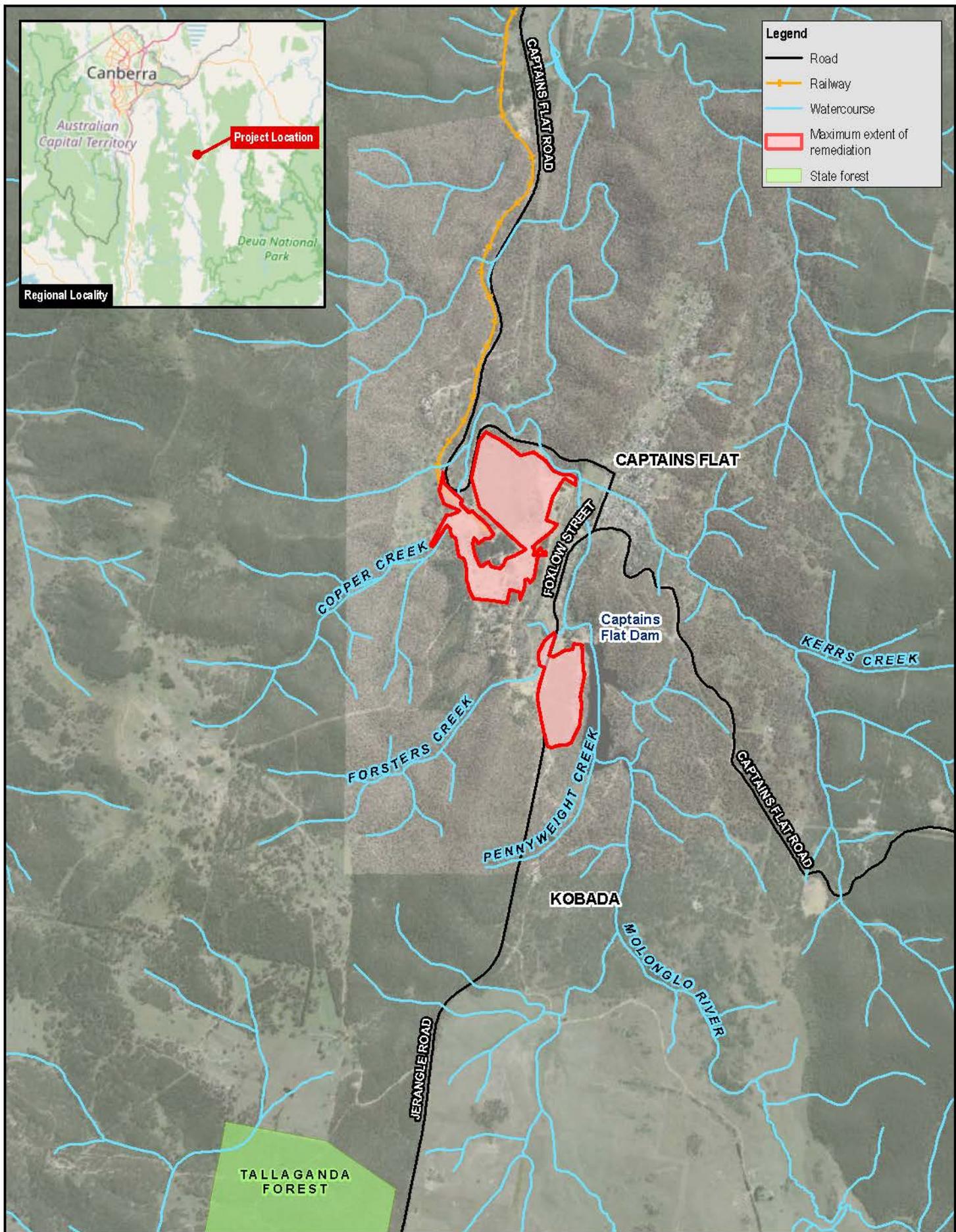
A separate works package is assessing the feasibility of water treatment for the acid and metalliferous drainage emanating from The Main Adit Spring.

To progress remedial work on the exposed, or partly vegetated contaminated soil in the Rail Loading and Mill Areas, and the exposed waste rock and mineralised *in situ* rock in the Central and Elliot's Mine Area, GHD were tasked to prepare a soil treatment, capping and vegetation design in late 2018. The resultant *Lake George Mine, Captains Flat Detailed Design Report* was the output (GHD 2020).

Additionally, Transport for NSW (TfNSW) has identified lead contamination in surface soils in the Captains Flat Railway Precinct, immediately to the north of the Rail Loading Area. TfNSW is planning to align remediation of the Captain's Flat Railway Precinct Railway Station precinct with the works described above at Lake George Mine.

Concurrently, Crown Lands / Queanbeyan-Palerang Regional Council (QPRC) are proposing to implement remedial works to property they own in the township of Captains Flat. Not greater than 20,000 tonnes of contaminated soil from the proposed Crown Lands / QPRC remedial works are to be managed by receiving the waste from premises outside the regulated area through macroencapsulation in the containment cell proposed for construction on the Northern Dumps.

The area requiring remediation around Captains Flat Railway Precinct is shown in Figure 1.2. Collectively, the areas identified above comprise the proposed remediation works (or 'the proposal') to be carried out at Lake George Mine. This Review of Environmental factors (REF) document is the statutory instrument that seeks approval to implement the remedial works as described by GHD (2020) in addition to the Captains Flat Railway Precinct remediation and receipt of Crown Lands / QPRC waste soil as described above.



Map Projection: Transverse Mercator
 Horizontal Datum: GDA1994
 Grid: GDA1994 MGA Zone 55



Department of Regional NSW
 Lake George Mine Remediation

Project No. 12551771
 Revision No. A
 Date 14/03/2022

Regional location and maximum spatial extent of remediation

FIGURE 1.1

1.2 Mining and site remediation history

1.2.1 Mining history

There have been three phases of mining at the Lake George Mine, with the first mining operations starting in 1882 to mine for gold. In 1887, the Vanderbilt Mine was opened on the eastern side of Captains Flat. Open heap roasting of ore began in 1890 which released sulfur into the atmosphere killing most of the surrounding vegetation.

Pyritic smelting replaced the wood and coal fuels as the mining company attempted to boost metal production. The principal commodity was now copper, with northern and southern workings having been developed. New stacks, flues and furnaces were built at the southern end of town between the Molonglo River and Jerangle Road. The mines produced silver, gold and copper. However, high lead and zinc levels meant that copper yields could not be improved. In 1899, Lake George mine stopped smelting for copper and attempted to extract gold by cyanidation. However, this attempt failed, and the mine shut down, with mine equipment subsequently dismantled.

The second phase of mining occurred from 1937 to 1962, with large-scale mining operations being employed. This included bringing electricity and a railway into the mine, with a dam constructed across the Molonglo River. Ore was recovered using froth flotation and transported to market via the railway. Much of the second phase of mining comprised sulfide ores containing pyrite, in addition to pyrite ore which was used to produce pyrite concentrate for the subsequent production of sulfuric acid (Glasson *et al.* 1965).

Mining wastes including slurries were initially stored in the area known as the Northern Dumps, which was compromised in 1939 due to a breach in the wall of Dump 6A (in the area now known as the North Dumps) – with tailings and slimes entering the Molonglo River. Following this, tailings were disposed of to the Southern Dumps, which on 3 July 1942 also collapsed sending approximately 30,000 m³ of tailings into the town water reservoir (Dobos and Associates 2002).

After the Southern Dumps failure, disposal of mine and process wastes reverted again to the Northern Dumps area. There were no recorded tailings impoundment failures after this. A major flood in 1954 mixed, and further dispersed, the contaminated riverbed sediments already in the Molonglo River, further impacting the river downstream to Queanbeyan around 55 kilometres downstream (Dobos and Associates 2002).

1.2.2 Remediation history

Since the 1939 Northern Dumps and 1942 Southern Dumps failures, various tranches of site remedial works have been undertaken to decrease the risk of off-site environmental impact from the Lake George Mine. In summary, these were:

1. Remedial works undertaken by the NSW Department of Public Works in 1976, at a cost of \$2.3 million, including:
 - Reshaping of the Northern and Southern Dumps to slopes of between 1:3 and 1:20 to improve stability, reduce scouring, promote vegetation, and reduce infiltration
 - Covering the reshaped dumps with a capping (from top down) of:
 - 30 cm of topsoil / growth medium
 - 45 cm of crushed rock and pebbles to promote drainage and act as a capillary break.
 - 22 cm of compacted clay
 - Revegetation of the dumps
 - Diversion of Forster's Creek and removal of a dam, to prevent it entering the mine through Keating's Collapse.
2. Capping of slag heaps on the eastern side of Jerangle Road adjacent to the Southern Dumps in 2002.
3. Between 2006 and 2014, various site works were undertaken by the NSW Legacy Mines Program and Department of Lands – Soil Conservation Service (SCS). These included:
 - Construction and periodic cleaning out of sediment dams above the Rail Loading Area
 - Cleaning out the V-notch weir at the Main Adit Spring
 - Re-profiling and ameliorating the area above the Rail Loading Area

- Adding inert gravel into the Ore Concentrate Bins in the Mill Area to attempt to suppress acid generation from the sulfidic ore stored in the bins
- Additional fencing and sealing of some shafts
- Rehabilitating the northern face of the Southern Dumps, which had eroded.

Additional diversion drains were also installed to reduce runoff over contaminated areas, primarily in the Creeks and Rail Loading Areas in the Copper Creek sub-catchment.

1.2.3 Additional remediation required

Despite the remedial works listed above, various site investigations over the recent past (e.g. Brooks 1980, Hogg 1990, Dobos and Associates 2002, URS 2004 and GHD 2018) have broadly concluded that the most likely remaining areas of significant contamination contributions are:

- The Main Adit Spring, which in dry weather, contributes around 80 to 90 per cent of dissolved zinc, and some 99 per cent of dissolved lead loads into the Molonglo River.
- Exposed or only partly vegetated, contaminated mineral waste and soil in the Rail Loading and Mill Areas (Copper Creek sub-catchment).
- Exposed mineral waste and mineralised rock in the Central and Elliot’s Mine Area (Molonglo River and Copper Creek sub-catchment).

Cumulatively, the above three issues are reported to contribute around 90 per cent of known, off-site dissolved contamination at Captains Flat. Therefore, they have become the focus of current design and remedial works by the Legacy Mines Program, with the water treatment project which addresses the Main Adit Spring contamination being progressed under a separate project. This REF, therefore, addresses the proposed capping works in the areas described below in Section 1.3.

1.3 Overview of the proposal

1.3.1 Proposed remediation works

The proposed remediation works include site preparatory early works, fencing historic mining structures, strategic structural works, remediation earthworks, augmentation of surface water drainage, and revegetation across several key domains in predominantly the northern portion of Lake George Mine.

The purpose of the proposed remediation works is to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at the Lake George Mine. The proposed remediation works are required to prevent potential environmental and human health risks to people accessing the site, to residents on-site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.

A summary of the proposed remediation works is provided in Table 1.1.

Table 1.1 Summary of proposed remediation works

Element	Description
Land affected	Approximately 20 hectares within Lake George Mine, Captains Flat NSW, as described in Section 1.3.2
Landowner	Private land (multiple landowners), Council, Crown Land and TfNSW land
Land operator	Not applicable – mine and railway line no longer in operation
Activity type	Remediation works, including fencing historic mining structures, strategic structural works, excavation and encapsulation, neutralisation of surface materials, importation of growing media and rock mulch, installation of surface water drainage, and revegetation of remediated areas; other than rock mulched areas

Element	Description
Activity location	Lake George Mine, Captains Flat NSW
Activity duration	Approximately 19 months, with site preparatory early works commencing in June 2022, remedial earthworks in August 2022, with works estimated for completion around December 2023

1.3.2 Site description

Lake George Mine is located immediately to the west of the township of Captains Flat NSW, about 50 kilometres south-east of Canberra (refer to Figure 1.1). The areas to the north, west and south of the site are vegetated, mountainous areas that includes Yanununbeyan State Conservation Area and Yanununbeyan National Park.

Lake George Mine lies adjacent to the Molonglo River. The Molonglo River flows in a northwest direction through Captains Flat to the east of Lake George Mine. The Molonglo River flows toward Queanbeyan and joins the Queanbeyan River which flows into Lake Burley Griffin in Canberra, approximately 70 kilometres downstream of Captains Flat. Captains Flat Dam (also known as the town water supply dam) is located on the Molonglo River, immediately to the south-east of Lake George Mine and adjacent to the Southern Dumps.

Lake George Mine is accessed via the sealed Miners and Old Mines Road in Captains Flat. Public access is therefore possible to Lake George Mine, in fact, it is promoted for mining heritage interpretation.

The proposed remediation works would be undertaken across several site domains located predominantly within the northern portion of Lake George Mine. These areas are:

- North Mine Ridge/Elliot’s
- Old Mill
- Mill Area (west of the Central Mine Area)
- Central Mine Area
- Creeks Area
- Rail Loading Area and Captains Flat Railway Precinct
- Minor areas of eroded capping on the Northern and Southern Dumps.

In addition, mine waste from the following sources are proposed for relocation to a containment cell that would be located on the Northern Dumps. These include:

- A sulfidic waste stockpile located on the junction of Miners Road and the Council wastewater treatment plant access road
- A slag heap located on the western side of Jerangle Road in Forster’s Gully, adjacent to the northern end of the Southern Dumps
- TfNSW lead contamination from the Captains Flat Railway Precinct
- Crown Land / QPRC land within the Captains Flat township. That is, The Captains Flat Lead Management Taskforce is currently undertaking an assessment of the Captains Flat township with the aim to prepare abatement plans for the higher risk public spaces. One option being investigated is moving up to 20,000 tonnes of contaminated soil from these Crown Land / QPRC-owned abatement areas into the containment cell on the Northern Dumps, as required. Note that approval under the NSW Planning and Assessment Act 1979 for the abatement area remediation would be undertaken as a separate approval to this REF.

The location of key site domains (excluding the Captains Flat abatement areas) subject to the proposed remedial works are shown in Table 1.2.

Table 1.2 Location of key site domains subject to proposed remediation works in MGA94

Area	Zone	Easting (m)	Northing (m)
North Mine Ridge / Elliot’s	55	721443.801	6058756.636
Old Mill	55	721439.247	6058657.286
Mill Area (west of the Central Mine Area)	55	721220.715	6058445.025

Area	Zone	Easting (m)	Northing (m)
Central Mine Area	55	721237.069	6058504.785
Creeks Area	55	721062.31	6058635.004
Rail Loading Area and Captains Flat Railway Precinct	55	720987.429	6058737.989
Northern Dumps	55	721278.748	6058832.33
Southern Dumps	55	721511.643	6057881.758
Sulfidic waste stockpile	55	721409.087	6058647.711
Slag Heap	55	721374.377	6057965.761
Fosters Gully	55	721069.331	6057786.820
Keating's Collapse	55	721192.665	6057791.729

1.3.3 Site plan

The maximum spatial footprint of the proposed remediation works at Lake George Mine are shown in Figure 1.2, excluding Crown Lands / QPRC abatement areas.

1.4 Document Purpose and Structure

This Traffic Impact Assessment (TIA) forms part of the Review of Environmental Factors (REF) that has been prepared by GHD on behalf of LMP. The purpose of the REF is to describe the proposed remediation works, to assess the potential impacts of the remediation works, and to identify mitigation measures to reduce the potential impacts of the proposed remediation works.

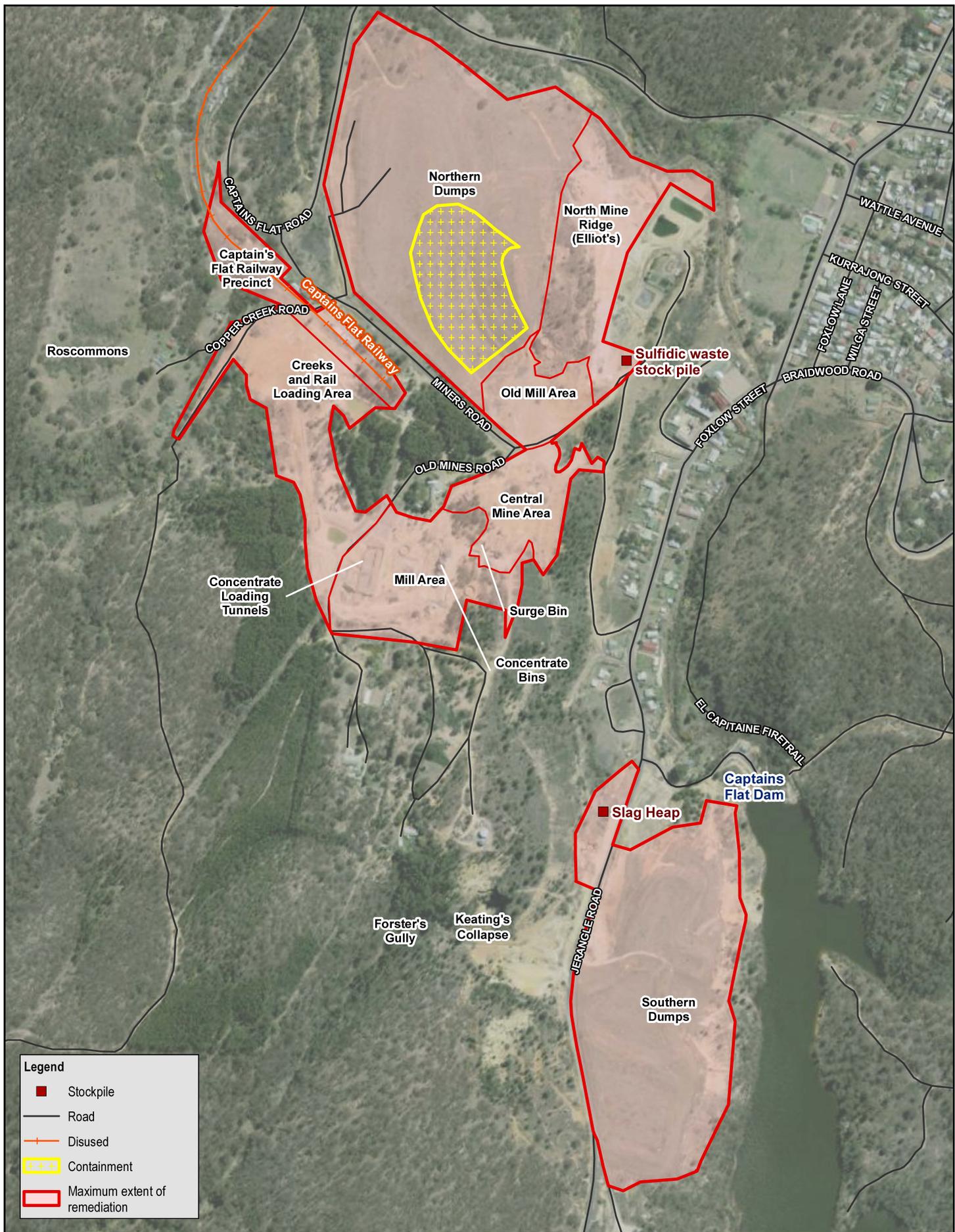
This TIA has been prepared with reference to *ESG2: Guideline for preparing a Review of Environmental Factors* (Department of Planning and Environment 2015), specifically Section 4.4 Assessment of Community Impacts (Transportation Impacts).

The TIA covers an overview of the existing road network and traffic conditions, a review of site access arrangements (including public transport), an assessment of the traffic implications arising from the remediation activities, and measures to minimise any adverse effects to existing road users.

The structure and content of the TIA is summarised in Table 1.3.

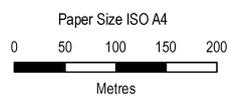
Table 1.3 Structure and content of the TIA

Chapter No.	Chapter title	Content
1	Introduction	Provides background to, and an overview of, the proposed remediation works and outlines the document purpose and structure. The section also contains a description of the proposal site, including site plans.
2	Existing environment	Provides a description of the existing road network, traffic, and transport conditions within the study area.
3	The proposed activity	Provides a description of the proposed remediation works.
4	Impact assessment	Provides an estimate of the transportation impacts (i.e. traffic generation) that will likely be generated by the proposed activities, and an assessment of the extent of these impacts on existing transportation systems.
5	Mitigation and Management Measures	Provides a description of corresponding mitigation/management measures to avoid or reduce the impacts identified.
6	Summary and conclusions	Provides a summary of the key findings of the TIA and the potential significance of the impacts (positive, negligible, adverse).
7	References	Provides a list of references used throughout the TIA.



Legend

- Stockpile
- Road
- Disused
- Containment
- Maximum extent of remediation



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

Department of Regional NSW
 Lake George Mine Remediation

Project No. 12551771
 Revision No. A
 Date 14/03/2022

**Key site domains and features
 including the maximum spatial
 extent of remediation**

FIGURE 1.2

1.5 Scope and limitations

This report has been prepared by GHD for Department of Regional NSW (Legacy Mines Program) and may only be used and relied on by Department of Regional NSW (Legacy Mines Program) Legacy Mines Program for the purpose agreed between GHD and Department of Regional NSW (Legacy Mines Program) Legacy Mines Program as set out in Section 1.4 of this report.

GHD otherwise disclaims responsibility to any person other than Department of Regional NSW (Legacy Mines Program) Legacy Mines Program arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section(s) 1.6 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.6 Assumptions

The following assumptions were made in preparing of this TIA:

- All information on traffic volumes along relevant roads are provided by QPRC and are assumed to be correct and fit for use in the assessment. No additional intersection surveys and traffic volume counts were conducted in relation to the preparation of this TIA.
- All vehicle trip generation associated with the remediation works were estimated based upon approximate volumes of imported material required for remedial purposes, in agreement with the Proponent and Principal Contractor. These are discussed in detail in Section 4.1.
- The following items are excluded from this assessment
 - Collection of additional traffic volume counts
 - Intersection modelling, microsimulation traffic modelling, or forecasting
 - Swept path assessment
 - Development of alternative layout options for existing intersections
 - Traffic generation estimates of approved developments within the vicinity of the site, future traffic generation, and background traffic growth.

2. Existing environment

2.1 Road network

This section provides an understanding of the existing road network in the study area.

2.1.1 Road hierarchy

Roads within New South Wales are categorised in the following two ways:

- By classification (ownership)
- By the function that they perform.

Road Classification

Roads, as defined by the *Roads Act 1993*, are classified based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Transport for New South Wales (TfNSW) to exercise authority of all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways, and Transitways. For management purposes, TfNSW has three administrative classes of roads:

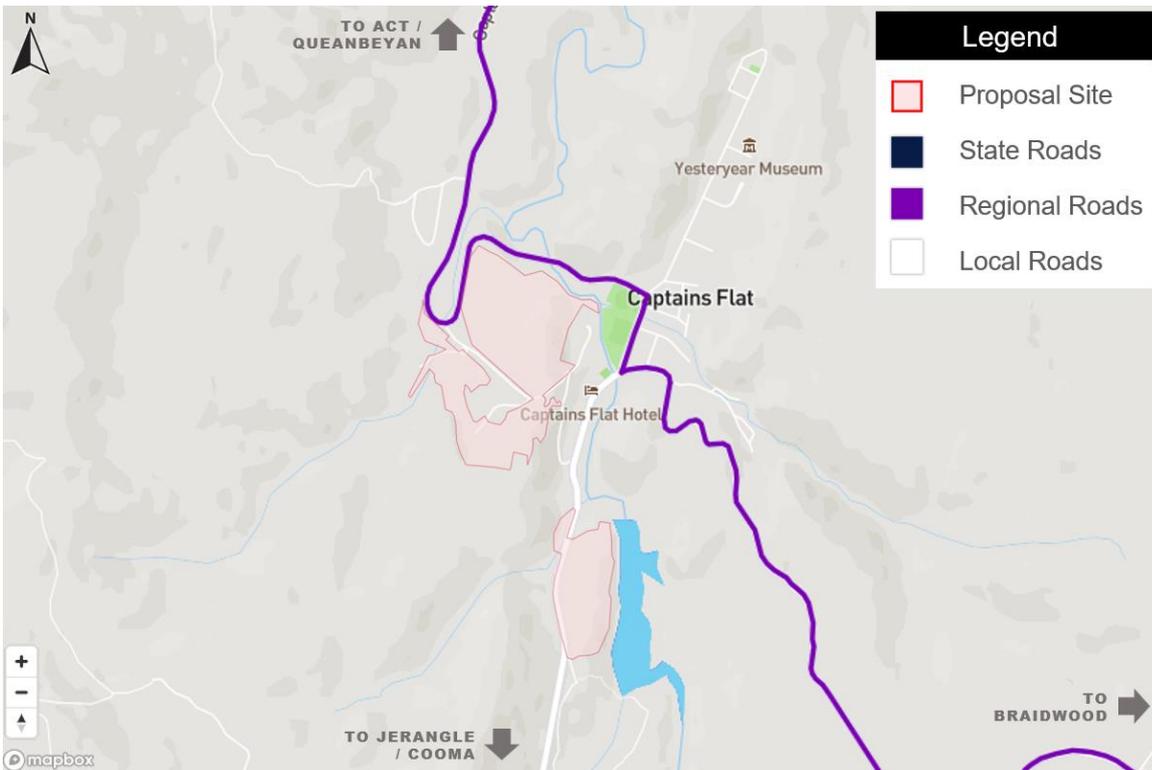
- **State Roads** – Major arterial links through NSW and within major urban areas. They are the principal traffic-carrying roads and are fully controlled and maintained by TfNSW. State Roads include all Tollways, Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- **Regional Roads** – Roads of secondary importance between State Roads and Local Roads which, along with State Roads, provide the main connections to and between smaller towns and perform a sub arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though TfNSW funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under the delegations to local government from TfNSW. Regional Roads may own all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by TfNSW.
- **Local Roads** – The remainder of the council-controlled roads, Local Roads are the responsibility of councils for maintenance funding. TfNSW may fund some maintenance and improvements based on specific programs (e.g. urban bus routes, road safety programs). Traffic management on Local Roads is controlled under the delegations to local government from TfNSW.

Functional Hierarchy

Functional road classification involves the relative balance of the mobility and access functions. TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility, to high accessibility and low mobility. These road classes are:

- **Arterial Roads** – generally controlled by TfNSW, they typically have no limit in flow and are designed to carry vehicles long distance between regional centres.
- **Sub-Arterial Roads** – can be managed by either TfNSW or local council. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day, and their aim is to carry through traffic between specific areas in a sub region or provide connectivity from arterial road routes (regional links).
- **Collector Roads** – provide connectivity between local roads and the arterial road network and typically carry between 2,000 and 10,000 vehicles per day.
- **Local Roads** – provide direct access to properties and the collector road system and typically carry less than 4,000 vehicles per day.

A map of the key roads within the study area and their respective classifications is presented in Figure 2.1. The key roads are discussed further in the following sections.



Source: [NSW Road Network Classifications, TfNSW](#), modified by GHD

Figure 2.1 Road classification within study area

2.1.2 Road characteristics

Captains Flat Road

Captains Flat Road (pictured in Figure 2.2 and Figure 2.3) is a regional road that runs from Carwoola to Ballaba, cutting through the towns of Primrose Valley, Captains Flat, and Harold’s Cross. It is relatively narrow, with carriageway width of approximately 6 metres and no shoulders. It provides inter-town connectivity and direct access to Queanbeyan/Canberra in the north. Due to the absence of any alternative routes, the road is shared by cars, freight, and school buses.

The key features of the section of Captains Flat Road in proximity to the proposal site are outlined in Table 2.1.



(L) North of proposal area, view facing west; (R) Intersection with Miners Road, view facing east | Image Source: Google Street View

Figure 2.2 Captains Flat Road

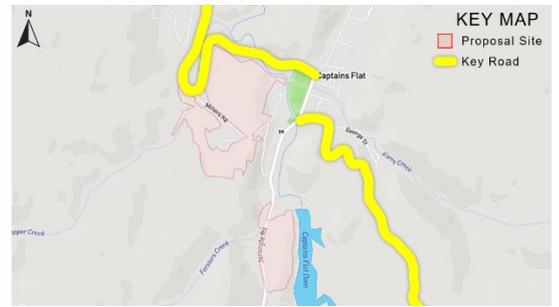


Image Source: Google Street View

Figure 2.3 School bus stops along Captains Flat Road

Table 2.1 Captains Flat Road key features

Feature	Description
Carriageway	Sealed undivided carriageway with two narrow lanes catering to two-way traffic. With lane markings; no shoulders provided.
Road Use	Special Purpose Vehicle (SPV) Level 1 Route
Parking	No designated parking facilities available on-street.
Speed Limit	Varies, from 45 km/h to 100 km/h.
Pedestrian Facilities	No pedestrian facilities are provided along the section of the road within the study area.
Bicycle Facilities	No cycling facilities are provided along the section of the road within the study area.
Public Transport	School bus stops are present along Captains Flat Road (as shown in Figure 2.3). There is no access to regular bus / coach services in the area.



Foxlow Street

Foxlow Street serves as the main spine road of the town of Captains Flat. It runs an approximate north-south alignment and has road widths varying from 10-14 metres, as shown in Figure 2.4 below. The section of Foxlow Street immediately to the right of the proposal area forms part of a regional road, while the rest of its alignment is categorised as a local road. The key features of the section of Foxlow Street located within the study area are outlined in Table 2.2.

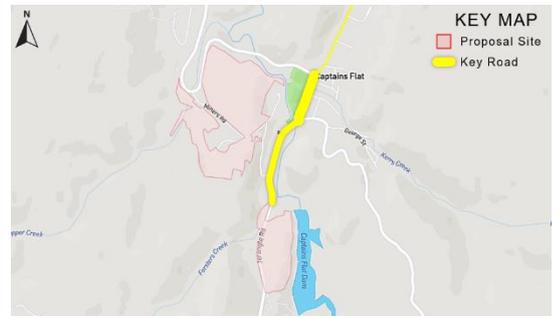


(L) Intersection with Captains Flat Road overlooking mine site, view facing south; (R) View facing south to Southern Dumps | Image Source: Google Street View

Figure 2.4 Foxlow Street

Table 2.2 Foxlow Street key features

Feature	Description
Carriageway	Sealed undivided carriageway with two lanes catering to two-way traffic. With lane markings on sections of the road associated with the regional road network.
Road Use	Special Purpose Vehicle (SPV) Level 1 Route
Parking	No designated parking facilities available, on-street parking is not regulated but observed along the road, particularly near Wilkins Park.
Speed Limit	50 km/h
Pedestrian Facilities	Footpaths are provided on at least one side of the road.
Bicycle Facilities	No dedicated cycling facilities are provided along the section of the road within the study area.
Public Transport	School bus stops are present along Foxlow Street. There is no access to regular bus / coach services in the area.

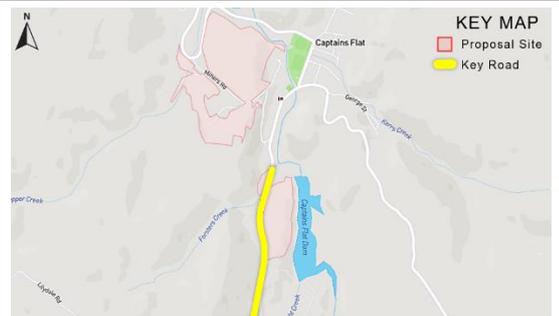


Jerangle Road

Jerangle Road is a local road that continues from the southern terminus of Foxlow Street, located west of the Southern Dumps. It runs an approximate north-south alignment and connects the localities of Captains Flat, Jingera, Anembo, Jerangle, and Bredbo. The section of Jerangle Road within the study area has a width of around 5 metres. The key features of this section of the road are outlined in Table 2.3.

Table 2.3 Jerangle Road key features

Feature	Description
Carriageway	Sealed undivided carriageway with two narrow lanes catering to two-way traffic. No lane markings and shoulders provided.
Road Use	Special Purpose Vehicle (SPV) Level 1 Route
Parking	No designated parking facilities available.
Speed Limit	100 km/h
Pedestrian Facilities	No pedestrian facilities are provided.
Bicycle Facilities	No dedicated cycling facilities are provided.



Feature	Description
Public Transport	No public transport facilities are provided. There is no access to regular bus / coach services in the area.



(L) View facing south; (R) View facing north | Image Source: Google Street View

Figure 2.5 Jerangle Road

Miners Road

Miners Road is a local road that provides primary access to, and within, the proposal site. It has a width of approximately 5 metres and is bounded by Captains Flat Road in the north and Foxlow Street in the south. The road is comprised of a sealed undivided carriageway with two lanes catering to two-way traffic (refer to Figure 2.6). The existing features of Miners Road are outlined in Table 2.4.

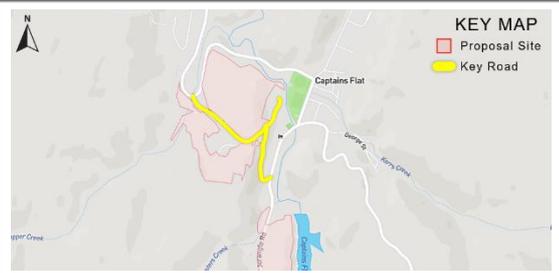


(L) Off Captains Flat Road facing southeast, leading to mine area; (R) View facing northwest toward Captains Flat Road | Image Source: Google Street View

Figure 2.6 Miners Road (western sections)

Table 2.4 Miners Road key features

Feature	Description
Carriageway	Undivided carriageway with two lanes catering to two-way traffic. No lane markings are provided.
Road Use	Special Purpose Vehicle (SPV) Level 1 Route
Parking	No designated parking facilities available.
Speed Limit	50 km/h
Pedestrian Facilities	No pedestrian facilities are provided.



Feature	Description
Bicycle Facilities	No dedicated cycling facilities are provided.
Public Transport	No public transport facilities are provided. There is no access to regular bus / coach services in the area.

2.1.3 Traffic

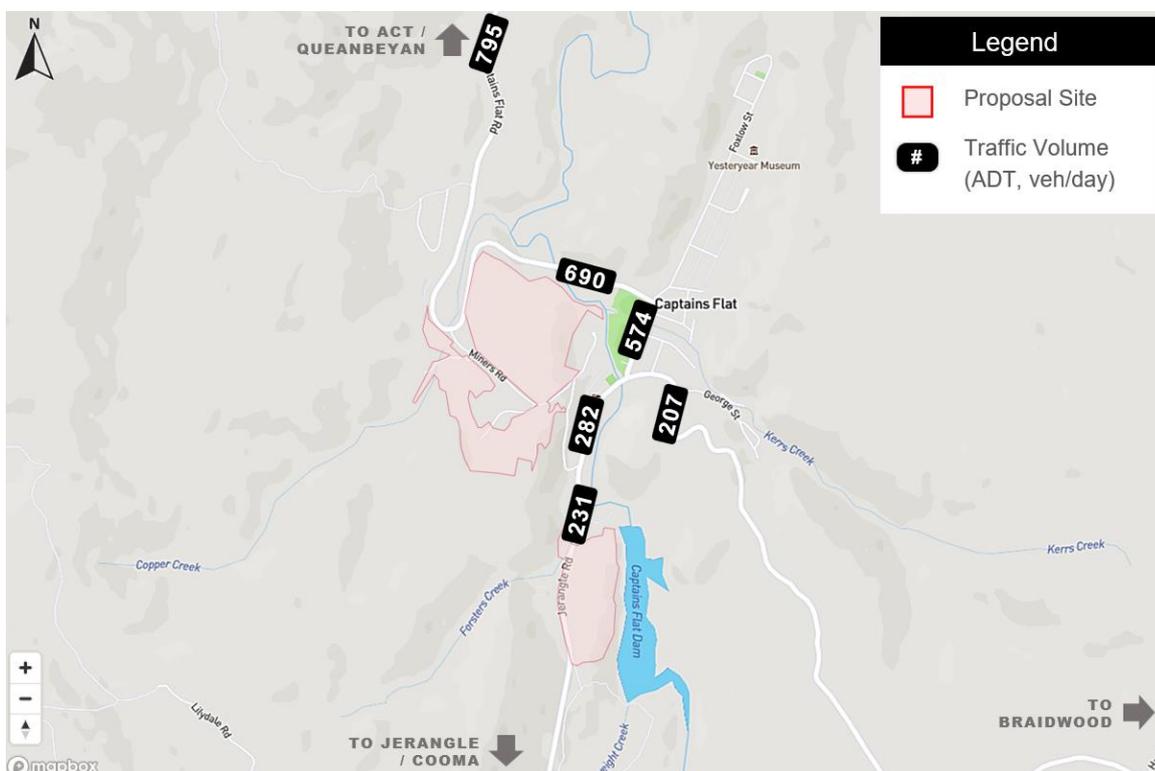
Traffic volumes

Information on the latest available traffic volume counts in the study area was obtained from QPRC. Per Council records, these counts were collected in August and October 2018. The average daily traffic (ADT) along roads in the study area is summarised in Table 2.5 and shown in Figure 2.7. The values indicated depict bi-directional traffic, assumed to be spread evenly between both directions. The percentage of heavy vehicles (%HV) is also indicated in the table.

Table 2.5 Existing traffic volume

Year	Month	Road	Location	ADT *	% HV
2018	8	Captains Flat Road	Primrose Valley South of Hoskinstown Road	795	15.6
2018	10	Captains Flat Road	Captains Flat West of Foxlow Street	690	23.4
2018	10	Foxlow Street	Captains Flat Wilkins Park – Kurrajong Street	574	12.1
2018	10	Captains Flat Road	Captains Flat South of George Street	207	22.1
2018	10	Foxlow Street	Captains Flat North of Miners Road	282	16.5
2018	10	Jerangle Road	Captains Flat South of Foxlow Street	231	14.8

* ADT is in vehicles per day (veh/day)



Source: Base map from OpenStreetMap, Traffic data from QPRC

Figure 2.7 Existing traffic volume

Mid-block analysis

Level of Service (LoS) is a qualitative description of the performance of a road facility that uses a set of letters from A to F to denote different levels of congestion of a corridor or network, with “A” being the most desirable (i.e. free flow) and “F” being the worst (i.e. forced or breakdown flow).

Table 2.6 indicates the LoS for two-way mid-block capacities of rural roads, with the relevant cells highlighted. The table is lifted from Table 4.5 of *Guide to Traffic Generating Developments* (Roads and Traffic Authority 2002); additional columns indicating figures for design speeds of 80 km/hr are shown in the table below, reflecting capacities at around 85 per cent of the original figures.

Table 2.6 Two-way peak hour flow on two-lane rural roads (veh/hr)

Terrain	Level of Service	Design Speed 100 km/hr				Design Speed 80 km/hr			
		Percent of Heavy Vehicles				Percent of Heavy Vehicles			
		0	5	10	15	0	5	10	15
Level	B	630	590	560	530	536	502	476	451
	C	1030	970	920	870	876	825	782	740
	D	1630	1550	1480	1410	1386	1318	1258	1199
	E	2630	2500	2390	2290	2236	2125	2032	1947
Rolling	B	500	420	360	310	425	357	306	264
	C	920	760	650	570	782	646	553	485
	D	1370	1140	970	700	1165	969	825	595
	E	2420	2000	1720	1510	2057	1700	1462	1284
Mountainous	B	340	230	180	150	289	196	153	128
	C	600	410	320	260	510	349	272	221
	D	1050	680	500	400	893	578	425	340
	E	2160	1400	1040	820	1836	1190	884	697

Note: Terrain types are classified based on the following general maximum grade (Austroads 2021; Guide to Road Design Part 3, Table 8.3). At 80 km/h: Flat: 4-6%; Rolling: 5-7%; Mountainous 7-9%

Peak hour volumes used in the assessment are assumed to be 10 per cent of the ADT. In accordance with the above, Table 2.7 presents the LoS of the roads within the study area.

Table 2.7 Mid-block review of roads within study area

Road	Location	ADT		LoS
		(veh / day)	(veh / hr)	
Captains Flat Road	Primrose Valley South of Hoskinstown Road	795	80	A
Captains Flat Road	Captains Flat West of Foxlow Street	690	69	A
Foxlow Street	Captains Flat Wilkins Park - Kurrajong Street	574	58	A
Captains Flat Road	Captains Flat South of George Street	207	21	A
Foxlow Street	Captains Flat North of Miners Road	282	29	A
Jerangle Road	Captains Flat South of Foxlow Street	231	24	A

As shown, the roads currently operate within desirable levels, with mid-block capacities all falling under LoS A.

2.2 Public and active transport

In reviewing the site and its accessibility to public transport opportunity, reference was made to the *NSW Planning Guidelines for Walking and Cycling* (NSW Government 2004). This document outlines a recommended walkable distance of 400 to 800 metres to public transport and other local amenities, or a 1.5-kilometre bicycle riding distance.

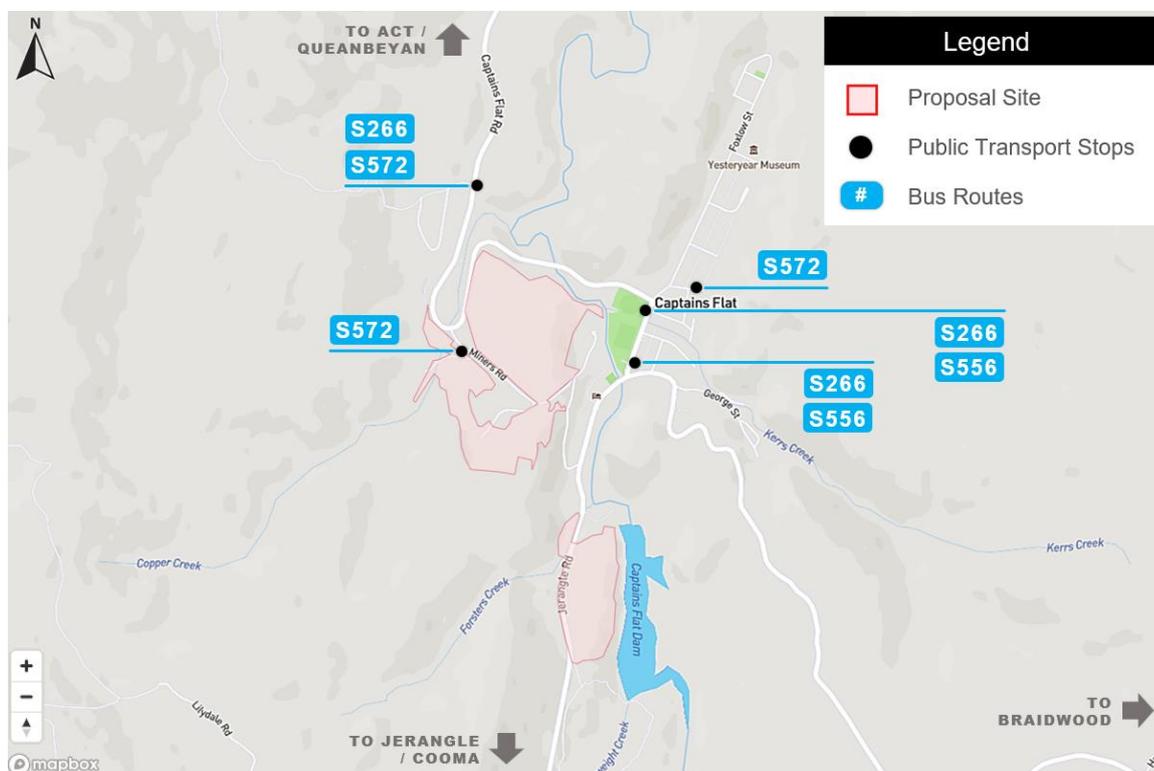
Details of public transport, walking and bicycle riding access is provided in the following sub-sections.

2.2.1 Train and bus services

At the time of writing, only school bus services are available within 800 metres from the proposal site. The following bus routes provide school children access to schools located in other towns, with the location of school bus stops shown in Figure 2.8:

- Route S266: Captains Flat to Queanbeyan West Public via Queanbeyan Interchange
- Route S572: Captains Flat to Hoskinstown via Rossi and vice versa
- Route S556: Captains Flat to Braidwood Schools and vice versa.

There is no access to train services and regular bus services in the proposal area.



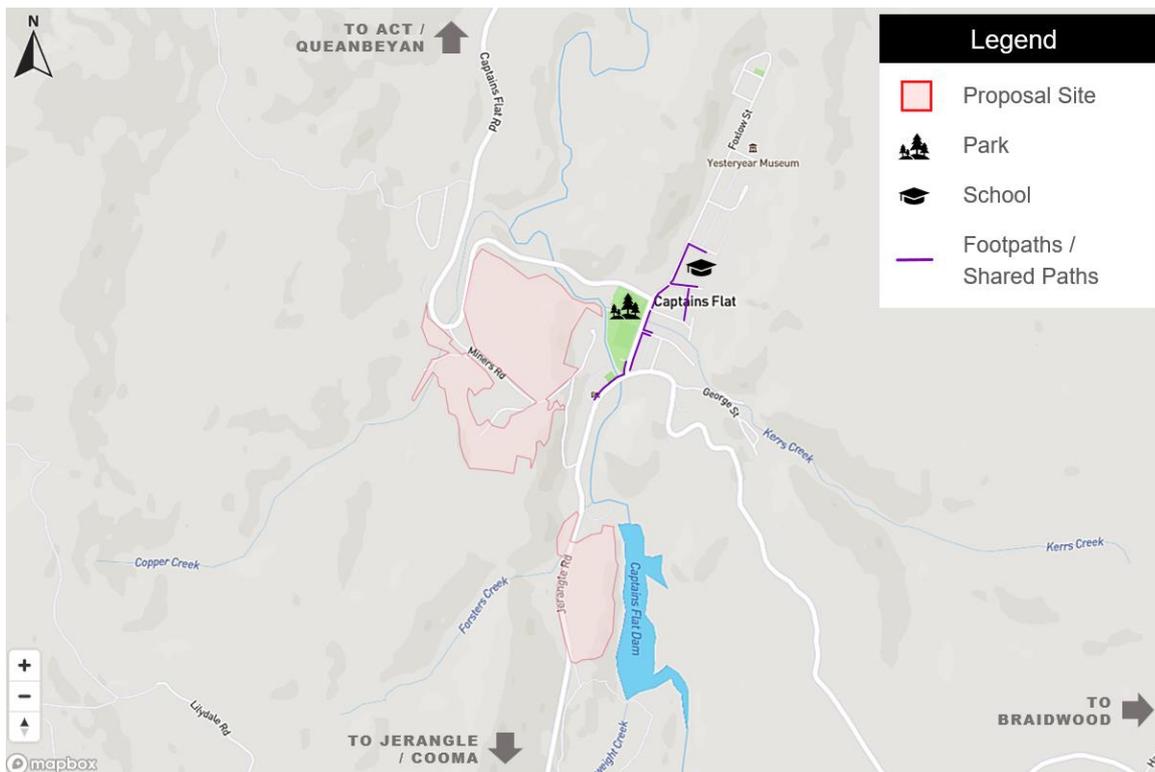
Source: Base map from OpenStreetMap; Bus stop information from [TfNSW Trip Planner](#)

Figure 2.8 Location of bus stops

2.2.2 Walking and cycling

Active transport facilities in proximity to the proposal site are limited to footpaths/shared paths along Foxlow Street, Montgomery Street, Newman Street, and Mulga Street in the town of Captains Flat (refer to Figure 2.9 below). These facilities are provided around Captains Flat Public School and Wilkins Park.

There are no dedicated footpaths and cycling lanes that provide access to or within the proposal site.



Source: Base map from OpenStreetMap, information from Google Street View

Figure 2.9 Walking and cycling facilities

2.3 Crash review

Road crash information in proximity to the site was collected from road crash statistics published by NSW Centre for Road Safety. From 2015 to 2019, a total of five road crash incidents were recorded within a two kilometre radius from the site, as presented in Table 2.8.

Table 2.8 Road crash incidents within a two-kilometre radius

Year	Crash ID	Location	Type of crash	Degree of Crash	Lighting Condition
2016	1107637	Foxlow Street	Off-carriageway left on right bend	Moderate injury	Daylight
2016	1132192	Captains Flat Road	Off-carriageway right on left bend into object	Moderate injury	Dusk
2017	1152846	Captains Flat Road	Off-carriageway right on left bend into object	Moderate injury	Darkness
2018	1170732	Captains Flat Road	Off-carriageway right on left bend into object	Moderate injury	Daylight
2019	1195498	Foxlow Street	Leaving parking	Non-casualty	Daylight

The predominant crash type is off-carriageway right on left bend into object (road user movement (RUM) code 85). The location of the crashes (shown in Figure 2.10) suggest that the topography and limited sight distance along the bends on Captains Flat Road contributed to the incidents.

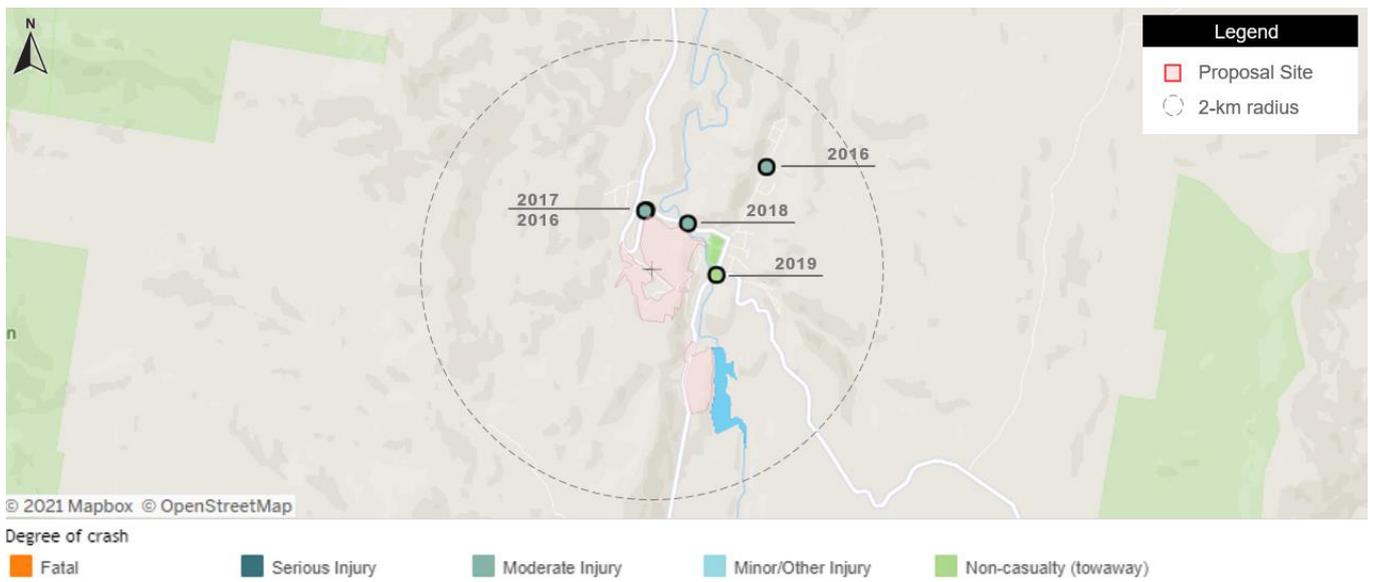


Figure 2.10 Road crashes within site vicinity

3. The proposed activity

3.1 Proposed remediation works

The proposed remediation works include, and build on, those described in the *Lake George Mine, Captains Flat Detailed Design Report* (GHD 2020). The proposed remediation works broadly include:

- Site preparatory early works
- Fencing historic mining structures
- Strategic structural works
- Remediation earthworks
- Augmentation of surface and subsurface drainage
- Revegetation site prep.

The proposed remediation works would be undertaken across several key domains, predominantly in the northern portion of Lake George Mine. These include:

- North Mine Ridge/Elliot's
- Old Mill
- Mill Area (west of the Central Mine Area)
- Central Mine Area
- Creeks Area
- Rail Loading Area
- Minor areas of eroded capping in the Northern and Southern Dumps.

In addition, mine waste from the following sources are proposed for relocation to a containment cell that would be located on the Northern Dumps. These include:

- A sulfidic waste stockpile located on the junction of Miners Road and the Council wastewater treatment plant access road.
- A slag pile located on the western side of Jerangle Road in Forster's Gully, adjacent to the northern end of the Southern Dumps.
- TfNSW lead contamination from around the Captains Flat Railway Precinct
- Crown Land / QPRC land within the Captains Flat township. That is, The Captains Flat Lead Management Taskforce is currently undertaking an assessment of the Captains Flat township with the aim to prepare abatement plans for the higher risk public spaces. One option being investigated is moving up to 20,000 tonnes of contaminated soil from these Crown Land / QPRC-owned abatement areas into the containment cell on the Northern Dumps, as required. Note that approval under the NSW Planning and Assessment Act 1979 for the abatement area remediation would be undertaken as a separate approval to this REF. The maximum spatial footprint of the proposed remedial works is shown in Figure 1.2 in Section 1 (excluding Crown Lands / QPRC abatement areas).

3.2 Equipment

The proposed remediation works would be undertaken using conventional earthmoving equipment. The plant and equipment likely to be used includes:

- Up to 2 x Excavators (20 to 30 tonnes)
- Up to 2 x Bulldozer (D5)
- 1 x Bulldozer (D8)
- Up to 3 x Dump trucks (30 tonnes articulated vehicles)
- Up to 2 x Padfoot rollers / Compactors
- 2 x Water trucks (water carts fed from an on-site 100,000-litre tank supplied by the town reservoir).

The exact make of the equipment may vary depending on availability and operational requirements. However, for the purposes of the assessment, it is assumed the above equipment or similar will be used.

3.3 Workforce

The proposed remediation works would require an estimated peak workforce of approximately 25 people. It is proposed to use predominantly local sub-contractors under the Principal Contractor, who would likely be sourced from the Queanbeyan/Canberra area.

3.4 Work hours

The proposed remediation works would be undertaken as follows, and in accordance with *Interim Construction Noise Guideline (DECC, 2009)*.

- Monday to Friday 07:00 AM to 06:00 PM
- Saturday 08:00 AM to 01:00 PM
- No works on Sundays or Public Holidays.

No work would be undertaken outside of these hours.

3.5 Duration of works

The proposed remediation works are estimated to take up to 19 months from site establishment / early works scheduled for June 2022 to final site demobilisation around December 2023. A period of 18 months has been assumed for imported material delivery. Material and supply delays may lead to the works being extended over a longer period.

3.6 Source and quantity of materials

Materials listed in Table 3.1 will be sourced from off-site under the proposal. For the purposes of this assessment, it was assumed that these materials will be imported from various sources including Bungendore, Marulan, Galong, and Braidwood. The origin of imported materials is assumed to be split as follows:

Table 3.1 Imported material sources

Material	Quantity	Origin*	
		North	East
Lime	1,628 tonnes	100%	0%
Lime alternate	9,071 tonnes	100%	0%
Subsoil	27,688 tonnes	100%	0%
Topsoil	12,844 tonnes	90%	10%
Clay	3,450 tonnes	100%	0%
Rock mulch	14,388 tonnes	100%	0%
Cellular confinement system	11,300 m ²	100%	0%
Hydromulch	-	100%	0%
Geotextile	47,960 m ²	100%	0%

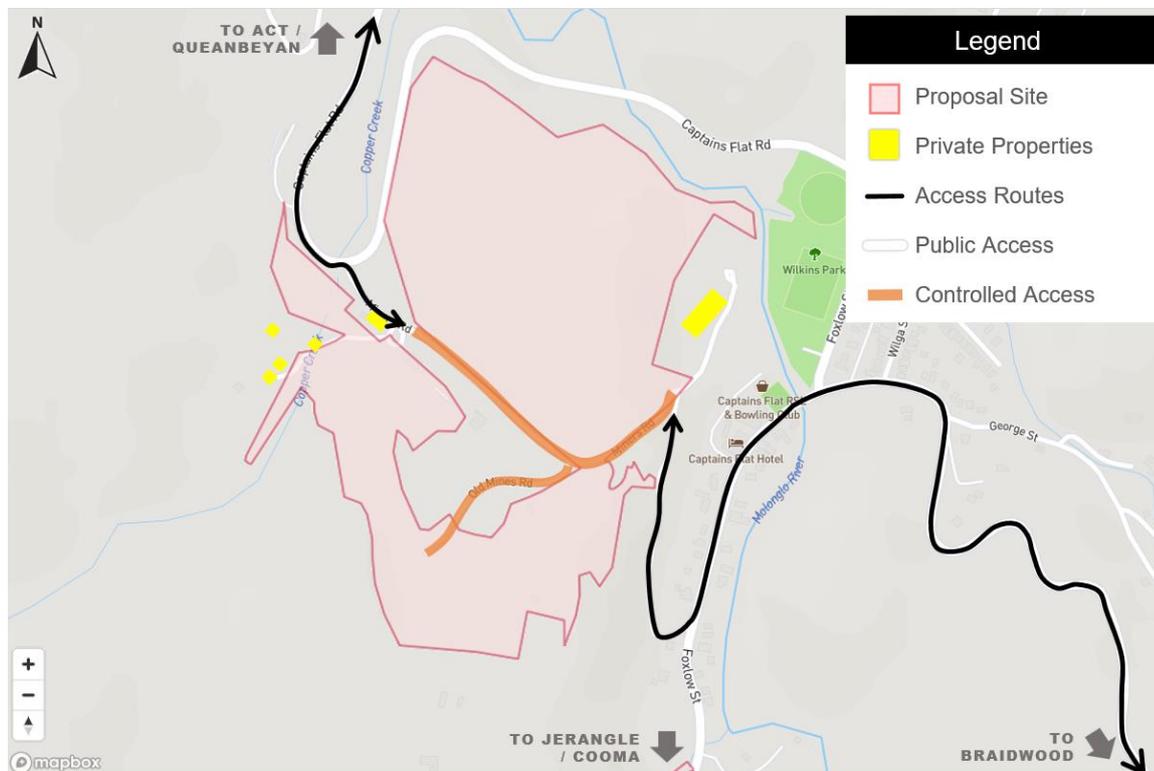
* Note: North to mean sourced from areas located north or west of the town of Captains Flat (e.g. Bungendore, Marulan, Galong)
East to mean sourced from areas located east of the town of Captains Flat (e.g. Braidwood).

3.7 Access

Access to the site is via public roads, specifically from the north via Miners Roads off Captains Flat Road and from the east from Miners Road off Foxlow Street. The majority of traffic will access the site from the north, with traffic coming from the south where required. This access arrangement will help to reduce traffic movement through the town of Captains Flat.

The proposal site will be a controlled construction site during the course of the remediation works. As such, internal access roads will be closed off to the public to manage vehicle movements and activities. The extent of internal road closures is shown in Figure 3.1. This arrangement will minimise movement of through traffic on Miners Road while maintaining access to the private properties located within the proposal site.

Further discussion on access arrangements is found at Section 4. Council will be consulted during the planning and construction of the proposed to manage any cumulative traffic impacts.



Source: Base map from OpenStreetMap

Figure 3.1 Site access during remediation

3.8 Parking

A parking area for site personnel’s vehicles will be allocated within the site compound, to be located at the northern portion of the Central Mine Area (currently utilised for tourist parking).

On-site car parking shall be provided in accordance with the *Guide to Traffic Generating Developments* (Roads and Traffic Authority 2002), as required in the Palerang Development Control Plan 2015 (DCP).

As site access will be limited to Miners Road, light vehicles will likely need to traverse internal haulage routes and share road space with heavy vehicles to access parking.

4. Impact assessment

4.1 Traffic generation

The approximate volumes of imported material are summarised in Table 4.1 to inform the volume of truck movements over the proposed remediation works schedule. The numbers assume the following densities; topsoil (1.3 tonnes per m³), subsoil (1.4), clay (2.0) and rock mulch (1.6). No bulking factors have been used. It is assumed that imported material is being supplied using truck and trailers (i.e. truck and dog configuration) with a payload of circa 33 tonnes. Both the number of trucks (for material delivery) and truck movements (return trip for traffic impact considerations) have been provided.

Table 4.1 Estimated truck movements for imported material

Material	m ²	m ³	tonnes	trucks	truck movements (in/out)
Lime	-	-	1,628	49	98
Lime alternate	-	-	9,071	275	550
Subsoil	-	27,688	38,763	1,175	2,350
Topsoil	-	12,844	16,697	506	1,012
Clay	-	3,450	6,900	209	418
Rock mulch	-	14,388	23,020	698	1,396
Cellular confinement system *	1,300	-	-	10	20
Hydromulch	-	-	-	30	60
Geotextile **	47,960	-	-	50	100

* Presto Geoweb at 150 mm depth.

** Assumes Bidim A24; 80 units of 600 m² each at circa 130 kg each.

The above totals around 3,002 trucks, for approximately 6,004 truck movements over the materials delivery window of 18 months. Based on standard construction work hours, this is the equivalent of around 79 truck movements per week, being approximately one truck for two truck movements every hour. Most material would be delivered from the north, with approximately 10 per cent of topsoil being delivered from the east (making up approximately two per cent of the total heavy vehicle movements).

Additionally, minor truck movements between the main site and the Southern Dumps are expected to be generated by the relocation of the slag heap located along the western side of Jerangle Road.

Light vehicle movements would be commensurate with the maximum estimated workforce of around 25 people. The bulk of light vehicle movements would be expected to come from the Queanbeyan/Canberra area, with car-pooling encouraged where possible, and COVID-permitting.

4.2 Access and haulage routes

Materials delivery arrangements are assumed to utilise truck and trailer combinations that comply with prescribed mass and dimension requirements¹ and are considered general access vehicles² (GAV). As such, these heavy vehicles would not be restricted to ply specific heavy vehicle routes.

Main access routes to the site are shown in Figure 4.1. The following roads are identified to be most affected by the remediation works:

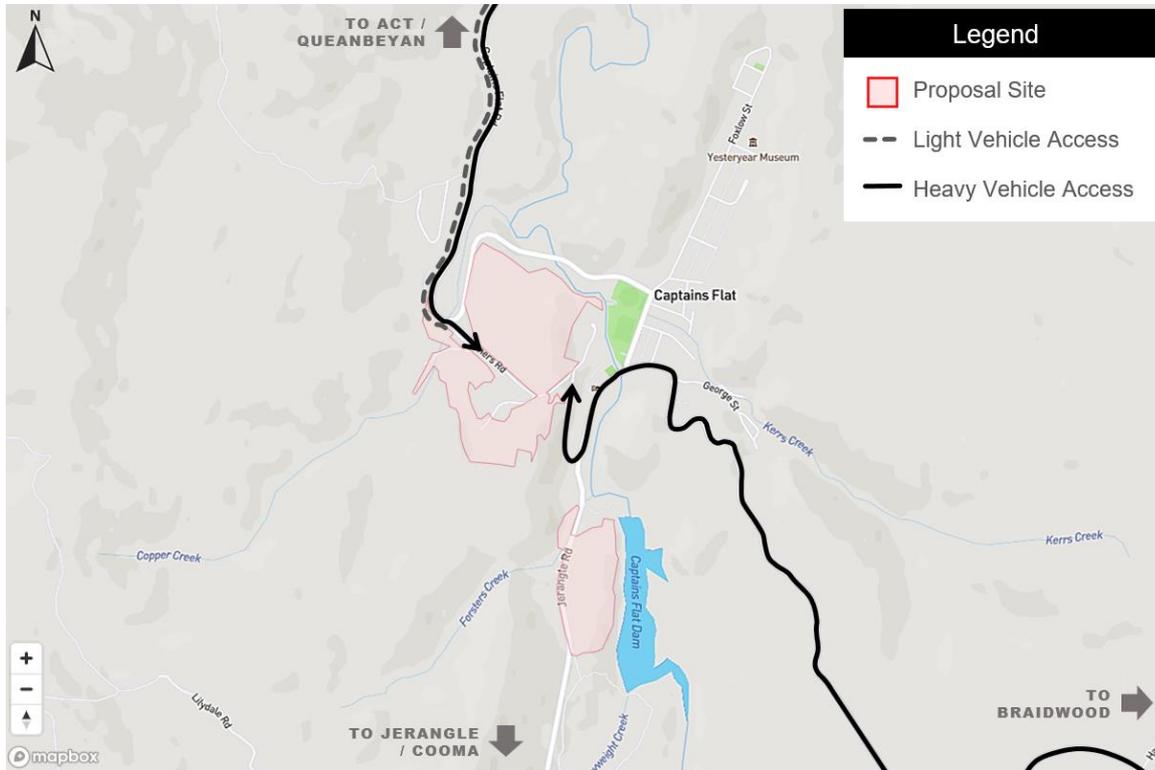
- Captains Flat Road (north of the proposal site, leading to Queanbeyan/Canberra)
- Captains Flat Road (east of the proposal site, leading to Braidwood)

¹ Requirements can be accessed on the NHVR webpage ([General Access Vehicles](#))

² [Classes of Heavy Vehicles in the Heavy Vehicle National Law](#), National Heavy Vehicle Regulator (NHVR) 2019

- Foxlow Street (east of the proposal site, between Miners Road and Captains Flat Road (Braidwood Road)).

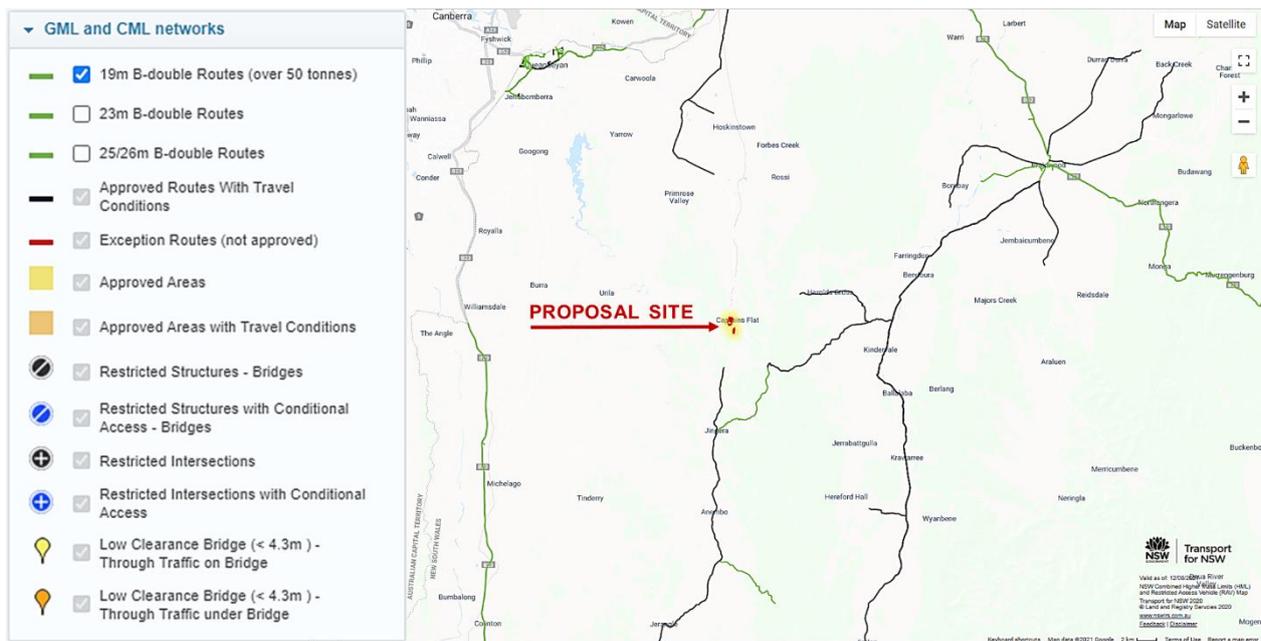
Other roads, such as Jerangle Road, will have minor traffic movements for short periods of time associated with specific activities such as remediation of the slag pile. However, these movements have been determined to have an insignificant impact to traffic generation.



Source: Base map from OpenStreetMap

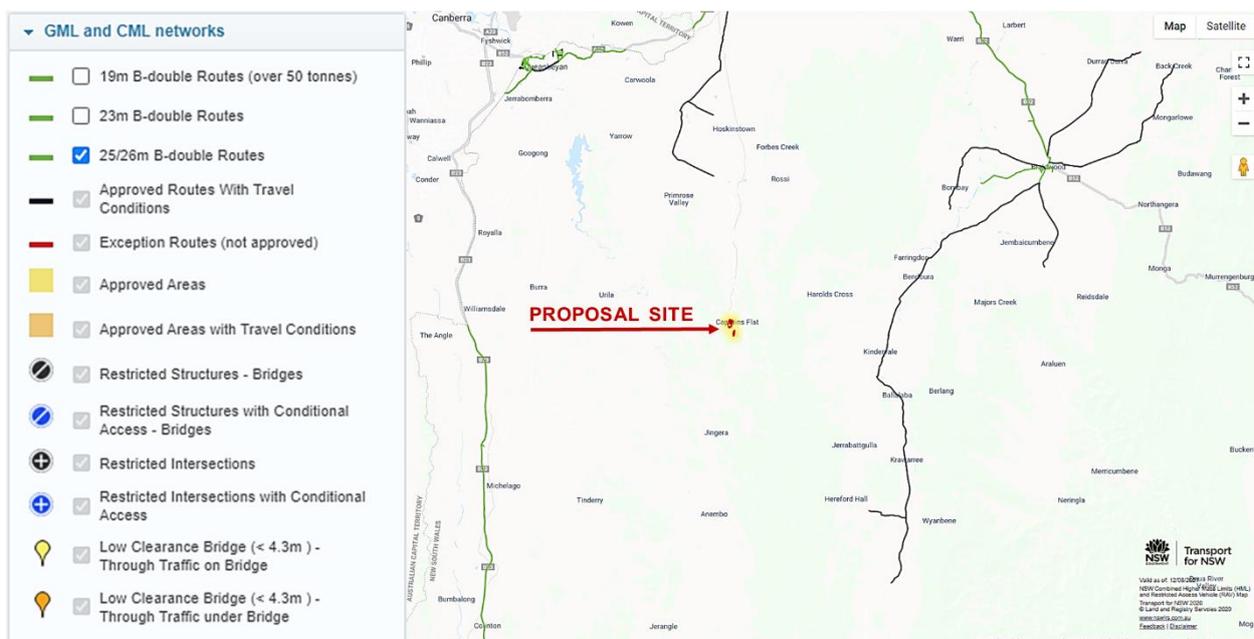
Figure 4.1 Proposed access routes

Should the use of larger vehicles be necessary, the contractor must comply with permits and approvals to access the proposal site as it is located in an area outside the coverage of approved General Mass Limit (GML) and Higher Mass Limit (HML) routes in the region (refer to Figure 4.2 and Figure 4.3 below).



Source: NSW Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Map, Transport for NSW; modified by GHD

Figure 4.2 GML Routes (19 B-double Routes)



Source: [NSW Combined Higher Mass Limits \(HML\) and Restricted Access Vehicle \(RAV\) Map](#), Transport for NSW; modified by GHD

Figure 4.3 HML Routes (19 B-double Routes) (25 / 26m B-double Routes)

4.3 Traffic impact

Traffic impacts on the immediate road network is assessed by taking the maximum hourly traffic generation (vehicle movement) of the proposal site and adding it to the existing traffic on the affected roads.

Heavy vehicle movements associated with material deliveries are expected to take place within the prescribed work hours (refer to Section 3.4). On the other hand, light vehicle movements associated with the ingress and egress of site personnel are expected to occur slightly earlier and later than the prescribed work hours (respectively).

Operationally, the maximum traffic generation of the two vehicle types will not coincide in the same period. For the purposes of this assessment, and to obtain a conservative estimate, the following conditions are assumed:

- The maximum hourly traffic generation for both vehicle types occur at the same hour, with the morning peak hour (AM peak) associated with ingress, and the afternoon peak hour (PM peak) for the egress.
- The maximum hourly traffic generation is the same for the AM peak and the PM peak. The values are simply referred to as “peak hour traffic generation”.
- Peak hour traffic generation of the proposed remediation works coincide with the existing peak hour of the road network.

The estimated peak hour traffic generation is shown in Table 4.2. The resulting LoS of the affected roads are presented in Table 4.3.

Table 4.2 Peak hour traffic generation (vehicle movements)

Vehicle Type	Movements (veh/hr)	Access Point		Movements (veh/hr)	
		North	South	North	South
Light Vehicles	25	100%	0%	25	0
Heavy Vehicles*	2	99%	1%	2	1**
Total	27			27	1

* Around 10% of imported topsoil material is assumed to be sourced from Braidwood, making up around 1% of the total number of HV accessing the site. * Around 10% of imported topsoil material is assumed to be sourced from Braidwood, making up around 2% of the total number of HV accessing the site.

** The number of HV accessing the site from the south has been rounded up to 1 get a very conservative assessment.

Table 4.3 Mid-block review of affected roads

Road	Location	Existing		Generated	Total	
		(veh / hr)	LoS	(veh / hr)	(veh / hr)	LoS
Captains Flat Road	Primrose Valley South of Hoskinstown Road	80	A	27	107	A
Captains Flat Road	Captains Flat South of George Street	21	A	1	22	A
Foxlow Street	Captains Flat North of Miners Road	29	A	1	30	A

As shown in Table 4.3, additional traffic generated by the remediation works would significantly increase volumes along Captains Flat Road north of the site; however, this is only due to the fact that the baseline traffic volumes in the area are very low. Inspection of traffic volumes against road capacity show that the road would still operate under LoS A (signifying unimpeded flow) with the additional traffic from the remediation works.

Traffic that would be rerouted from the partial closure of Miners Road is expected to be very minimal and would not affect the LoS of existing roads or adversely impact circulation in the road network.

Opportunities to reduce light vehicle movements by encouraging carpooling or providing coach services from Queanbeyan/Canberra to Captains Flat would also potentially reduce the expected traffic generation from the remediation works.

4.4 Public and active transport

The proposed remediation works would not impact on public and active transport in the study area.

4.5 Parking impacts

A parking area for site personnel’s vehicles would be allocated within site premises and would not impact on-street and other public parking in the town of Captains Flat.

4.6 Property access

Access to private properties that are within the proposal site are being organised by NSW Legacy Mines. Access to these properties will be maintained through the proposal’s construction.

The proposed remediation works would not impact access to properties located outside the proposal site.

5. Mitigation and management measures

5.1 Traffic Management Plan

A Traffic Management Plan (TMP) would be prepared by the contractor prior to commencing the remediation works. The TMP will aim to facilitate the safety of all workers and road users within, including access to, the proposal site. The primary objectives of the TMP will be:

- To minimise the impact of the vehicle traffic (particularly, heavy vehicle traffic) on the operation of the adjoining road network
- To facilitate the continuous, safe, and efficient movement of traffic for both the general public and site personnel / workers
- To facilitate the establishment of a safe pedestrian environment in the vicinity of the site
- To provide a description of the types of vehicles and estimated vehicle volumes during each stage of the remediation works
- To provide information regarding the access arrangement and a description of the proposed routes for vehicles accessing and egressing the proposal site.

The TMP should include the following:

- TMP objectives similar to those defined above
- Vehicle approach and departure routes to the site that will minimise the impacts of heavy vehicles and equipment on the adjacent road network
- Vehicle types and ambulant equipment to be used in the remediation works
- Areas of parking for site personnel which should preferably be within site premises (away from residential areas, not impacting public parking)
- Transport options for workers to the site that will maximise safety and maintain accessibility for pedestrians and cyclists
- Site access constraints such as vehicle restrictions (e.g. road network load limits/height restrictions) on haulage routes
- Areas of vulnerable road users (pedestrians and bicycle riders) and high areas of potential pedestrian activity
- Methods of communicating traffic changes on the road network
- Impacts on public and active transport (including cycle / pedestrian paths) services around the site
- Road network operational impacts within the vicinity of the site
- A Driver's Code
- General mitigation measures.

5.2 Traffic management measures

The following are the recommended measures that should be in place prior to the commencement of and during the remediation period.

- Key stakeholders, including owners/operators of adjacent lands and emergency service providers, should be notified of any changes to the traffic management arrangements prior to the commencement of works.
- Construction works should occur within the standard hours defined by the *Interim Construction Noise Guideline* (DECC, 2009).
- Truck drivers should be directed to follow the predetermined haulage routes. Additionally, all drivers must observe post speed limits on adjoining road networks to comply with Australian Road Rules. Drivers are to adjust speeds to suit the road environment and weather conditions appropriately to ensure safe movement of the vehicles based on the individual vehicle configurations.
- Any workers required to undertake works or traffic control shall be suitably trained and hold the required accreditation to carry out works on site and will also be site inducted.

- Protection will be provided to workers and road users through advance warning of roadworks, speed changes, safety barriers with adequate offsets and deflection allowance, where necessary.
- Roadwork speed zones must be logical, credible, and enforceable. They should only be used where they are self-enforcing or will be enforced. They should be used with other traffic control signs and devices and should not be used in place of more effective traffic controls.
- A safe exclusion zone around mobile plants are to be maintained which includes 10 metres from excavators and 3 metres from loaders. Signs such as “Stop” signs, “Give way” signs and “Speed Humps” are to be placed at various locations along entry points and haul roads. Drivers are to follow the internal site road rules (which shall be outline in the TMP) as well as to comply with Australian Road Rules at all times.
- Access for emergency vehicles would be maintained at the proposal site during the duration of the remediation works, in accordance with emergency vehicle requirements. The emergency services, including fire, ambulance and police, would be advised of all planned changes to traffic arrangements prior to the commencement of remediation works.
- The following environmental requirements should be adhered to:
 - All vehicles transporting loose materials will have the entire load covered and/or secured to prevent any large items, excess dust or debris depositing onto the roadway during travel to and from the site, including but not limited to construction rumble strips/wheels wash at the site egress location.
 - The lead contractor will monitor the roads leading to and from the site and take all necessary steps to rectify any road deposits caused by site vehicles, to maintain the safety of all road users.
 - Vehicles operating to, from and within the site shall do so in a manner, which does not create unreasonable or unnecessary noise or vibration.
 - Public roads and access points will not be obstructed by any materials, vehicles, refuse skips or the like, under any circumstances.
 - All staff and subcontractors engaged on site should be required to undergo site induction. The induction will outline the requirements of the TMP, including (but not limited to):
 - Site access routes
 - Environmental and occupational health and safety responsibilities
 - Emergency procedures
 - Potential carpooling opportunities
 - Vehicle height restriction under the power lines.
 - Additionally, the Site Manager will discuss TMP requirements regularly as a part of “toolbox talks”.

6. Summary and Conclusions

6.1 Overview

This Traffic Impact Assessment (TIA) forms part of the Review of Environmental Factors (REF) that has been prepared by GHD on behalf of LMP. The purpose of the REF is to describe the proposed remediation works, to assess the likely impacts of the works, and to identify mitigation measures to reduce these impacts.

This TIA documents the results of the assessment of the potential traffic and transportation impacts of the proposed remediation works, and includes the following scope:

- Review of the existing road network and traffic conditions
- Review of site access arrangements (including public transport)
- Assessment of the traffic implications arising from the remediation activities
- Determine suitable mitigation measures to minimise any adverse effects to existing road users.

6.2 Key findings

The Key findings of the TIA are summarised as follows:

Existing Conditions

- **Access.** The proposal site has two access points: Miners Road, off Captains Flat Road in the north; and Miners Road off Foxlow Street in the south. As both points are located outside of the town, vehicles going to/from the proposal site do not need to go through Captains Flat town to access the site.
- **Traffic Volume.** The existing road network in proximity to the proposal site is characterised by low traffic volumes, with ADT ranging from 207 to 795 vehicles per day (equivalent to an LoS of “A”).
- **Active and Public Transport.** There is no access to train services or regular bus services in the proposal area. At the time of writing, only school bus services are available within 800 metres from the proposal site. There are no dedicated footpaths and cycling lanes that provide access to or within the proposal site. Active transport facilities in proximity to the site are limited to the town, located around Captains Flat Public School and Wilkins Park.
- **Crash Review.** A review of five-year crash data showed five road crash incidents recorded within a two-kilometre radius from the site, three of which occurred on Captains Flat Road. The predominant crash type was off-carriageway right on left bend into object (RUM 85). The location of the crashes (shown in Figure 2.10) suggest that the topography and limited sight distance along the bends on Captains Flat Road contributed to the incidents. The recorded crash incidents are not located along identified haulage routes for the proposed remediation works.

Traffic Generation and Implications

- The proposed remediation works is anticipated to generate 6,004 truck movements (heavy vehicle movements, in and out) over the 19-month materials delivery window, equalling to about two truck movements per hour. In addition, around 50 light vehicle movements (in and out) are expected to be generated by site personnel accessing the site, equivalent to 25 light vehicle movements during the peak hour.
 - The proposed remediation works is anticipated to generate the following total vehicle movements during the peak hour:

– LV	25 vehicle movements per hour	access off Captains Flat Road (north)
– HV	2 vehicle movements per hour	access off Captains Flat Road (north)
– HV	1 vehicle movement per hour	access off Foxlow Street (south).
- There is adequate capacity in the surrounding existing local road network to accommodate the traffic generated by the remediation works. Based on the assessment, LoS A would be maintained on the affected roads even with the additional vehicle movements associated to the works.

Traffic that would be rerouted from the partial closure of Miners Road is expected to be very minimal and would not affect the LoS of existing roads or impact circulation in the road network.

- Opportunities to reduce light vehicle movements by encouraging carpooling or providing coach/shuttle services from Queanbeyan to Captains Flat would also potentially reduce the expected traffic generation from the remediation works.
- A parking area for site personnel's vehicles would be allocated within site premises and would not impact on-street and other public parking in the town of Captains Flat.
- The proposal would not impact on public transport movements or property access.

6.3 Conclusion

Based on the assumptions and findings outlined in this report, it is considered that the proposal satisfies the planning requirements on traffic engineering grounds and is not anticipated to have adverse traffic impacts on the surrounding road network.

7. References

- Austrroads (2021). *Guide to Road Design Part 3: Geometric Design, Edition 3.4*, AGRD03-16, Austrroads, Sydney, NSW.
- Brooks, K. (1980). *Mine Waste Pollution of the Molonglo River: An Investigation into the Effect of Remedial Measures Carried Out in 1976 at Captains Flat*. Sydney : Chemical Laboratory New South Wales Department of Mineral Resources, 1980.
- Dobos and Associates. (2002). *Risk Assessment and Remedial Action Plan Derelict Lake George Mine Captains Flat*.
- GHD (2018). *Lake George Captains Flat Mine Review: Assessment of Remedial Options*.
- GHD (2020). *Lake George Mine, Captains Flat Detailed Design Report*.
- Glasson, K R and Paine, V R. (1965). *Lead-zinc-copper deposits of Lake George Mines, Captains Flat*. [book auth.] J McAndrew. *Geology of Australian Ore Deposits*. Melbourne : Australasian Institute of Mining and Metallurgy, 1965, pp. 423-431.
- Hogg, D. (1990). *Evaluation of Remedial Works at Captains Flat Mine*. Macquarie, ACT : David Hogg Pty Ltd, 1990.
- National Heavy Vehicle Regulator (2019). *Classes of Heavy Vehicles in the Heavy Vehicle National Law*. Accessed online at: <https://www.nhvr.gov.au/files/201708-0672-classes-of-heavy-vehicles-in-hvnl.pdf>
- NSW Department of Environment and Climate Change (DECC) (2009). *NSW Interim Construction Noise Guideline*. Accessed online at: <https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/noise/09265cng.ashx>
- NSW Department of Planning and Environment (DPE) (2015). *ESG2: Guideline for preparing a Review of Environmental Factors*. DPE, Sydney, NSW.
- NSW Government (1993). *Roads Act 1993*. No 33. Accessed online at: <https://legislation.nsw.gov.au/view/whole/html/inforce/2016-06-01/act-1993-033>
- NSW Government (2004). *NSW Planning Guidelines for Walking and Cycling*.
- Palerang Council (2020). *Palerang Development Control Plan 2015*, with amendments to Part E Notification. Palerang Council. QPRC, Australia.
- Roads and Traffic Authority (2002). *Guide to traffic generating developments, version 2.2*, RTA, Sydney, NSW.
- URS (2004). *Environmental Site Assessment and Remediation Action Plan for the Ore Processing and Loading Area at the Lake George Mine at Captain's Flat*. North Sydney : URS Australia Pty Ltd, 2004.



ghd.com

→ **The Power of Commitment**

Appendix N

Sensitive Land

Sensitive land

Land	Identification	Is the site in this Sensitive Land?	Is Sensitive Land less than 20 km away?	Source
Conservation Areas				
Land Reserved under the National Parks and Wildlife Act	A search of the OEH spatial portal has identified to be surrounded by the Tallaganda National Park, the Yanununbeyan National Park and the Yanununbeyan State Conservative Area. The site is not located within these land reserves.	No	Yes	Sharing and Enabling Environmental Data (SEED) NSW National Parks and Wildlife Services
Land acquired by the Minister for the Environment under the <i>National Parks and Wildlife Act</i>	The site is in an area of highly disturbed terrain. It has not been identified to be land acquired by the minister for the environment.	No	No	NSW Crown Lands
Land subject to the conservation agreement under the <i>National Parks and Wildlife Act 1974</i>	The site is in an area of highly disturbed terrain. It has not been identified to be land subject to the conservation agreement by the minister for the environment.	No	No	NSW Crown Lands
Land declared as an aquatic reserve under the <i>Marine Estate Management Act 2014</i> .	Aquatic reserves are part of the marine protected areas under the Marine Estate Management Act 2014. A search of the Department of Primary Industries (DPI) has identified that the site is not in a marine protected area and is therefore not in an aquatic reserve.	No	No	DPI protecting habitat web page SEED
Land declared as marine parks under the <i>Marine Estate Management Act 2014</i> .	Marine Parks are part of the marine protected areas under the Marine Estate Management Act 2014. A search of the Department of Primary Industries has identified that the site is not in a marine protected area and is therefore not in a marine park.	No	No	DPI protecting habitat web page SEED
Land within in a State Forest set aside under the <i>Forestry Act 2012</i> for conservation values	A search of the Forestry Corporation Ecologically Sustainable Forest Management Plans has not identified the site to be land within a State Forest or a dedicated reserve.	No	Yes	Forestry Corporation Ecologically Sustainable Forest Management Plans – South Coast Region Reserve Map
Land Reserved under the Crown Lands Act 1989 Crown Land Management Act 2016	The site is identified to contain Crown land and is overlapped to be identified as part of Crown Reserves.	Yes	Yes	DPIE Spatial Planner SEED

Land	Identification	Is the site in this Sensitive Land?	Is Sensitive Land less than 20 km away?	Source
Land Identified as a wilderness or declared a wilderness area under the <i>Wilderness Act 1987</i>	The area is not identified to be declared in a wilderness area under the <i>Wilderness Act 1987</i>	No	No	SEED
Land Subject to Biodiversity Banking and Offset Scheme under the Biodiversity Conservation Act 2016	A search for biobanking agreements was conducted on the bio banking public registers and identified non results for Palerang Council Local Government Area	No	No	OEH website
Drinking water catchment protection areas				
Land declared to be a controlled area or a 'special area' under the Water NSW Act 2014 or a 'special area' under the Water Management Act 2000 or Hunter Water Act 1991.	The site is found to be part of the Captains Flat Dam Catchment area under the Palerang LEP 2014.	Yes	Yes	SEED
Environmentally Sensitive Areas				
Land declared as areas of outstanding biodiversity value under the Biodiversity Conservation Act 2016 or critical habitat under Part 7A of the Fisheries Management Act 1994	A search of the DPIE website found the site is not part of a land declared as areas of outstanding value. The site is not identified to contain critical habitats under the register of critical habitats	No	No	DPIE website – Areas of outstanding biodiversity value register DPI webpage – Threatened Species Register
Land designated as a wetland of international significance under the Ramsar Convention on Wetlands.	The site is not identified to be in an area of international importance under the Ramsar Convention Wetlands	No	No	SEED
Land designated as a nationally important wetland in the Directory of Important Wetlands of Australia.	The site is not in a nationally important wetland. The closest is the Googong Reservoir approx. 17.5 km northwest of the site.	No	Yes	SEED
Coastal wetlands to which State Environmental Planning Policy (Coastal Management) 2018 applies.	The site is not identified to be in a coastal wetland or a proximity area for coastal wetlands.	No	No	SEED
Littoral rainforests to which State Environmental Planning Policy (Coastal Management) 2018 applies.	The site is not identified to be in a littoral rainforest or a proximity area for littoral rainforest.	No	No	SEED
Coastal Zone as defined in the Coastal Management Act 2016	The site is not identified to be in a coastal zone and is further than three nautical miles from the NSW coastline	No	No	SEED

Land	Identification	Is the site in this Sensitive Land?	Is Sensitive Land less than 20 km away?	Source
Land identified in an environmental planning instrument as being of biodiversity significance or zoned for environmental conservation.	The site is on significantly disturbed terrain and has not been identified to be on land with biodiversity significance.	No	Yes	SEED
Waterfront land as defined under the Water Management Act 2000.	As defined in the Water Management Act 2000, waterfront land is any bed of water, lake or estuary and any land 40 metres of the riverbanks, lake shore or estuaries. The site is considered in waterfront land as the Molonglo River runs through the proposed site.	Yes	Yes	SEED
Land with a slope greater than 18° measured from the horizontal.	The landscape maps of the Palerang LEP have identified the site to contains land with slope greater than 18°.	Yes	Yes	Palerang LEP 2014 – Landscape Mapping 005
Land with Potential for soil and water contamination				
Potential Acid Sulfate Soils or Actual Acid Sulfate Soils.	No potential acid sulfate soil or actual acid sulfate soil was identified on the site.	No	No	SEED
Aboriginal Heritage protection area				
Land declared as an Aboriginal place under the National Parks and Wildlife Act 1974.	An AHIMS search of the site did not identify any Aboriginal heritage items.	No	-	AHIMS
Land identified in an environmental planning instrument as being of Aboriginal cultural significance.	The site was no identified to be land in an area of Aboriginal cultural significance.	No	No	Palerang LEP 2014 Mapping
Historic or natural heritage protection areas				
Land identified on the World Heritage List, National Heritage List or Commonwealth Heritage List.	The site land is not identified to be on the World heritage list, the National heritage list or the Commonwealth heritage list. The closest it the Googong Foreshores Cultural and Geodiversity Heritage Areas approximately 19.6 km west	No	Yes	SEED
Land, places, buildings or structures listed on the State Heritage Register	The site is not identified to be on the state significance.	No	No	State Heritage Register SEED
Land identified in an environmental planning instrument as being of heritage significance.	The site is in land identified as an item of local significance. The immediate surroundings of the site also contain items of local significance.	Yes	Yes	SEED State Heritage Register

Land	Identification	Is the site in this Sensitive Land?	Is Sensitive Land less than 20 km away?	Source
Biophysical strategic and agricultural land and critical industry clusters				
Land identified as biophysical strategic agricultural land under State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007	The site has not been identified to be biophysical strategic agricultural land.	No	No	DPE website – BSAL maps NSW Mining Exploration and Geosciences – MinView
Land identified as critical industry cluster land under State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.	The site has not been identified to be in land classified in a critical industry cluster.	No	No	NSW Mining Exploration and Geosciences – MinView
Community Land				
Public land classified as community land under the Local Government Act 1993.	No land has been identified as community land in the Palerang LEP.	No	No	Palerang LEP 2014

Appendix O

**Non-Aboriginal heritage impact
assessment**



Statement of Heritage Impact

LAKE GEORGE MINE REMEDIATION: REVIEW OF
ENVIRONMENTAL FACTORS

GHD

MAY 2022

Table of Contents

Abbreviations.....	iv
Executive Summary	v
1 Introduction	1
2 The Proposed Remediation Works	1
Site preparatory early works.....	2
Fencing historic mining structures	2
Strategic structural works	3
Remediation earthworks	4
3 Legislative Context.....	5
Heritage Act 1977	5
Environmental Planning and Assessment Act 1979.....	5
4 Methodology.....	6
5 Existing Environment	7
Heritage Database Results.....	7
Study Area Description	7
Description of Heritage Items Within the Proposed Activity Area	8
Railway Precinct – Mining	13
6 Identified Heritage Values.....	14
NSW Heritage Register Criteria	14
7 Statement of Heritage Impacts	22
8 Stakeholder Consultation.....	38
9 Mitigation Measures	39
10 Conclusion.....	41
11 References	42
Appendix A Detailed History of Lake George Mine.....	43

Authorship

The report was prepared by GHD's heritage consultant, Alistair Grinbergs BA (Hons.). Grad. Dip. App. Science. Alistair is a qualified archaeologist and heritage management practitioner with 28 years' experience in archaeology and cultural heritage management.

Scope and limitations

This report has been prepared by GHD for Department of Regional NSW and may only be used and relied on by Department of Regional NSW for the purpose agreed between GHD and Department of Regional NSW as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Department of Regional NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by Department of Regional NSW and others who provided information to GHD, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Abbreviations

DCP	Development Control Plan
ICOMOS	International Council on Monuments and Sites
LEP	Local Environmental Plan
LMP	Legacy Mines Program
REF	Review of Environmental Factors
SoHI	Statement of Heritage Impact
TfNSW	Transport for New South Wales

Executive Summary

The Legacy Mines Program (LMP) within the Department of Regional NSW propose to undertake remediation works at the site of the legacy Lake George Mine, located immediately to the west of the township of Captains Flat, New South Wales (NSW).

An assessment of impacts to heritage places and values is required to accompany a Review of Environmental Factors (REF) for the proposed remediation works at Lake George Mine.

This Statement of Heritage Impact (SoHI) has been prepared in accordance with the *NSW Heritage Manual Statements of Heritage Impact* (2002) and *Assessing Heritage Significance* (2001) guidelines. The philosophy and process adopted is that guided by the *Australia ICOMOS Burra Charter* (1999).

The proposal has also been assessed in relation to the relevant controls and provisions contained within the *Palerang Local Environmental Plan* (LEP) 2014 and the *Palerang Development Control Plan* (DCP) 2015.

The purpose of the proposed remediation works is to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent serious environmental and human health risks including to people accessing the site, to residents on-site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River that includes the urban centres of Queanbeyan and Canberra.

The proposed remediation works include those described in the *Lake George Mine, Captains Flat Detailed Design Report* (GHD 2020). The proposed remediation works broadly include:

- Site preparatory early works;
- Fencing historic mining structures;
- Strategic structural works;
- Remediation earthworks;
- Augmentation of surface water drainage; and
- Revegetation.

The criteria employed to assess the heritage significance of the historic mining heritage sites at Captains Flat are those specified in the *Heritage Act*. Each item has been assessed according to these criteria. In considering the degree of significance, each item has been assessed as either meeting the criteria or not. In most cases, an item will meet more than one criterion. It should be recognised that it is not necessary for every criterion to be satisfied, as meeting just one criterion will be sufficient to warrant heritage protection.

The Lake George Mine and Captains Flat rail precinct are not included in the NSW Heritage Register. Nor are they listed on the National Heritage List. They are included in Schedule 5 of the *Palerang Local Environmental Plan* (LEP) 2014 on account of their recognised local heritage values. On this basis a permit to undertake the proposed works is not required under the *Heritage Act 1977*.

Once implemented, the proposed remedial works would enhance the amenity of the Lake George Mine and Captains Flat Rail precinct as the removal and/or containment of contaminated soil would make the site safer for public visitation. Revegetation work would contribute to stabilising the site and augment future opportunities for additional interpretive signage and other visual materials to help visitors gain an understanding and appreciation of the mining history and heritage of Captains Flat.

The proposed activity would not have a negative impact on identified heritage values, so long as the identified mitigation measures are implemented.

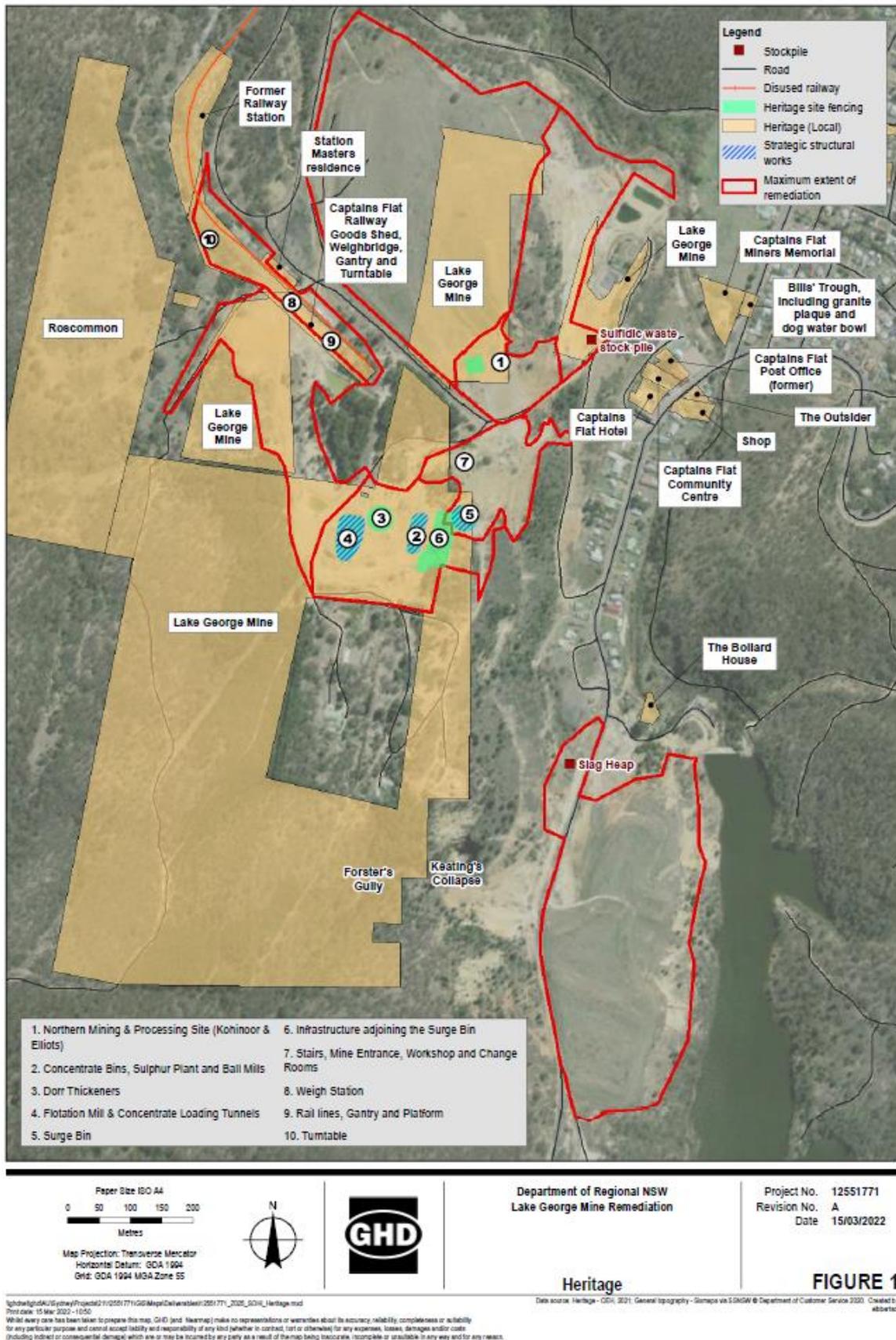


Figure 1. Lake George Mine: Heritage listings, location of heritage items discussed in this report and the proposed activity footprint.

1 Introduction

The Legacy Mines Program (LMP) within the Department of Regional NSW propose to undertake remediation works at the site of the legacy Lake George Mine, located immediately to the west of the township of Captains Flat, New South Wales (NSW).

An assessment of potential impacts to heritage places and values is required to accompany a Review of Environmental Factors (REF) for the proposed remediation works at the Lake George Mine. This assessment comprises a search of heritage registers, a review of other relevant historical resources and background reports, and an assessment of the potential impact of the proposed works.

This Statement of Heritage Impact (SoHI) has been prepared in accordance with the NSW Heritage Manual *Statements of Heritage Impact* (2002) and *Assessing Heritage Significance* (2001) guidelines. The philosophy and process adopted is that guided by the *Australia ICOMOS Burra Charter* (1999).

The proposal has been assessed in relation to the relevant controls and provisions contained within the *Palerang Local Environmental Plan* (LEP) 2014 and the *Palerang Development Control Plan* (DCP) 2015.

2 The Proposed Remediation Works

The LMP within the Department of Regional NSW propose to undertake remediation works at the site of the legacy Lake George Mine, located immediately to the west of the township of Captains Flat, NSW.

The purpose of the proposed remediation works is to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent serious environmental and human health risks including to people accessing the site, to residents in the vicinity of the site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River that includes the urban centres of Queanbeyan and Canberra.

The proposed remediation works include those described in the *Lake George Mine, Captains Flat Detailed Design Report* (GHD 2020). The proposed remediation works broadly include:

- Site preparatory early works;
- Fencing historic mining structures (including native fauna fencing where applicable to encourage revegetation and demarcate private property);
- Strategic structural works;
- Remediation earthworks;
- Augmentation of surface water drainage; and
- Revegetation.

The proposed remediation works would be undertaken across several key domains, predominantly in the northern portion of Lake George Mine. These areas are:

- North Mine Ridge/Elliot's;
- Old Mill;
- Mill Area (west of the Central Mine Area);
- Central Mine Area;
- Creeks Area;
- Rail Loading Area; and
- Minor areas of eroded capping on the Northern and Southern Dumps.

In addition, mine waste from the following sources are proposed for relocation to a containment cell that would be located on the Northern Dumps. These include:

- A sulfidic waste stockpile located on the junction of Miners Road and the Council wastewater treatment plant access road
- A slag heap located on the western side of Jerangle Road in Forster's Gully, adjacent to the northern end of the Southern Dumps.
- Transport for NSW (TfNSW) lead contamination from around the Captains Flat Railway Station precinct. TfNSW propose to remediate the Captains Flat Railway Precinct by removing approximately the surface 500 millimetres of contaminated topsoil for encapsulation in the containment cell on the Northern Dumps, before importing railway ballast, sub- and topsoil to site for backfilling. Prior to excavation of the contaminated surface soils, existing railway infrastructure including the railway line, signalling, gantry, signs, posts and fencing would be removed and temporarily stored on, or nearby the site. Once excavation and backfilling had been completed, the railway infrastructure would be replaced into its original location as far as reasonably practicable.
- Crown Land / QPRC within the Captains Flat township. i.e., The Captains Flat Lead Management Taskforce is currently undertaking an assessment of the Captains Flat township with the aim to prepare abatement plans for the higher risk public spaces. One option being investigated is moving up to 20,000 tonnes of contaminated soil from these Crown Land / QPRC-owned abatement areas into the containment cell on the Northern Dumps. These remediation works would be subject to a separate approval under the NSW Planning and Assessment Act 1979.

The areas listed above (except for the lead abatement areas) and the maximum spatial extent of the proposed remediation works are shown on Figure 1. The proposed remediation works (specifically, the early works, proposed fencing, strategic structural works, and remediation earthworks) are discussed below.

Site preparatory early works

The Principal Contractor proposes to access the Lake George Mine prior to the remedial earthworks commencing for site establishment. The proposed activities include:

- Establishing a site office including ablutions and worker decontamination/washroom facilities at either the NSW State Emergency Services building (the preferred option) or at the Mine lookout parking area.
- The installation of a truckwash at an existing hardstand in the Mill Area.
- The installation of a water tank in the Mill Area.
- Preparation of a bunded laydown area on the designated stockpile area on the Northern Dumps and/or the contingency site located on the Creeks/Rail Loading Area.
- Importation and stockpiling of approximately one third of imported clean remedial materials (i.e., subsoil, topsoil, lime, alternative liming products etc) onto the bunded laydown area on the designated stockpile area on the Northern Dumps and/or the contingency site located on the Creeks/Rail Loading Area.
- Preparation of the Northern Dumps Access track off Miners Road including the addition of a surface treatment for stability as well as drainage works.
- Site safety fencing.
- Geotechnical investigations around key site features including the main shaft to ensure civil plant and equipment can safely traverse the areas for remedial purposes.
- Install erosion and sediment controls around Copper Creek and the Northern Dumps in accordance with the 'Blue Book' (DECC 2008a and b and Landcom 2008), including de-silting of existing sediment basins.

It is important to note that no remediation of disturbed areas on site are proposed during site establishment, therefore, there is no trigger for issuance of an Environment Protection Licence under Schedule 1 of the NSW *Protection of the Environment Operations Act 1997* prior to undertaking site establishment activities.

Fencing historic mining structures

Much of the mining infrastructure that remains at the site can be classified as ruins. These are buildings and structures associated with the extraction, handling and processing of ore and mineral concentrates. Some are partly demolished, some have deteriorated with age. These features are all accessible to the public and in some instances they could pose a safety risk. In some cases, existing safety fencing is in a state of disrepair and other areas are not fenced. The following activities are proposed:

- Prior to, during or following (as applicable for safety, access and revegetation purposes) the commencement of the proposed remediation works, heritage elements within the activity footprint would be secured with temporary fencing to restrict access, minimise on-site safety risk and to protect the historic structures from inadvertent mechanical damage.
- Permanent fencing would be erected at specific locations where unrestricted access could pose a safety risk – this includes locations where existing barrier fencing is in poor condition. The majority of historic structures would be preserved and fenced, potentially with the exception of the Concentrate Loading Tunnels and the Surge Bin. Some historic structures may be fenced as a group for practical reasons.

Strategic structural works

Strategic structural works are proposed within the Surge Bin and Mill areas. These relate to the Concentrate Loading Tunnels, the Concentrate Bins, the metal and timber elements of the Surge Bin and rail infrastructure located within the Captains Flat Railway Precinct.

2.1.1 Concentrate Loading Tunnels

Previous site surveys (e.g., URS 2004 and GHD 2018) have established that there are public safety issues associated with the Concentrate Loading Tunnels and that their structural integrity may be compromised. It is proposed that the Concentrate Loading Tunnels be either:

- Fenced;
- Filled; or
- Demolished and lawfully disposed of.

If the Concentrate Loading Tunnels are demolished, the area would then be remediated consistent with the rest of the Mill Area. For the purposes of assessing impacts, a “worst case” scenario has been assumed whereby the Concentrate Loading Tunnels would be demolished and lawfully disposed of.

2.1.2 Concentrate Bins

The Concentrate Bins were used to store ore concentrate prior to load out and off-site transport. Between 2006 and 2014 an attempt was made to remediate the residual sulfidic ore stored within the bins by covering the sulfidic ore with inert gravel. Despite these measures, sulfidic efflorescences from what appears to be groundwater leaching through the retaining wall upslope of the bins, and potentially, also from drainage from residual sulfidic ore despite the previously discussed remedial works. This secondary mineralisation poses both a public safety and an environmental risk as it is highly soluble relative to the sulfidic ore.

Two remedial options are proposed for the concentrate bins once the site establishment/early works geotechnical investigation is completed for safety and access purposes:

1. Install a trench on the upslope side of the concentrate bins to a level below the base of the bins and fill with inert rock to create a preferred drainage pathway to redirect the groundwater currently leaching through the retaining wall into the bottom of the concentrate bins around the structure. The diverted drainage would report to a sediment dam.
2. Empty the bins by removing the inert gravel and the sulfidic waste and placing the material into the Northern Dumps encapsulation cell, noting that there may be opportunity to beneficially reuse the inert gravel onsite during the remedial works.

There are currently two options being proposed to remove the rock from the bins:

1. Constructing a temporary earthen bund parallel to the structure to support a long-reach excavator that would excavate the material into dump trucks for relocation to the encapsulation cell.
2. Use of truck-mounted dryvac technology to vacuum the material from the bins for relocation and placement in the encapsulation cell. As the dryvac truck has an internal storage cell for the sulfidic waste, it would simply shuttle between the bins and encapsulation cell, negating the need for an excavator and/or dump trucks. This is the preferred option.

The Concentrate Bins will remain onsite. Pending safety and heritage inspections, it is proposed that the emptied Concentrate and Surge Bin (if retained – removal is the preferred option) would be fenced and remain *in situ* as mining heritage items for mining heritage interpretative purposes.

2.1.3 Surge Bin

The Surge Bin is partially filled with sulfidic ore and as a result it is a source of sulfate-rich leachate emanating from the ore. This secondary mineralisation poses both a public safety and an environmental risk. The sulfate-rich leachate has also severely corroded the metal elements of the Surge Bin to the extent that it appears to be structurally compromised.

To remediate the Surge Bin, it is proposed that the metal and timber elements of the structure be removed with the sulfidic waste ore within the bin relocated to the Northern Dumps encapsulation cell. Following completion of works and pending a safety inspection, it is proposed that the remaining concrete and masonry elements of the Surge Bin precinct will remain *in situ*, with an earthen bund built around the structure for water management purposes. An engineered concrete slab will be constructed to seal the shaft if required.

Pending safety and heritage inspections, it is proposed that the emptied Surge Bin (if retained – removal is the preferred option) would be fenced and remain *in situ* as mining heritage items for mining heritage interpretative purposes.

2.1.4 Captains Flat Railway Precinct

TfNSW propose to remediate the Captains Flat Railway Precinct by removing approximately the surface 500 millimetres of contaminated topsoil for encapsulation in the containment cell on the Northern Dumps, before importing railway ballast, sub- and topsoil to site for backfilling. Prior to excavation of the contaminated surface soils, existing railway infrastructure including the railway line, signalling, gantry, signs, posts and fencing would be removed and temporarily stored on, or nearby the site.

Once excavation and backfilling had been completed, the railway infrastructure would be replaced into its original location as far as reasonably practicable. It is understood that the railway turntable located on a short spur line northwest of the Station Master's Cottage, can remain *in situ* during remedial works.

Remediation earthworks

The proposed remediation earthworks are based on the:

- Volume of contamination present;
- Environmental geochemistry of the contaminated material in each domain (i.e., the level of contamination);
- Topography/slope within the individual domain; and
- Land ownership and aesthetic considerations.

The proposed activity would include the following earthworks:

- Removal of highly contaminated soil from the Mill Area and a small number of identified locations to a containment cell located in the Northern Dumps portion of the Lake George Mine site (this area was previously re-landscaped during a rehabilitation program that commenced in 2006). Following sealing of the cell the area would be revegetated with shallow rooted grass species to maintain cap integrity.
- The majority of the Lake George Mine site would be subject to capping - a stoichiometric volume of lime would be spread over the required area and mechanically ripped into the existing surface. The area would then be wheel rolled for compaction, before 200mm of imported subsoil is spread and lightly tamped. A 100mm depth of growing media would then be spread and revegetated.
- In the Central Mine Area (where the majority of the extant heritage fabric is located), the capping would involve the following: a stoichiometric volume of lime would be spread over the required area and mechanically ripped into the existing surface where the slopes safely permitted this activity. The area would then be wheel rolled for compaction, over which separation geotextile would be installed. A 300mm layer of imported and inert rock mulch would then be emplaced over the geotextile as the capping option. This approach would retain the mining/industrial aesthetic of the precinct.

- In the Captains Flat Railway Station precinct, the existing rail infrastructure would be lifted and temporarily stored. The top circa 300 mm of contaminated soil would be excavated and relocated to the containment cell on the Northern Dumps. Clean imported sub- and topsoil backfill would be backfilled, with the area revegetated. New rail ballast would be brought in as required. The stored railway infrastructure would then be replaced. It is understood from TfNSW that the Railway Turntable would remain *in situ* throughout the remedial works and will not be impacted.

Finishing and surfacing works would result in modifications to existing surface water management aimed at reducing surface erosion and managing collected rainwater within the Lake George Mine site. This work would not impact on existing heritage fabric.

3 Legislative Context

Heritage Act 1977

The *Heritage Act 1977* provides protection of the environmental heritage of the State of New South Wales which includes places, buildings, works, relics, movable objects or precincts that are of State or local heritage significance. A key measure for the identification and conservation of State significant items is listing on the State Heritage Register (SHR) as provided in Part 3A of the *Heritage Act*.

Listing of a place on the SHR means that any proposed works or alterations (unless exempted) must be approved by the Heritage Council or its delegates. Proposals to alter, damage, move or destroy places, buildings, works, relics; moveable objects or precincts protected by an Interim Heritage Order (IHO) or listed on the SHR require an approval under Section 60 of the *Heritage Act*.

Section 57(2) of the *Heritage Act* provides for a number of potential exemptions to Section 57(1) approval requirements to reduce the need for approval of minor or regular works. Exempted development does not require prior Heritage Council approval. 'Standard' exemptions generally include minor and non-intrusive works such as maintenance, minor repairs and repainting.

Under Section 170 of the *Heritage Act*, all state government agencies must keep and administer a database of heritage assets called a Section 170 Heritage and Conservation Register. The Section 170 Register is an important resource to be used for making decisions about maintaining, conserving and making changes to heritage assets.

Archaeological features and deposits are afforded statutory protection by the 'relics provision'. Section 4(1) of the *Heritage Act* (as amended 2009) defines 'relic' as any deposit, artefact, object or material evidence that:

- (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
- (b) is of State or local heritage significance.

The 'relics provision' requires that no archaeological relics be disturbed or destroyed without prior consent from the Heritage Council of NSW. To determine if an area has historical archaeological potential or relics an assessment is made using the guidelines *Assessing Significance for Historical Archaeological Sites and Relics* (Heritage Branch 2009). The Heritage Council must be notified on the discovery of a relic under Section 146 of the *Heritage Act 1977*.

Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) requires that consideration is given to environmental impacts as part of the land use planning process. In NSW, environmental impacts include impacts upon cultural heritage places and values. Proposed activities and developments are considered under different parts of the EP&A Act, including:

- Major projects (State Significant Development under Part 4.1 and State Significant Infrastructure under Part 5.1), requiring the approval of the Minister for Planning.

- Minor or routine development requiring local council consent, are usually undertaken under Part 4. In limited circumstances, projects may require the Minister's consent.
- Part 5 activities which do not require development consent. These are often infrastructure projects approved by local councils or the State agency undertaking the project.

The EP&A Act also controls the making of Environmental Planning Instruments (EPIs) such as LEPs and State Environmental Planning Policies (SEPPs). LEPs commonly identify and have provisions for the protection of local heritage items and heritage conservation areas.

The Palerang LEP 2014 lists heritage items, archaeological sites and heritage conservation areas in Schedule 5 (Environmental Heritage).

Part 5 - Miscellaneous Provisions in the Palerang LEP provides objectives and actions that are applicable to all heritage items, these include:

5.10 Heritage conservation

The objectives of this clause are as follows:

- to conserve the environmental heritage of Palerang,*
- to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,*
- to conserve archaeological sites,*
- to conserve Aboriginal objects and Aboriginal places of heritage significance.*

Under Section 5.10(5) Heritage Assessment:

The consent authority may, before granting consent to any development:

- on land on which a heritage item is located, or*
- on land that is within a heritage conservation area, or*
- on land that is within the vicinity of land referred to in paragraph (a) or (b),*

require a heritage management document to be prepared that assesses the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item or heritage conservation area concerned.

4 Methodology

This assessment of potential heritage impacts included the following:

- A description of heritage items (and their significance) within the proposed activity area.
- A search of the NSW State Heritage Inventory, the Palerang LEP and the Australian Heritage Database to determine if there is any additional information on places of heritage significance in or near to the proposed activity area;
- An assessment of the site that focussed on consideration of the potential for the proposed works to impact upon identified heritage places and values within the proposed activity area, including:
 - Consideration of the questions posed in the NSW Heritage Office's *Statement of Heritage Impact Guidelines* as they relate to identified heritage places within the proposed activity area and heritage listed places adjacent to the proposed activity area; and
 - Consideration of the relevant questions posed in the requirements of the Palerang LEP.
- Description of any proposed impacts and Identification of any potential impacts and the methods proposed to avoid, ameliorate or mitigate those impacts.

5 Existing Environment

Heritage Database Results

A search of the NSW State Heritage Inventory undertaken on Tuesday 20th July 2021 did not identify any sites or places within or near the proposed activity area that were:

- declared Aboriginal Places;
- listed on the State Heritage Register; or
- listed in Interim Heritage Orders.

A search of the Australian Heritage Database undertaken on Tuesday 20th July 2021 did not identify any sites or places within or near the proposed activity area that were included on the:

- National Heritage List;
- Commonwealth Heritage List; or
- Register of the National Estate.

A review of the *Palerang Local Environment Plan 2014* identified three listings for the Lake George Mine and the associated rail facilities included in Schedule 5 of the LEP.

Table 1: Palerang LEP Schedule 5 – Listings within proposed activity area.

Listing	Significance	Item No.	Property Description
Captains Flat railway goods shed, weighbridge, gantry and turntable	Local	I266	Railway land adjacent to Lots 155, 194, and 319 DP754870; Lot 1 DP189797 and Lot 1 DP36902
Lake George Mine, including smelter site, mine processing sites, railway precinct, Fosters Gully and Keatings Collapse	Local	I267	Lot 2, DP229690; Lot 1, DP222274; Lot C, DP172630; Lot 319, DP 754870; Lot 2, DP 1033184 and adjacent Crown land
Stationmasters Residence (Former)	Local	I251	Lot 1, DP 572636

Two listings that are immediately adjacent to (share a boundary with one or more of) the above sites are also included in Schedule 5 of the Palerang LEP.

Table 2: Palerang LEP Schedule 5 – Listings adjacent to the proposed activity area.

Listing	Significance	Item No.	Property Description
Railway Station (Former)	Local	I249	Lot 1, DP 189797 and adjacent land
Roscommon	Local	I252	Lot 2, DP 369062; Lot 192, DP 754870

Study Area Description

The Lake George Mine has played a dominant role in the development of the town of Captains Flat and has recognised local heritage values. Mining at the site occurred in two distinct periods: small scale mining from 1881 to 1899 and large-scale mining from 1937 to 1962. At the height of its operation, Lake George Mine was one of the largest operating mines in NSW and the town of Captains Flat grew alongside the mine. The mine closed in early 1962 and although exploration licences have existed for the site since, no further mining activity has been undertaken since then (Grinbergs & McGowan 2006). A comprehensive history of mining at Captains Flat is included at Appendix A. It details the rise and closure of the mine, labour relations, class conflict and its impact on the fortunes of the Captains Flat town and community (including social, cultural and sporting endeavours).

The Lake George Mine site and Railway loadings precinct cover DP222274 lots 1-3, DP229690 lots 1-2, DP1033183 lot 2, DP1033184 lot 2, DP714087 lot 1, DP542415 lot 1, DP369062 lot 1, DP572636 lots 1-2, DP189797 lot 1, DP1103495 lot 1, DP1217100 lot 4425, DP754870 lot 319, and adjacent Crown land.

An extensive and diverse collection of cultural fabric and landscapes is present within Lake George Mine. Some elements – such as the spoil dumps and slag heap are significant on a landscape scale – dominating views from the village and surrounding area. As the mine was decommissioned following its closure in 1962 rather than abandoned, little in the way of machinery remains and many of the buildings have been purposefully demolished and their materials repurposed at other locations – locally at Captains Flat and further afield. The structures associated with the mine and processing plant that remain are, however, amply sufficient to allow for the site to be readily understood.

The existing historic heritage present within the proposed activity domains is described in Table 3.

Table 3: Lake George Mine heritage items and proposed activity domains.

Proposed Activity Domain	Heritage Items (other than landscape elements)
North Mine Ridge/Elliot's	None
Old Mill	<ul style="list-style-type: none"> Northern Mining & Processing Site (Kohinoor & Elliots)
Mill Area (west of the Central Mine Area)	<ul style="list-style-type: none"> Concentrate Bins, Sulphur Plant and Ball Mills Dorr Thickeners Flotation Mill
Central Mine Area	<ul style="list-style-type: none"> Surge Bin Infrastructure adjoining the Surge Bin Stairs, Mine Entrance, Workshop and Change Rooms
Creeks Area	None
Rail Loading Area	None
Minor areas of eroded capping on the Northern and Southern Dumps	None
Captains Flat Railway Precinct	<ul style="list-style-type: none"> Weigh Station Rail lines, Gantry and Platform Turntable

Description of Heritage Items Within the Proposed Activity Area

These descriptions are drawn from the comprehensive assessment of the site undertaken in 2006 (Grinbergs & McGowan 2006). Some changes may have taken place in the intervening 15 years. The nature of the heritage fabric and its construction – concrete, steel, stone and timber mean that changes resulting from natural decay and weathering have been minor in some instances and in others there has been significant decline in the structural integrity of the fabric. Where a change from another cause is known to have occurred, it is noted against the relevant item.

5.1.1 Surge Bin

The surge bin sits atop a large hill overlooking the town at its southern end and was once visible from almost all directions although in recent years some of the badly corroded metal elements have collapsed reducing the height of the structure to the extent that it is no longer visible from the township. In plan aspect, it is circular in shape and constructed primarily of riveted iron plates in three sections. The concrete elements are largely intact, however the riveted iron elements are severely corroded to the extent that the structural integrity of the bin appears to be compromised. The bin is partly filled with ore. Above the riveted sections the bin is constructed of timber uprights and beams. A concrete and timber structure is located inside the bin against its north-east side. This would appear to be part of a wooden bay or chute, which protrudes externally where it is supported by several upright timber beams. The ore in the bin covers part of this structure.



Plate 1: Surge Bin- northern face. Image: GHD 2021



Plate 2: Surge Bin -Aerial. Image: NSW Govt.

5.1.2 Infrastructure Adjoining the Surge Bin

Almost all of this fabric consists of concrete slabs and concrete walls. These features are associated with the operation of the mine and the first stage of the ore processing. Immediately adjoining the surge bin on its northern side is a concrete slab which covers the main shaft. The mine poppet head was set over the slab and surge bin. Adjoining the slab on its north side is another large concrete slab, and some concrete buttresses, which would have been the site for the winding and pumping machinery. A cellar or storeroom is located under the north-west corner, and in front of this is some dry-stone walling.

Beneath the surge bin on its western side is a large hopper which fed ore into the jaw crusher, which was located below. The preliminary crushing of the ore took place in the jaw crusher. This site consists of two tall concrete walls, which enclosed the jaw crusher, a deep concrete pit, and a concrete room, which adjoins the southern wall on the outside. High concrete walls and foundations adjoin the northern wall of the jaw crusher. A separate area of high concrete walls is located downhill and to the west of the jaw crusher, towards the concentrate bins. Immediately above this structure and 50m south of the jaw crusher a track leads to a large circular concrete water tank. Above and to the south of the surge bin a track leads 65m to three galvanised water tanks. This track continues on to Keating's Collapse 1942/45.



Plate 3: Infrastructure Adjoining Surge Bin. Image: McGowan 2006



Plate 4: Infrastructure Adjoining Surge Bin - Aerial. Image: NSW Govt.

5.1.3 Stairs, Mine Entrance, Change Rooms & Workshop Area

A series of timber and stone stairs led from the valley floor to what is now the visitor car park, which is located below the mine entrance. The stairs are visible but in poor condition. The car park area was once the site of the employment and paymaster's offices. A concrete staircase leads to the change room and workshop area and the mine entrance. It is now used by visitors to the viewing platform. Above the staircase there are three concrete slab floors. The west section was the site for the electrical, carpenter's and possibly plumbing and fitter's workshops. Small concrete blocks and some wall remains are located to the south of this area. The scout hall is a later addition to the site.

Another area of concrete slab floors adjoins the visitor's walkway to the viewing platform, to the east of the staircase. This was the time office, battery room (for helmet lamps), change, shower, toilet and locker rooms. To the west of this area is another concrete staircase. West of the staircase is the mine entrance. The entrance has been sealed off with bricks. Above the adit is a concrete beam engraved with the words, Lake George Mines 1937. The entrance is visible from the walkway.



Plate 5: Change Rooms & Workshop Area. Image: McGowan 2006



Plate 6: Mine entrance, change Rooms & Workshop Area. Image: NSW Govt.

5.1.4 Concentrate Bins, Sulphur Plant & Ball Mills

The concentrate bins constitute another important element of the mining fabric. They have been subject to previous efforts to mitigate further site contamination. This has included the repair of broken concrete walls, the sealing of the base of the bins and deposition of waste material in the bins with capping on the top. Although the bins are not visible from the valley floor, they are very visible from the surge bin and the road near the mill. The concrete walls and foundations of the sulphur plant are located approximately 30m south of the concentrate bins. It was used to produce sulphur and sulphuric acid, which was used as a reagent in the flotation mill. The walls and foundations of the plant are in very good condition. The ball mills were located immediately in front of the Concentrate bins. Only a part of the mill foundations remain. Crushed ore was transported by conveyor belt from the bins to the mills, where it was further reduced, before conveyance to the Dorr thickeners.



Plate 7: Concentrate Bins. Image: GHD 2021



Plate 8: Concentrate Bins, Sulphur Plant & Ball Mill – Aerial. Image: NSW Govt.

5.1.5 Dorr Thickeners

Two Dorr thickeners are located immediately below the ball mill site and about 20m east of the flotation plant, between the plant and the ball mills. The walls and floor of one of the thickeners are still largely intact although part of a wall is broken; the other thickener is full of contaminated material and silt. The thickeners converted the finely ground ore from the ball mills to a liquid slurry which was then conveyed to the flotation mill.



Plate 9: Dorr Thickener. Image: GHD 2021



Plate 10: Dorr Thickeners – Aerial. Image: NSW Govt.

5.1.6 Flotation Mill

This was the main processing area where the various minerals were separated from each other by the flotation process. It consists primarily of a large area of concrete floor, in the middle and on either side of which are the remains of the concrete walls and pillars. Concrete ramps leading into the plant are located at the northern and southern ends. There are three tunnels under the floor of the plant. The tunnels were used by road trucks which took the metal concentrates (the product of the flotation process) to the weigh station for transport by rail.

Two of the tunnels (A and B) remain, although they are littered with debris and rubble. Tunnel A has a timber roof, which is still largely intact, although part of it has collapsed. A third tunnel (C) is located on the southern end of the plant. It has totally collapsed. Concrete slabs and building foundations are located to the west of the plant and north and south of the driveway to tunnel C. The southernmost set of foundations / blocks adjoins a concrete ramp, which in turn adjoins the concrete ramp leading into the plant. A sealed roadway is located to the west of the plant. Another road leads to the weigh station. A road culvert is located near the entrance to tunnel C.



Plate 11: Flotation Mill. Image: GHD 2021



Plate 12: Flotation Mill – Aerial. Image: NSW Govt.

5.1.7 Northern Mining & Processing Site (Kohinoor & Elliots), Slime Dumps & Tailings Dams

This site is located at the top of a hill to the north of the main mine site and immediately adjacent to the now rehabilitated remains of the slime dumps and dams. The main part of the site consists of concrete foundations and pits that housed two large revolving screens used for separation of the ore. A concrete faced underground entrance or drain is located under the road about 5m west of the foundations and pits. At this point, the road is reinforced with dry stone walling either side of the entrance.

Steps lead up to the screen housing from the southern part of the structure. Further steps leading to a smaller area of concrete pits and a possible shed site are located on the east side of the main screens. Two concrete Dorr thickeners (about 60m in circumference) and a galvanized water tank are located to the east. It is likely that this site was used for the reprocessing of tailings in the 1930-60s period. The residue from the tailings was conveyed directly to the slime dams. Photographic evidence suggests that the old Kohinoor smelters were located downhill and on the southern slope of the hill and facing the surge bin and poppet head area. There is a cutting into the hill in this area, but no other remnants.

A four-tiered series of stone and concrete walled embankments, concrete footings and blocks is located about 45m south west of the underground entrance or drain referred to above. This site has all the appearances of a gold stamper site and may date back to the 1880s. Stamper sites were normally located downhill from the main mine site to allow for gravity feed of ore.



Plate 13: Ore Separators – Northern Mining & Processing Site. Image: GHD 2021



Plate 14: Northern Mining & Processing Site (Kohinoor & Elliots), Image: NSW Govt.

Railway Precinct – Mining

5.1.8 Weigh Station

This is another prominent and iconic part of the mining fabric. The concrete road leads up a ramp built on concrete trestles with wooden trusses to a large shed, also built on trestles and constructed over the weigh station shed and the railway line. The shed walls and roof are constructed of galvanised iron and the floor is built of timber planks and logs. In the middle of the floor are two metal hopper bins, through which concentrates were deposited direct into the railway trucks. The weigh station is constructed of galvanised iron and includes a weighing machine. A voice pipe for sending messages from the upper shed floor to the weigh station is also intact. This is an important site and is in a good condition. Some elements of this structure, including the milled timber and log access ramp were removed around 2010 without proper assessment and consideration of the heritage value of the structure.



Plate 15: Weigh Station (note: timber ramp – right – has been demolished). Image: McGowan 2006



Plate 16: Rail precinct – Aerial. Image: NSW Govt.

5.1.9 Railway Lines, Gantry & Railway Platform

There are three railway lines in the area near the turntable and the railway platform. The gantry is located 27m south east of the site of the weigh station, and is constructed of metal and built on concrete blocks. It is in very good condition. The platform is located approximately 85m east of the gantry and is in very good condition. All three railway lines continue for a further 30m and terminate at a rock face.



Plate 17: Gantry. Image: McGowan 2006



Plate 18: Rail precinct – Aerial. Image: NSW Govt.

5.1.10 Turntable

The rail line diversion to the turntable is located about 270m west of the weigh station. At this point, a separate rail line diverges from the most southerly of the three rail lines and runs in a south east direction for approximately 50m, before passing over a deep concrete pit about 20m long. Some small concrete blocks and a floor area are located on the south side of the line. The turntable is located approximately 6m south east of the pit. It is built on concrete pylons and constructed of timber and metal and is about 30m long. The turntable appears to be in very good condition.



Plate 19: Turntable. Image: McGowan 2006



Plate 20: Turntable – Aerial. Image: NSW Govt.

6 Identified Heritage Values

The criteria employed to assess the heritage significance of the historic mining heritage sites at Captains Flat are those specified in the *Heritage Act*. Each item has been assessed according to these criteria. In considering the degree of significance, each item has been assessed as either meeting the criteria or not. In most cases, an item will meet more than one criterion. It should be recognised that it is not necessary for every criterion to be satisfied, as meeting just one criteria will be sufficient to warrant heritage protection.

NSW Heritage Register Criteria

The NSW State Heritage Register is established under Part 3A of the *Heritage Act 1977* (as amended in 1998) for listing of items of environmental heritage which are of state heritage significance.

To be assessed for listing on the State Heritage Register an item will, in the opinion of the Heritage Council of NSW, meet one or more of the following criteria.

- A. An item is important in the course, or pattern, of NSW's cultural or natural history;
- B. An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history;
- C. An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;
- D. An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;
- E. An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history;
- F. An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history; and
- G. An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places, or cultural or natural environments.

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register.

The assessment of heritage significance for those elements of the Lake George Mine that are within the proposed activity area is provided in Tables 4 – 10 (below).

Table 4: Assessment against Criterion A.

Criterion A	<i>An item is important in the course, or pattern, of NSWs cultural or natural history</i>
General Statement	
<p>The Captain's Flat mining field is significant for its contribution to base metal mining in Australia, and in particular, New South Wales, over a period of 80 years. It was the major mining site in southern NSW in the 1890s and part of the 1880s and again in the period 1937 to 1962. In the 1880s-90s it was first a gold, then silver, and later, a predominantly copper mining operation. In the 1930s-60s period, Captain's Flat was one of the most important mining sites in Australia, as a producer of lead, silver, zinc and sulphur and to a lesser extent, copper and gold. Its production was particularly valuable during World War II. The highly complex mineralogy of the ore body and consequently the varied and changing processing technology was a unique aspect of mining at Captain's Flat.</p> <p>During both periods, Captain's Flat was one of the largest towns in the southern mining region and was economically significant as an employer and market for farm produce, timber and other raw materials. It had a considerable impact on development and settlement and was totally dependent upon the mines for its existence. The mines also had a significant negative impact on the natural landscape because of pollution and environmental degradation, both in the mine and town area and downstream of the mine area. Extensive rehabilitation works bear witness to the significance of this impact, and they can now be regarded as part of the mining heritage fabric.</p>	
Elements that meet Criterion A	
Element	Description
Processing Site (Kohinoor & Elliots)	The northern mine site and processing area (Kohinoor & Elliott's), slime dumps and tailings dams comprise separating screens and an area of largely intact concrete pits, foundations and walls. It also includes an underground entrance or drain and two Dorr thickeners. The plant was probably used for secondary processing of tailings. A second processing site downhill of the main site may have been part of this process or it may relate to an earlier period of mining in the 1880s. Rehabilitation work has preserved the contours of the slime dumps and tailings dams, which are a reminder of the scale of the mining and processing operations and the extent of rehabilitation work.
Concentrate Bins, Sulphur Plant & Ball Mills	Dating from the 1936-62 mining era, the concentrate bins held crushed ore prior to its conveyance to the ball mills. They are largely intact and have been subject recently to rehabilitation work to prevent further site contamination. The bins are highly visible and form an iconic part of the mining landscape. Foundations and walls of the sulphur plant are located south of the bins; it was used for the production of sulphur and sulphuric acid for use in the flotation mill. The foundations of the ball mills are located immediately below the bins.
Dorr Thickeners	The thickeners, built in the 1930s, converted the finely crushed ore into a liquid slurry prior to its conveyance to the flotation mill. One of the thickeners remains although part of the wall is broken. The other one is silted up. They were an important part of the processing infrastructure.
Flotation Mill	This area relates to the 1930-60s. It was the main processing area where the various minerals were separated one from the other using the flotation process. Captain's Flat is one of the few mining sites in Australia where the remains of a flotation mill can be seen. The flotation mill was central to the operations of the mine.
Surge Bin	The bin was built in the 1930s to hold ore prior to processing by the jaw crusher, which was located immediately below. It was once an iconic structure overlooking the town and visible from many parts of the valley floor. Much of the metal fabric of this element is in poor condition.
Infrastructure Adjoining the Surge Bin	These structures were built in the 1930s. Almost all of this fabric consists of concrete slabs and walls. It is important, however, for it is largely intact and relates to the mine operations and the first stages of ore processing. Included in this site are the jaw crusher and the circular concrete water tank 50m to the south.

Criterion A	<i>An item is important in the course, or pattern, of NSWs cultural or natural history</i>
Stairs, Mine Entrance, Change Rooms & Workshop Area	This area relates to the 1930s and is located mostly on the slope uphill of the modern era car park. Stair remains are located below and to the east of the car park, which is the site for the former employment and paymaster's offices. The main entrance (adit) and concrete beam engraved with Lake George Mines 1937 was uncovered during recent excavation work and is in excellent condition. The change rooms included the time office, battery room, shower, toilet and locker rooms and workshop area included electrical, carpenter, plumbing and fitter's shops. These remains are comprised almost entirely of concrete foundations and blocks, with the exception of the scout hall, which is an 'import'. This area is one of the most visible and accessible of the 1930s-60s mine sites.
Weigh Station	This is another prominent and iconic part of the mining fabric dating to the 1936-1962 mining period. Concentrates from the flotation mill were trucked by road to the mill and dumped through hopper bins into railway trucks. This was the final step in the mining process. The station is substantially intact and visually significant.
Railway Lines, Gantry & Railway Platform	These three items are an important element of the railway precinct of the 1936-1962 mining period but are not as significant as weigh station and turntable.
Turntable	This was the area where the train engines were reversed so that railway trucks could be backed up towards the weigh station. The turntable dating from the 1930s would appear to be largely intact and in very good condition. However, part of it is overgrown with brambles, which makes a definitive assessment difficult. The turntable is an important part of the railway precinct.

Table 5: Assessment against Criterion B.

Criterion B	<i>An item has strong or special association with the life or works of a person, or group of persons, of importance in NSWs cultural or natural history</i>
General Statement	
Whilst the mines and mining activity have strong associations with mining companies, managers and a former local mining community, these associations are normal for any mining operations.	

Table 6: Assessment against Criterion C

Criterion C	<i>An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW</i>
General Statement	
An important aspect of the first part of this criterion is whether the place has a relationship between its parts and the setting that reinforces the quality of both. Some sites are located in elevated positions in full view of the valley floor. Other sites have elevated structures which are also highly visible. Some of the reclaimed slime dumps also fall into the aesthetic category. Visually, the mine site dominates vistas to the north, south and west from the town of Captains Flat. The expanse of bare earth and the visually hard concrete and steel elements are both aesthetically striking and challenging.	
The high degree of technical achievement is demonstrated through the industrial response to the highly complex mineralogy of the Captain's Flat ore body and consequently the varied and changing mining emphases and range of technologies that were applied to process the ore. This complexity and in turn the exceptional technical level of achievement is best demonstrated by 1930s-60s mining and processing sites.	
Elements that meet Criterion C	
Element	Description
Processing Site (Kohinoor & Elliots)	The northern mine site and processing area (Kohinoor & Elliott's), slime dumps and tailing dams are visible from the surge bin area. Earlier rehabilitation work allowed some of the fabric to be retained, stabilised the dumps and tailing dams and enhanced their appearance. The essential contours of the dumps and dams remain.

Criterion C	<i>An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW</i>
Concentrate Bins, Sulphur Plant & Ball Mills	Dating from the 1936-62 mining era, the concentrate bins are largely intact and have been subject recently to rehabilitation work to prevent further site contamination. They are highly visible and form an iconic part of the mining landscape although the high level of rubble and debris in the vicinity detracts from their aesthetic value. Foundations and walls of the sulphur plant are readily visible and largely intact. The foundations of the ball mills are located immediately below the bins.
Dorr Thickeners	The thickeners, built in the 1930s, converted the finely crushed ore into a liquid slurry prior to its conveyance to the flotation mill. One of the thickeners remains although part of the wall is broken. The other one is silted up. They were an important part of the processing infrastructure and have some aesthetic value.
Flotation Mill	A large part of the walls of this structure are still intact and highly visible, although the rubble and debris currently in the area detract from its aesthetic value.
Surge Bin	The bin was built in the 1930s to hold ore prior to processing by the jaw crusher, which was located immediately below. It was once an iconic structure overlooking the town and visible from many parts of the valley floor. Much of the timber and metal fabric of this element is in poor condition.
Infrastructure Adjoining the Surge Bin	Some of these structures, in particular the jaw crusher site, are highly visible and an integral part of the surge bin site.
Stairs, Mine Entrance, Change Rooms & Workshop Area	This area relates to the 1930s and is located mostly on the slope uphill of the modern era car park. Stair remains are located below and to the east of the car park, which is the site for the former employment and paymaster's offices. The main entrance (adit) and concrete beam engraved with Lake George Mines 1937 was uncovered during recent excavation work and has some aesthetic appeal. Aesthetically, the appeal of the change rooms and workshop area relates solely to its association with and proximity to the mine entrance. For many miners this was the only above ground area of the mining complex that they visited.

Table 7: Assessment against Criterion D

Criterion D	<i>An item has strong or special associations with a particular community or cultural group in NSW for social, cultural or spiritual reasons</i>
General Statement	
<p>The Captain's Flat mining and processing areas are crucial to the present community's sense of place and identity. Some of the town residents were former employees of the mining company or worked in other occupations in the town. The mining field and town have been the subject of a large number of feature articles and several local history books. A monument has been constructed near the recreation park in memory of men who were killed in the mining operations. Much of the town consists of buildings relating to the 1930-60s period of mining, and there are some buildings relating to the earlier period of mining in the 1890s. The mining past is integral to the present community's sense of identity.</p>	
Elements that meet criterion D	
Element	Description
Processing Site (Kohinoor & Elliots)	The main northern mine site processing area comprises separating screens and an area of largely intact concrete pits, foundations and walls. It also includes an underground entrance or drain and two Dorr thickeners. This site demonstrates a different processing technique to that employed at the flotation plant. A second processing site downhill of the main site may have been part of this process, or it may relate to an earlier period of mining in the 1880s. Rehabilitation work has preserved the contours of the slime dumps and tailings dams.
Concentrate Bins, Sulphur Plant & Ball Mills	Dating from the 1936-62 mining era, the concentrate bins are largely intact and have been subject recently to rehabilitation work to prevent further site contamination. Foundations and walls of the sulphur plant are readily visible and largely intact. The foundations of the ball mills are located immediately below the bins. These structures were an integral part of the mining and processing complex.
Dorr Thickeners	The thickeners, built in the 1930s, converted the finely crushed ore into a liquid slurry prior to its conveyance to the flotation mill. They were a very important part of the processing infrastructure and of community significance.

Criterion D	<i>An item has strong or special associations with a particular community or cultural group in NSW for social, cultural or spiritual reasons</i>
Flotation Mill	This area relates to the 1930s. It was the main processing area where the various minerals were separated one from the other using the flotation process. Captain's Flat is one of the few mining sites in Australia where remains of flotation mills can be seen. The flotation mill was central to the operations of the mine and is of community significance.
Surge Bin	The bin was built in the 1930s to hold ore prior to processing by the jaw crusher, which was located immediately below. It was once an iconic structure overlooking the town and visible from many parts of the valley floor. Much of the timber and metal fabric of this element is in poor condition.
Infrastructure Adjoining the Surge Bin	These structures were built in the 1930s. Almost all of this fabric consists of concrete slabs and walls. It is important, however, for it is largely intact and relates to the mine operations and the first stages of ore processing. Included in this site are the jaw crusher and the circular concrete water tank 50 m to the south. The site was an integral part of the mining and processing complex.
Stairs, Mine Entrance, Change Rooms & Workshop Area	This area relates to the 1930s and is located on the slope uphill of the modern era car park. Stair remains are located below and to the east of the car park. The main entrance (adit) and concrete beam embossed with Lake George Mines 1937 was uncovered during recent excavation work. The change rooms and workshop area are comprised almost entirely of concrete foundations and blocks, with the exception of the scout hall, which is an 'import'. For many miners this was the only above ground area of the mining complex that they visited.
Weigh Station	This is another prominent and iconic part of the mining fabric dating to the 1936-1962 mining period. Concentrates from the flotation mill were trucked by road to the mill and dumped through hopper bins into railway trucks. This was the final step in the mining process. The station is substantially intact and visually significant.
Railway Lines, Gantry & Railway Platform	These three items are an important element of the railway precinct of the 1936-1962 mining period but are not as significant as weigh station and turntable.
Turntable	This was the area where the train engines were reversed so that railway trucks could be backed up towards the weigh station. The turntable dating from the 1930s would appear to be largely intact and in very good condition. However, part of it is overgrown with brambles, which makes a definitive assessment difficult. The turntable is an important part of the railway precinct.

Table 8: Assessment against Criterion E

Criterion E	<i>An item has potential to yield information that will contribute to an understanding of NSWs cultural or natural history</i>
General Statement	
<p>The highly complex mineralogy of the Captain's Flat ore body and consequently the varied and changing mining emphases and technology were unique aspects of mining at Captain's Flat. This complexity and in turn the exceptional technical level of achievement is best demonstrated by 1930s-60s mining and processing sites.</p> <p>The Lake George Mine is important for its potential to yield information about past mining and processing techniques. The main mine and processing site, though not unique, is rare as there are few integrated base metal mining plants using the flotation system remaining in NSW (or in Australia) from the 1930s-60s period. Although all equipment has been removed there is enough integrity in the remaining structures to allow for a considerable degree of interpretation. Also important from an interpretative aspect is the Northern mine site and processing area (Kohinoor & Elliott's), slime dumps and tailing dams.</p>	
Elements that meet Criterion E	
Element	Description
Processing Site (Kohinoor & Elliotts)	This processing area comprises separating screens and an area of largely intact concrete pits, foundations and walls. It also includes an underground entrance or drain and two Dorr thickeners. This site demonstrates a different processing technique to that employed at the flotation plant. The secondary processing site downhill of the main site may have been part of this process, or it may relate to an earlier period of mining in the 1880s. Rehabilitation work has preserved the contours of the slime dumps and tailings dams.

Criterion E	<i>An item has potential to yield information that will contribute to an understanding of NSWs cultural or natural history</i>
Concentrate Bins, Sulphur Plant & Ball Mills	Dating from the 1936-62 mining era, the concentrate bins are largely intact and have been subject recently to rehabilitation work to prevent further site contamination. Foundations and walls of the sulphur plant are readily visible and largely intact. The foundations of the ball mills are located immediately below the bins. These structures area a very important part of the processing complex.
Dorr Thickeners	The thickeners, built in the 1930s, converted the finely crushed ore into a liquid slurry prior to its conveyance to the flotation mill. They were a very important part of the processing infrastructure.
Flotation Mill	This area relates to the 1930s. It was the main processing area where the various minerals were separated one from the other using the flotation process. Captain's Flat is one of the few mining sites in Australia where remains of flotation plants can be seen. The flotation mill was central to the operations of the mine.
Surge Bin	The bin was built in the 1930s to hold ore prior to processing by the jaw crusher, which was located immediately below. It was once an iconic structure overlooking the town and visible from many parts of the valley floor. Much of the timber and metal fabric of this element is in poor condition.
Infrastructure Adjoining the Surge Bin	These structures were built in the 1930s. Almost all of this fabric consists of concrete slabs and walls. It is important, however, for it is largely intact and relates to the mine operations and the first stages of ore processing. Included in this complex are the jaw crusher site and a circular concrete water tank 50 m to the south.
Stairs, Mine Entrance, Change Rooms & Workshop Area	This area relates to the 1930s and is located on the slope uphill of the modern era car park. Stair remains are located below and to the east of the car park. The main entrance (adit) and concrete beam embossed with Lake George Mines 1937 was uncovered during recent excavation work. The change rooms and workshop area are comprised almost entirely of concrete foundations and blocks, with the exception of the scout hall, which is an 'import'. For many miners this was the only above ground area of the mining complex that they visited.
Weigh Station	All elements of the railway precinct were built in the 1930s. The weigh station is a prominent and iconic part of the mining fabric. Concentrates from the flotation mill were trucked by road to the mill and dumped through hopper bins into railway trucks. This was the final step in the mining and processing of the ore.
Railway Lines, Gantry & Railway Platform	These three items are an important element of the railway precinct of the 1936-1962 mining period but are not as significant as weigh station and turntable.
Turntable	This was the area where the train engines were reversed so that railway trucks could be backed up towards the weigh station. The turntable dating from the 1930s would appear to be largely intact and in very good condition. However, part of it is overgrown with brambles, which makes a definitive assessment difficult. The turntable is an important part of the railway precinct.

Table 9: Assessment against Criterion F

Criterion F	<i>An item possesses uncommon, rare or endangered aspects of NSWs cultural or natural history</i>
<p>General Statement</p> <p>Captain's Flat is significant as an uncommon historic mining centre by virtue of its mineralogy and the integrity of the remaining structures. The highly complex mineralogy of the Captain's Flat ore body and consequently the varied and changing mining emphases and technology were unique aspects of mining at Captain's Flat. It produced primarily gold, silver and then copper in association with other ores in the 1880s-90s period. In the 1930s-60s period it produced all the aforementioned commodities and was one of Australia's leading lead producers. Its complexity is best demonstrated by 1930s-60s mining and processing sites. It is one of the few integrated base metal mining and processing complexes demonstrating the past use of the flotation process in NSW, and of these it is probably the second most significant. Lead mining and processing sites, in particular, constitute a rare class of industrial activity. Some of the sites are subject to ongoing mine rehabilitation work and from that viewpoint can be regarded as endangered.</p>	

Criterion F	<i>An item possesses uncommon, rare or endangered aspects of NSWs cultural or natural history</i>
Elements that meet Criterion F	
Element	Description
Processing Site (Kohinoor & Elliots)	The main processing area comprises separating screens and an area of largely intact concrete pits, foundations and walls. It also includes an underground entrance or drain and two Dorr thickeners. This site demonstrates a different processing technique to that employed at the flotation plant. A second processing site downhill of the main site may have been part of this process, or it may relate to an earlier period of mining in the 1880s. Rehabilitation work has preserved the contours of the slime dumps and tailings dams. It is unusual to find as much infrastructure as this from sites of this period
Concentrate Bins, Sulphur Plant & Ball Mills	Dating from the 1936-62 mining era, the concentrate bins are largely intact and have been subject recently to rehabilitation work to prevent further site contamination. Foundations and walls of the sulphur plant are readily visible and largely intact. The foundations of the ball mills are located immediately below the bins. These structures area a very important part of the processing complex. It is unusual to find as much infrastructure as this from sites of this period.
Dorr Thickeners	The thickeners, built in the 1930s, converted the finely crushed ore into a liquid slurry prior to its conveyance to the flotation mill. They were a very important part of the processing infrastructure.
Flotation Mill	This area relates to the 1930s. It was the main processing area where the various minerals were separated one from the other using the flotation process. Captain's Flat is one of the few mining sites in Australia where remains of flotation plants can be seen. The flotation mill was central to the operations of the mine.
Surge Bin	The bin was built in the 1930s to hold ore prior to processing by the jaw crusher, which was located immediately below. It was once an iconic structure overlooking the town and visible from many parts of the valley floor. Much of the timber and metal fabric of this element is in poor condition.
Infrastructure Adjoining the Surge Bin	These structures were built in the 1930s. Almost all of this fabric consists of concrete slabs and walls. It is important, however, for it is largely intact and relates to the mine operations and the first stages of ore processing. Included in this site are the jaw crusher and the circular concrete water tank 50 m to the south. It is unusual to find as much infrastructure as this from sites of this period.
Stairs, Mine Entrance, Change Rooms & Workshop Area	This area relates to the 1930s and is located on the slope uphill of the modern era car park. Stair remains are located below and to the east of the car park. The main entrance (adit) and concrete beam engraved with Lake George Mines 1937 was uncovered during recent excavation work. The change rooms and workshop area are comprised almost entirely of concrete foundations and blocks, with the exception of the scout hall, which is an 'import'. For many miners this was the only above ground area of the mining complex that they visited.
Weigh Station	All elements of the railway precinct were built in the 1930s. The weigh station is a prominent and iconic part of the mining fabric and could be regarded as uncommon. Concentrates from the flotation mill were trucked by road to the mill and dumped through hopper bins into railway trucks. This was the final step in the mining process. The railway precinct's importance under this criterion is related to its linkage with the mining and milling complex.
Turntable	This was the area where the train engines were reversed so that railway trucks could be backed up towards the weigh station. The turntable dating from the 1930s would appear to be largely intact and in very good condition. However, part of it is overgrown with brambles, which makes a definitive assessment difficult. The turntable is an important part of the railway precinct.

Table 10: Assessment against Criterion G

Criterion G	<i>An item is important in demonstrating the principal characteristics of a class of NSWs cultural or natural places or cultural or natural environments</i>
General Statement	
<p>Captain's Flat demonstrates the principal characteristics of a class of NSW's cultural places and environments as a complex base metal mining and processing centre. It retains almost all the key elements of such a centre and has considerable interpretative potential. There are few such sites in NSW and Australia compared to gold and copper sites, and they constitute a separate class of cultural places. Lead mining and processing sites, in particular, constitute a rare class of industrial activity.</p>	
Elements that meet Criterion G	
Element	Description
Processing Site (Kohinoor & Elliots)	The main processing area comprises separating screens and an area of largely intact concrete pits, foundations and walls. It also includes an underground entrance or drain and two Dorr thickeners. This site demonstrates a different processing technique to that employed at the flotation plant. A second processing site downhill of the main site may have been part of this process, or it may relate to an earlier period of mining in the 1880s. Rehabilitation work has preserved the contours of the slime dumps and tailings dams.
Concentrate Bins, Sulphur Plant & Ball Mills	Dating from the 1936-62 mining era, the concentrate bins are largely intact and have been subject recently to rehabilitation work to prevent further site contamination. Foundations and walls of the sulphur plant are readily visible and largely intact. The foundations of the ball mills are located immediately below the bins. These structures are a very important part of the processing complex.
Dorr Thickeners	The thickeners, built in the 1930s, converted the finely crushed ore into a liquid slurry prior to its conveyance to the flotation mill. They were a very important part of the processing infrastructure.
Flotation Mill	This area relates to the 1930s. It was the main processing area where the various minerals were separated one from the other using the flotation process. Captain's Flat is one of the few mining sites in Australia where the remains of a flotation plant can be seen. The flotation plant was central to the operations of the mine.
Surge Bin	The bin was built in the 1930s to hold ore prior to processing by the jaw crusher, which was located immediately below. It was once an iconic structure overlooking the town and visible from many parts of the valley floor. Much of the timber and metal fabric of this element is in poor condition.
Infrastructure Adjoining the Surge Bin	These structures were built in the 1930s. Almost all of this fabric consists of concrete slabs and walls. It is important, however, for it is largely intact and relates to the mine operations and the first stages of ore processing. Included in this site are the jaw crusher and the circular concrete water tank 50 m to the south.
Stairs, Mine Entrance, Change Rooms & Workshop Area	This area relates to the 1930s and is located on the slope uphill of the modern era car park. Stair remains are located below and to the east of the car park. The main entrance (adit) and concrete beam embossed with Lake George Mines 1937 was uncovered during recent excavation work. The change rooms and workshop area are comprised almost entirely of concrete foundations and blocks, with the exception of the scout hall, which is an 'import'. For many miners this was the only above ground area of the mining complex that they visited.
Weigh Station	All elements of the railway precinct were built in the 1930s. The weigh station is a prominent and iconic part of the mining fabric. Concentrates from the flotation mill were trucked by road to the mill and dumped through hopper bins into railway trucks. This was the final step in the mining process. The railway precinct's importance under this criterion is related to its linkage with the mining and milling complex.
Railway Lines, Gantry & Railway Platform	These three items are an important element of the railway precinct of the 1936-1962 mining period but are not as significant as weigh station and turntable.
Turntable	This was the area where the train engines were reversed so that railway trucks could be backed up towards the weigh station. The turntable dating from the 1930s would appear to be largely intact and in very good condition. However, part of it is overgrown with brambles, which makes a definitive assessment difficult. The turntable is an important part of the railway precinct.

7 Statement of Heritage Impacts

An assessment of impacts on heritage items listed in Schedule 5 of the Palerang LEP that are located within the proposed activity area has been undertaken in accordance with the *Statement of Heritage Impact Guidelines* prepared by NSW Heritage (Table 11). The assessment of potential impacts on heritage items listed in Schedule 5 of the Palerang LEP that are located immediately adjacent to the proposed activity area is included at Table 12.

Consideration of the potential impacts of the proposed remediation works in relation to the requirements of the Palerang Local Environment Plan 2014 are addressed in Table 13.

Table 11: Statement of Heritage Impacts - Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
<p>The following aspects of the proposal respect or enhance the heritage significance of the item or conservation area for the following reasons:</p>	<p>The purpose of the proposed remediation works is to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent serious environmental and human health risks to people accessing the site, to residents on-site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.</p> <p>The proposed works would enhance the amenity of the Lake George Mine and Captains Flat Railway sites as the removal and/or containment of contaminated soil would make the sites safer for public visitation. Revegetation work would contribute to stabilising the site and augment proposed signage and interpretive material designed to help visitors gain an understanding and appreciation of the mining history and heritage of Captains Flat.</p>
<p>The following aspects of the proposal could detrimentally impact on heritage significance.</p> <p>The reasons are explained as well as the measures to be taken to minimise impacts:</p>	<p>There are no identified detrimental aspects to the proposed activity.</p> <p>The improved amenity and safety resulting from the proposed works may potentially make the Lake George Mine and Captains Flat rail precinct a more attractive destination for visitors, and with that the attendant increased potential for inadvertent or deliberate damage to listed items.</p>
<p>The following sympathetic solutions have been considered and discounted for the following reasons:</p>	<p>The proposed works are the most sympathetic solution to addressing the significant health risks associated with mine site contamination that does not involve physical impact upon the heritage fabric of the Lake George Mine and rail precincts.</p> <p>No other solution has been proposed.</p>
<p>Demolition of a building or structure</p> <p>Have all options for retention and adaptive re-use been explored?</p> <p>Can all of the significant elements of the heritage item be kept, and any new development be located elsewhere on the site?</p> <p>Is demolition essential at this time or can it be postponed in case future circumstances make its retention and conservation more feasible?</p> <p>Has the advice of a heritage consultant been sought? Have the consultant's recommendations been implemented? If not, why not?</p>	<p>The remediation strategy for the Railway Precinct (including the weigh station, railway lines, gantry, platform and turntable) is to excavate and remove lead contaminated soil and relocate the contaminated material in the containment cell to be located on the Northern Dumps. This would involve temporary removal and relocation of selected heritage fabric elements including signs, posts, signals, fencing and the rail tracks. Once the contaminated soil has been removed and replaced with clean fill all heritage fabric elements would be reinstated in their original position. To mitigate any unintended harm the following measures would be taken:</p> <ul style="list-style-type: none"> • Detailed geospatial survey of the site will be prepared identifying all elements subject to removal and temporary relocation. Drone footage and GIS mapping should be used to identify the location of each element in order to return items to their original position once the remediation works have been completed. • A detailed photographic record will be prepared of each element subject to removal and temporary relocation; • Elements subject to removal and temporary relocation will be securely stored at an appropriate location near the site; • Reinstatement of elements subject to removal and temporary relocation will occur as soon as practicable following completion of the remediation works; and • Fabric elements associated with the rails including rail spikes, fishplates and ties should be salvaged wherever possible and were not possible to be salvaged replaced with like components. Timber sleepers will likely be subject to lead contamination and will not be salvaged. The ballast and sub-grade will also likely be removed and replaced with new material.

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
	As the Captains Flat railway is no longer operating the reinstatement of railway tracks may not require engineering and construction to meet operational railway standards. Advice should be obtained from Transport for NSW on this matter.
<p>Partial Demolition</p> <p>Is the demolition essential for the heritage item to function?</p> <p>Are important features of the item affected by the demolition (e.g. fireplaces in buildings)?</p> <p>Is the resolution to partially demolish sympathetic to the heritage significance of the item?</p> <p>If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?</p>	<p>The Concentrate Loading Tunnels that form part of the Flotation Mill contain toxic material and are an ongoing source of contamination. An assessment undertaken by GHD (2018) also identified evidence to suggest that their structural integrity may be compromised. It is proposed that the Concentrate Loading Tunnels be either:</p> <ul style="list-style-type: none"> • Fenced; • Filled; or • Demolished. <p>If the Concentrate Loading Tunnels are demolished, mineral waste material associated with the Tunnels would be relocated to the containment cell at the Northern Dumps and the area would then be remediated consistent with the rest of the Mill Area.</p> <p>The Concentrate Bins were used to store ore concentrate prior to load out and transport. Between 2006 and 2014 an attempt was made to remediate the sulfidic ore stored within them by covering the sulfidic ore with inert gravel. Despite these measures, sulfidic efflorescences are forming under the bins from sulfate-rich leachate emanating from the ore and/or the subsurface water seeping through the concrete retaining wall at the base of the bins. This secondary mineralisation poses both a public safety and an environmental risk.</p> <p>To remediate the Concentrate Bins, there will be one of two options (or a combination of both options) undertaken:</p> <ol style="list-style-type: none"> 1. Remove sulfidic waste within the southern-most bin and place in the Northern Dumps encapsulation cell. The inert gravel would either be beneficially reused or placed in the encapsulation cell. It is proposed that this will take place either by: <ol style="list-style-type: none"> a. Constructing a temporary earthen bund parallel to the bins that would support a long-reach excavator that would remove the material into dump trucks for relocation to the encapsulation cell. b. Use of a dryvac excavation truck to remove the material for relocation and placement in the encapsulation cell. As the dryvac truck has an internal storage cell for the sulfidic waste, it would simply shuttle between the bins and encapsulation cell, negating the need for an excavator and/or dump trucks 2. Leave the contents of the Ore Concentrate Bins <i>in situ</i> and install a deep excavator trench on the upslope of the Bins to deliver groundwater around the structure to prevent seepage. This is aimed at acting as a cut off drain to capture subsoil contaminated water. <p>Pending a safety inspection, it is proposed that the emptied Concentrate Bins would remain in situ.</p> <p>To mitigate any unintended harm the following measures will be taken before the proposed activity commences:</p> <ul style="list-style-type: none"> • A detailed archival recording of the Concentrate Loading Tunnels and Concentrate Bins will be prepared including site plans and measured drawings; and • A detailed archival photographic record of the Concentrate Loading Tunnels and Concentrate Bins will be prepared.

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
	<p>The Surge Bin is partially filled with sulfidic ore and as a result it is a source of sulfate-rich leachate emanating from the ore. This secondary mineralisation poses both a public safety and an environmental risk. The sulfate-rich leachate has also severely corroded the metal elements of the Surge Bin to the extent that it appears to be structurally compromised.</p> <p>Whilst repair and stabilisation of the metal elements may have been management options a decade or more ago, the extent of the corrosion and the structural collapse is such that repair is no longer possible. Although the removal of the metal and timber elements will permanently change the visual appearance of the Surge Bin site, the remaining concrete elements are of a size and proportion sufficient to retain its existing identified heritage values. The concrete elements of Surge Bin would remain <i>in situ</i> following the works.</p> <p>To remediate the Surge Bin, it is proposed the metal and timber elements of the structure be removed with the sulfidic waste ore contained within the bin relocated to the Northern Dumps encapsulation cell.</p> <p>To mitigate the impact of removing the metal and timber elements of the structure the following measures will be taken before the proposed activity commences:</p> <ul style="list-style-type: none"> • A detailed archival recording of the Surge Bin will be prepared; and • A detailed archival photographic record of the Surge Bin will be prepared.
<p>Minor additions</p> <p>How is the impact of the addition on the heritage significance of the item to be minimised?</p> <p>Can the additional area be located within an existing structure? If no, why not?</p> <p>Will the additions visually dominate the heritage item?</p> <p>Is the addition sited on any known or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?</p> <p>Are the additions sympathetic to the heritage item? In what way (e.g. form, proportions, design)?</p>	<p>Elements of the mining infrastructure that remains at the site is in a derelict or partially demolished state. As these features are accessible to the public, there is a safety risk. In some cases, existing safety fencing is in a state of disrepair and other areas are not fenced.</p> <p>Barrier fencing would be erected at the following locations to restrict public access to hazardous or unstable elements of the site:</p> <ul style="list-style-type: none"> • Flotation Mill; • Concentrate Bins, Sulphur Plant & Ball Mills; and • Surge Bin. <p>Prior to the proposed remediation works, the heritage fabric would be secured with temporary fencing to restrict access, minimise on site safety risk, and to protect the historic structures from inadvertent mechanical damage.</p> <p>The following heritage elements may pose an ongoing safety risk if unrestricted public access continues. The proposal includes the installation of appropriate safety fencing to restrict access. Final barrier design would be determined based on site specific conditions and the relevant Australian Design Standards:</p> <ul style="list-style-type: none"> • Flotation Mill; • Concentrate Bins, Sulphur Plant & Ball Mills; and • Surge Bin.

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
<p>Major additions</p> <p>How is the impact of the addition on the heritage significance of the item to be minimised?</p> <p>Can the additional area be located within an existing structure? If not, why not?</p> <p>Will the additions tend to visually dominate the heritage item?</p> <p>Are the additions sited on any known or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?</p> <p>Are the additions sympathetic to the heritage item?</p> <p>In what way (e.g. form, proportions, design)?</p>	<p>No major additions to the existing heritage fabric are proposed as part of this activity.</p>
<p>Change of use</p> <p>Has the advice of a heritage consultant or structural engineer been sought?</p> <p>Has the consultant's advice been implemented? If not, why not?</p> <p>Does the existing use contribute to the significance of the heritage item?</p> <p>Why does the use need to be changed?</p> <p>What changes to the fabric are required as a result of the change of use?</p> <p>What changes to the site are required as a result of the change of use?</p>	<p>No change of use is proposed as part of this activity. The site will continue as a derelict mine.</p>
<p>Repainting</p> <p>Have previous (including original) colour schemes been investigated? Are previous schemes being reinstated?</p> <p>Will the repainting effect the conservation of the fabric of the heritage item?</p>	<p>No re-painting of heritage fabric is proposed as part of this activity</p>

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
<p>Re-roofing/re-cladding</p> <p>Have previous (including original) roofing/cladding materials been investigated (through archival and physical research)?</p> <p>Is a previous material being reinstated?</p> <p>Will the re-cladding effect the conservation of the fabric of the heritage item?</p> <p>Are all details in keeping with the heritage significance of the item (e.g. guttering, cladding profiles)?</p> <p>Has the advice of a heritage consultant or skilled tradesperson (e.g. slate roofer) been sought?</p>	<p>No re-roofing or re-cladding of heritage fabric is proposed as part of this activity</p>
<p>New services (e.g. air conditioning, plumbing)</p> <p>How has the impact of the new services on the heritage significance of the item been minimised?</p> <p>Are any of the existing services of heritage significance? In what way? Are they affected by the new work?</p> <p>Has the advice of a conservation consultant (e.g. architect) been sought? Has the consultant's advice been implemented?</p> <p>Are any known or potential archaeological deposits (underground and under floor) affected by the proposed new services?</p>	<p>No new services are proposed as part of this activity.</p> <p>Certain aspects of the proposed earthworks would include modification to existing surface water management aimed at reducing surface erosion and managing collected rainwater within the Lake George Mine site. This work would not impact on existing heritage fabric.</p>
<p>Fire upgrading</p> <p>How has the impact of the upgrading on the heritage significance of the item been minimised?</p> <p>Are any of the existing services of heritage significance? In what way? Are they affected by the new work?</p> <p>Has the advice of a conservation consultant (e.g. architect) been sought? Has their advice been implemented?</p> <p>Are any known or potential archaeological deposits (underground or under floor) affected by the proposed new services?</p> <p>Has the advice of a fire consultant been sought to look for options that would have less impact on the heritage item?</p> <p>Will this advice be implemented? How?</p>	<p>No fire upgrade to heritage fabric is proposed as part of this activity.</p>

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
<p>New landscape works (including car parking and fences)</p> <p>How has the impact of the new work on the heritage significance of the existing landscape been minimised?</p> <p>Has evidence (archival and physical) of previous landscape work been investigated? Are previous works being reinstated?</p> <p>Has the advice of a consultant skilled in the conservation of heritage landscapes been sought? If so, have their recommendations been implemented?</p> <p>Are any known or potential archaeological deposits affected by the landscape works? If so, what alternatives have been considered?</p> <p>How does the work impact on views to, and from, adjacent heritage items?</p>	<p>The proposed activity would include with the following earthworks:</p> <ul style="list-style-type: none"> • Removal of highly contaminated soil from the Mill Area along with a small number of identified locations to a containment cell located in the Northern Dumps portion of the Lake George Mine site (this area was previously re-landscaped during a rehabilitation program that commenced in the 1970s). Following sealing of the cell the area would be revegetated. • The majority of the Lake George Mine site would be subject to capping - a stoichiometric volume of lime would be spread over the required area and mechanically ripped into the existing surface. The area would then be wheel rolled for compaction, before 200mm of imported subsoil is spread and lightly tamped. A 100mm depth of growing media would then be spread and revegetated as per the Revegetation Plan. • In the central portion of the Central Mine Area (where the majority of the extant heritage fabric is located), the capping would involve the following: a stoichiometric volume of lime would be spread over the required area and mechanically ripped into the existing surface. The area would then be wheel rolled for compaction, over which separation geotextile would be installed. A 300mm layer of imported and inert rock mulch would then be emplaced over the geotextile as the capping option. This approach would retain the mining/industrial aesthetic of the precinct. <p>Finishing and surfacing works would result in modifications to existing surface water management aimed at reducing surface erosion and managing collected rainwater within the Lake George Mine site. This work would not impact on existing heritage fabric.</p> <p>The existing surface is heavily deflated following decades of erosion and redeposition of disturbed sediments. Nevertheless, there remains potential for archaeological deposits to be associated with the mine entrance, workshop and change rooms and at the northern Processing Site (Kohinoor & Elliots) would be protected from disturbance with physical barriers whilst remediation works are underway. The application of lime to surface deposits at the northern Processing Site (Kohinoor & Elliots) will be undertaken by hand and without disturbance to surface deposits to avoid any impact to potential archaeological deposits.</p> <p>The proposed activity would retain the existing form and contour of the surface and would not impact on views to, and from, the site.</p>
<p>Tree removal or replacement</p> <p>Does the tree contribute to the heritage significance of the item or landscape?</p> <p>Why is the tree being removed?</p> <p>Has the advice of a tree surgeon or horticultural specialist been obtained?</p> <p>Is the tree being replaced? Why? With the same or a different species?</p>	<p>Some trees may be removed as part of the proposed remediation works. Where this occurs, it would be to allow access to contaminated soil deposits or to avoid an impact on the built heritage fabric of the site. An ecological assessment has been undertaken to assess the environmental impacts should tree removal be required.</p> <p>None of the trees within the proposed activity footprint have been identified as having heritage value or contributing to significant aesthetic values.</p> <p>The proposal includes measures for re-vegetation once the earthworks have been completed. Plant variety would be site dependant according to the Revegetation Pan.</p>

Question	Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable)
<p>New signage</p> <p>How has the impact of the new signage on the heritage significance of the item been minimised?</p> <p>Have alternative signage forms been considered (e.g. free standing or shingle signs). Why were they rejected?</p> <p>Is the signage in accordance with section 6, Areas of Heritage Significance', in Outdoor Advertising: An Urban Design-Based approach? (1) How?</p> <p>Will the signage visually dominate the heritage item/ heritage conservation area or heritage streetscape?</p> <p>Can the sign be remotely illuminated rather than internally illuminated?</p>	<p>No new signage is proposed as part of this activity, however, it is understood that additional interpretive heritage signage will be considered as part of the ongoing management of the site that would be captured in a site Environmental Management Plan post-remediation works</p>

Table 12: Statement of Heritage Impacts - Stationmasters Residence (Former)

Question	Stationmasters Residence (Former)
<p>The following aspects of the proposal respect or enhance the heritage significance of the item or conservation area for the following reasons:</p>	<p>The purpose of the proposed remediation works is to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent serious environmental and human health risks to people accessing the site, to residents on-site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.</p> <p>The proposed works would enhance the amenity of the former Stationmasters Residence site as the removal and/or containment of contaminated soil would make the site safer for public visitation. Revegetation work would contribute to stabilising the site.</p>
<p>The following aspects of the proposal could detrimentally impact on heritage significance.</p> <p>The reasons are explained as well as the measures to be taken to minimise impacts:</p>	<p>There are no identified detrimental aspects to the proposed activity.</p> <p>The proposed works will improve the amenity and safety for residents of the former Stationmasters Residence</p>
<p>The following sympathetic solutions have been considered and discounted for the following reasons:</p>	<p>The proposed works are the most sympathetic solution to addressing the significant health risks associated with site contamination that does not involve physical impact upon the heritage fabric of the former Stationmasters Residence.</p> <p>No other solution has been proposed.</p>
<p>Demolition of a building or structure</p> <p>Have all options for retention and adaptive re-use been explored?</p> <p>Can all of the significant elements of the heritage item be kept, and any new development be located elsewhere on the site?</p> <p>Is demolition essential at this time or can it be postponed in case future circumstances make its retention and conservation more feasible?</p> <p>Has the advice of a heritage consultant been sought? Have the consultant's recommendations been implemented? If not, why not?</p>	<p>The remediation strategy for the former Stationmasters Residence is to excavate and remove lead contaminated soil and relocate the contaminated material in the containment cell to be located on the Northern Dumps. This would involve temporary removal and relocation of selected non-heritage elements including signs, posts, and fencing. Once the contaminated soil has been removed and replaced with clean fill all elements would be reinstated in their original position or replaced with new items. To mitigate any unintended harm the following measures would be taken:</p> <ul style="list-style-type: none"> • A detailed photographic record will be prepared of the external elevations of the Stationmasters Residence and its setting; • Non-heritage elements subject to removal and temporary relocation will be securely stored at an appropriate location near the site; and • Reinstatement of non-heritage elements subject to removal and temporary relocation will occur as soon as practicable following completion of the remediation works.

Question	Stationmasters Residence (Former)
<p>Partial Demolition</p> <p>Is the demolition essential for the heritage item to function?</p> <p>Are important features of the item affected by the demolition (e.g. fireplaces in buildings)?</p> <p>Is the resolution to partially demolish sympathetic to the heritage significance of the item?</p> <p>If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?</p>	<p>No partial demolition of the existing heritage fabric is proposed as part of this activity.</p>
<p>Major partial demolition</p> <p>Is the demolition essential for the heritage item to function?</p> <p>Are particular features of the item affected by the demolition (e.g. fireplaces in buildings)?</p> <p>Is the detailing of the partial demolition sympathetic to the heritage significance of the item (e.g. creating large square openings in internal walls rather than removing the wall altogether)?</p> <p>If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?</p> <p>How is the impact of the addition on the heritage significance of the item to be minimised?</p> <p>Can the additional area be located within an existing structure? If no, why not?</p> <p>Will the additions visually dominate the heritage item?</p> <p>Is the addition sited on any known or potentially significant archaeological deposits?</p> <p>Is the resolution to partially demolish sympathetic to the heritage significance of the item?</p> <p>If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?</p>	<p>No major partial demolition of the existing heritage fabric is proposed as part of this activity.</p>

Question	Stationmasters Residence (Former)
<p>Minor additions</p> <p>How is the impact of the addition on the heritage significance of the item to be minimised?</p> <p>Can the additional area be located within an existing structure? If no, why not?</p> <p>Will the additions visually dominate the heritage item?</p> <p>Is the addition sited on any known or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?</p> <p>Are the additions sympathetic to the heritage item? In what way (e.g. form, proportions, design)?</p>	<p>No minor additions are proposed at this site</p>
<p>Major additions</p> <p>How is the impact of the addition on the heritage significance of the item to be minimised?</p> <p>Can the additional area be located within an existing structure? If not, why not?</p> <p>Will the additions tend to visually dominate the heritage item?</p> <p>Are the additions sited on any known or potentially significant archaeological deposits? If so, have alternative positions for the additions been considered?</p> <p>Are the additions sympathetic to the heritage item?</p> <p>In what way (e.g. form, proportions, design)?</p>	<p>No major additions to the existing heritage fabric are proposed as part of this activity.</p>
<p>Change of use</p> <p>Has the advice of a heritage consultant or structural engineer been sought?</p> <p>Has the consultant's advice been implemented? If not, why not?</p> <p>Does the existing use contribute to the significance of the heritage item?</p> <p>Why does the use need to be changed?</p> <p>What changes to the fabric are required as a result of the change of use?</p> <p>What changes to the site are required as a result of the change of use?</p>	<p>No change of use is proposed as part of this activity.</p>
<p>Repainting</p> <p>Have previous (including original) colour schemes been investigated? Are previous schemes being reinstated?</p> <p>Will the repainting effect the conservation of the fabric of the heritage item?</p>	<p>No re-painting of heritage fabric is proposed as part of this activity</p>

Question	Stationmasters Residence (Former)
<p>Re-roofing/re-cladding</p> <p>Have previous (including original) roofing/cladding materials been investigated (through archival and physical research)?</p> <p>Is a previous material being reinstated?</p> <p>Will the re-cladding effect the conservation of the fabric of the heritage item?</p> <p>Are all details in keeping with the heritage significance of the item (e.g. guttering, cladding profiles)?</p> <p>Has the advice of a heritage consultant or skilled tradesperson (e.g. slate roofer) been sought?</p>	<p>No re-roofing or re-cladding of heritage fabric is proposed as part of this activity</p>
<p>New services (e.g. air conditioning, plumbing)</p> <p>How has the impact of the new services on the heritage significance of the item been minimised?</p> <p>Are any of the existing services of heritage significance? In what way? Are they affected by the new work?</p> <p>Has the advice of a conservation consultant (e.g. architect) been sought? Has the consultant's advice been implemented?</p> <p>Are any known or potential archaeological deposits (underground and under floor) affected by the proposed new services?</p>	<p>No new services are proposed as part of this activity.</p> <p>Certain aspects of the proposed earthworks would include modification to existing surface water management aimed at reducing surface erosion and managing stormwater. This work would not impact on existing heritage fabric.</p>
<p>Fire upgrading</p> <p>How has the impact of the upgrading on the heritage significance of the item been minimised?</p> <p>Are any of the existing services of heritage significance? In what way? Are they affected by the new work?</p> <p>Has the advice of a conservation consultant (e.g. architect) been sought? Has their advice been implemented?</p> <p>Are any known or potential archaeological deposits (underground or under floor) affected by the proposed new services?</p> <p>Has the advice of a fire consultant been sought to look for options that would have less impact on the heritage item?</p> <p>Will this advice be implemented? How?</p>	<p>No fire upgrade to heritage fabric is proposed as part of this activity.</p>

Question	Stationmasters Residence (Former)
<p>New landscape works (including car parking and fences)</p> <p>How has the impact of the new work on the heritage significance of the existing landscape been minimised?</p> <p>Has evidence (archival and physical) of previous landscape work been investigated? Are previous works being reinstated?</p> <p>Has the advice of a consultant skilled in the conservation of heritage landscapes been sought? If so, have their recommendations been implemented?</p> <p>Are any known or potential archaeological deposits affected by the landscape works? If so, what alternatives have been considered?</p> <p>How does the work impact on views to, and from, adjacent heritage items?</p>	<p>The remediation works for the former Stationmasters Residence involve the excavation and removal of lead contaminated soil and relocation of the contaminated material in the containment cell to be located on the Northern Dumps. Once the contaminated soil has been removed and replaced with clean fill finishing and surfacing works would be undertaken This work would not impact on existing heritage fabric.</p> <p>The proposed activity would retain the existing form and contour of the surface and would not impact on views to, and from, the site.</p>
<p>Tree removal or replacement</p> <p>Does the tree contribute to the heritage significance of the item or landscape?</p> <p>Why is the tree being removed?</p> <p>Has the advice of a tree surgeon or horticultural specialist been obtained?</p> <p>Is the tree being replaced? Why? With the same or a different species?</p>	<p>Some trees may be removed as part of the proposed remediation works. Where this occurs, it would be to allow access to contaminated soil deposits or to avoid an impact on the built heritage fabric of the site. An ecological assessment has been undertaken to assess the environmental impacts should tree removal be required. As a working ethos, where trees remain, the soil logically is relatively uncontaminated and therefore, would not need to be remediated.</p> <p>None of the trees within the proposed activity footprint have been identified as having heritage value or contributing to significant aesthetic values.</p> <p>The proposal includes measures for re-vegetation once the earthworks have been completed. Plant variety would be site dependant according to the Revegetation Pan.</p>
<p>New signage</p> <p>How has the impact of the new signage on the heritage significance of the item been minimised?</p> <p>Have alternative signage forms been considered (e.g. free standing or shingle signs). Why were they rejected?</p> <p>Is the signage in accordance with section 6, Areas of Heritage Significance', in Outdoor Advertising: An Urban Design-Based approach? (1) How?</p> <p>Will the signage visually dominate the heritage item/ heritage conservation area or heritage streetscape?</p> <p>Can the sign be remotely illuminated rather than internally illuminated?</p>	<p>No new signage is proposed as part of this activity.</p>

Table 13: Statement of Heritage Impacts – Neighbouring Listed Places: Captains Flat Railway Station and Roscommon.

Question	Railway Station	Roscommon
The following aspects of the proposal respect or enhance the heritage significance of the item or conservation area for the following reasons:	The proposed works would enhance the amenity of the Captains Flat rail precinct The improved amenity and safety resulting from the proposed works may potentially make the Captains Flat rail precinct a more attractive destination for visitors, and with that the attendant increased potential for inadvertent or deliberate damage to listed items.	The proposed works will neither enhance nor be of any detriment to the Roscommon site
The following aspects of the proposal could detrimentally impact on heritage significance. The reasons are explained as well as the measures to be taken to minimise impacts:	The proposed works will not detract from, or detrimentally impact the Railway Station site.	
The following sympathetic solutions have been considered and discounted for the following reasons:	The proposed works are the most sympathetic solution to addressing the significant health risks associated with mine site contamination. No other solution has been proposed.	
New development adjacent to a heritage item	Railway Station	Roscommon
How does the new development affect views to, and from, the heritage item? What has been done to minimise negative effects?	The proposed works would not impact the views to or from the heritage items, once complete.	
How is the impact of the new development on the heritage significance of the item or area to be minimised?	The proposed works would have no impact on the heritage significance of the items.	
Why is the new development required to be adjacent to a heritage item?	The proposed works involve remediation of a mine site and include measures to mitigate the impact of toxic mine waste. The works are location-dependant.	
How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?	The proposed works would not encroach upon or interfere with the heritage items curtilage.	
Is the development sited on any known, or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?	Potential archaeological deposits may be associated with the mine entrance, workshop and change rooms and at the Processing Site (Kohinoor & Elliots). The significance if these deposits is unknown. They would be protected from disturbance with physical barriers whilst remediation works are underway. These locations are at some distance from the Stationmasters Residence, Railway Station and Roscommon sites. The proposed works and the mitigative measures would have no impact on the identified heritage values of the Stationmasters Residence, Railway Station and Roscommon sites	

Question	Railway Station	Roscommon
Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportions, design)?	Yes. The proposed works involve the capping and sealing of contaminated soil, the removal of contaminated soil and landscaping consistent with the existing site topography.	
Will the additions visually dominate the heritage item? How has this been minimised?	No. The proposed works involve the capping and sealing of contaminated soil, the removal of contaminated soil and landscaping consistent with the existing site topography.	
Will the public, and users of the item, still be able to view and appreciate its significance?	The proposed works would improve the ability of the public and other users to access, view or appreciate the significance of the Captains Flat Railway Station site.	The proposed works would not interfere with the ability of the public and other users to access, view or appreciate the significance of the Roscommon site.

Table 13: Consideration of Palerang LEP 2014 requirements- Lake George Mine and Captains Flat Railway (goods shed, weighbridge, gantry and turntable).

Objective	Lake George Mine, including smelter site, mine processing sites, railway precinct, Fosters Gully and Keatings Collapse	Captains Flat railway goods shed, weighbridge, gantry and turntable	Stationmasters Residence (Former)
To conserve the environmental heritage of the Queanbeyan-Palerang region	The purpose of the proposed remediation works is to reduce the risk of offsite contamination through airborne dust and surface erosion generating contaminated runoff from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent environmental and human health risks to people accessing the site, to residents on-site and in the township of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.	The purpose of the proposed remediation works is to reduce the risk of offsite contamination through airborne dust and surface erosion generating contaminated runoff from the continued residual lead contamination at rail facilities associated with Lake George Mine. The proposed remediation works are required to prevent environmental and human health risks to people accessing the site, to residents of the township of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.	
To conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views	The proposed works can be implemented without impacting on the heritage significance of the site, its fabric, settings, or views. Some minor alterations to the fabric are required to control the spread of contamination and make structures safe – including blocking or filling of loading tunnels, removal of fabric that could cause harm (e.g., removal of exposed steel reinforcing and fencing of some structures to restrict access)	The proposed works can be implemented without impacting on the heritage significance of the site, its fabric, settings and views.	

Objective	Lake George Mine, including smelter site, mine processing sites, railway precinct, Fosters Gully and Keatings Collapse	Captains Flat railway goods shed, weighbridge, gantry and turntable	Stationmasters Residence (Former)
To conserve archaeological sites	<p>Potential archaeological deposits may be associated with the mine entrance, workshop and change rooms and at the Processing Site (Kohinoor & Elliotts). The significance of these deposits is unknown. They would be protected from disturbance with physical barriers whilst remediation works are underway.</p> <p>If the mitigative actions are taken, the proposed works would not impact on the identified heritage values of the site.</p>	No archaeological sites, or areas of archaeological potential have been identified within the proposed impact footprint that is within the curtilage of the Captains Flat railway goods shed, weighbridge, gantry and turntable site or the former Stationmasters Residence.	
To conserve Aboriginal objects and Aboriginal places of heritage significance	No Aboriginal objects, Aboriginal places or heritage values would be impacted by the proposed works. A separate assessment of Aboriginal cultural heritage impacts has been completed and forms part of the REF.		

8 Stakeholder Consultation

The site-based assessment undertaken on 27th October 2021 provided an opportunity for the project proponent, Department of Regional NSW Legacy Mines Program, to engage with a range of stakeholders including landowners, the Captains Flat Community Association and local government. A list of participants present at the consultation meeting is included at Table 14 (below).

During the meeting a representative from the Legacy Mines Program detailed the nature and extent of the proposed remediation works and the way that the proposal had the potential to impact on identified heritage fabric at the site. An overview of the history of the site and the heritage significance assessment process was provided by a GHD heritage consultant. Participants then undertook a walking tour of the mine site stopping at key locations including:

- Stairs, Mine Entrance, Change Rooms & Workshop Area;
- The Surge Bin;
- Concentrate Bins;
- Flotation Mill; and
- Dorr Thickeners.

At each location the proposed works and the potential impacts (as outlined in this document) were discussed. Participants were invited to express their views on the works and the potential impacts and to offer their own perspectives on the site and the values that were important to them. Issues that were raised included:

- Safe opportunities for visitors to view and understand the site;
- The benefits of remediating the toxic and contaminated soils;
- Securing elements of the site that were on private property to restrict unregulated public access; and
- That the potential impacts to heritage fabric were felt to be minor when compared to the health and environmental benefits that would result from the proposed remediation works.

Table 14: Participants in the onsite stakeholder meeting.

Participants
Property owner (adjacent to mine)
Property owner (adjacent to mine)
Property owner (old mill processing area)
Captains Flat Community Association representative
NSW Soil Conservation Service representative
NSW Soil Conservation Service representative
Queanbeyan- Palerang Regional Council representative
Regional NSW - Legacy Mines Program representative
Heritage Consultant - GHD

9 Mitigation Measures

Mitigation Measure 1: Proposed Impact Footprint

The proposed activity must be confined to the proposed works footprint. This would ensure that neighbouring and adjacent heritage sites (Captains Flat Railway Station, and Roscommon) are not impacted upon.

Mitigation Measure 2: Railway Precinct and former Stationmasters Residence

To mitigate any unintended harm the following measures must be taken:

- Detailed geospatial survey of the site must be prepared that identifies all elements subject to removal and temporary relocation. Drone footage and GIS mapping should be used to identify the location of each element in order to return items to their original position once the remediation works have been completed.
- A detailed photographic record must be prepared of each element subject to removal and temporary relocation;
- Elements subject to removal and temporary relocation will be securely stored at an appropriate location at, or near, the site;
- Reinstatement of elements subject to removal and temporary relocation must occur as soon as practicable following completion of the remediation works;
- Fabric elements associated with the rails including rail spikes, fishplates and ties should be salvaged and, where that is not possible, they should be replaced with like components;
- Replacement timbers (including rail sleepers) should be like items, where possible; and
- The rail ballast and sub-grade is to be replaced with new material.

As the Captains Flat railway is no longer operating, the reinstatement of railway tracks may not require engineering and construction to meet operational railway standards. Advice should be obtained from TfNSW on this matter.

Mitigation Measure 3: Protection of Potential Archaeological Deposits

Potential archaeological deposits are likely to be associated with the mine entrance, workshop and change rooms and at the Processing Site (Kohinoor & Elliots). These sites will be remediated using hand tools and must be protected from unintended disturbance with physical barriers whilst works are underway. The positioning of barrier fencing should be determined in consultation with an archaeologist with experience of the Lake George Mine site.

The application of lime to surface deposits at the Processing Site (Kohinoor & Elliots) will be undertaken by hand and without disturbance to surface deposits to avoid any impact to potential archaeological deposits.

Mitigation Measure 4: Flotation Mill – Removal of Concentrate Loading Tunnels

If the Concentrate Loading Tunnels are to be removed, the following measures would be taken before the proposed activity commences in order to mitigate the impact:

- A detailed archival recording of the Concentrate Loading Tunnels will be prepared including site plans and measured drawings; and
- A detailed archival photographic record of the Concentrate Loading Tunnels will be prepared.

Mitigation Measure 5: Concentrate Bins – Removal of contaminated material

To mitigate any unintended harm to the Concentrate Bins, the following measures would be taken before the proposed activity commences:

- A detailed site plan of the Concentrate Bins will be prepared; and
- A detailed archival photographic record of the Concentrate Bins will be prepared.

If removal of the inert gravel and the sulfidic waste causes the structural integrity of one or more of the Concentrate Bins to be compromised, additional heritage assessment will be required to determine the most appropriate future management of the structure(s).

Mitigation Measure 6: Surge Bin – Removal of metal and timber elements and contaminated ore

To mitigate the proposed impacts to the Surge Bin associated with removing the metal and timber elements and the contaminated ore inside the bin, the following measures would be taken before the proposed activity commences:

- A detailed site plan of the Surge Bin will be prepared; and
- A detailed archival photographic record of the Surge Bin will be prepared.

If removal of the sulfidic waste causes the structural integrity of the remaining concrete and masonry elements of the Surge Bin to be compromised, additional heritage assessment will be required to determine the most appropriate future management of the structure.

Mitigation Measure 7: Protective Temporary Fencing – Processing Site (Kohinoor & Elliots)

Prior to the commencement of the proposed remediation works, the Processing Site (Kohinoor & Elliots) should be secured with temporary fencing to restrict access, minimise on site safety risk, and to protect the historic structures from inadvertent damage during the works.

Mitigation Measure 8: Permanent Safety Fencing

At the completion of construction works, the following heritage elements should be secured with appropriate permanent safety fencing to restrict access. Final barrier design would be determined based on site specific conditions and the relevant Australian Design Standards.

- Flotation Mill;
- Concentrate Bins, Sulphur Plant & Ball Mills; and
- Surge Bin concrete footers .

10 Conclusion

The proposed works are necessary to reduce the risk of off-site migration of airborne dust and contaminated runoff generated from the continued oxidation of sulfidic mineral waste at Lake George Mine. The proposed remediation works are required to prevent serious environmental and human health risks to people accessing the site, to residents on-site and in the town of Captains Flat, and to aquatic ecosystems and downstream users of the Molonglo River.

Once implemented, the works would enhance the amenity of the Lake George Mine and Captains Flat Rail precinct as the removal and/or containment of contaminated soil would make the sites safer for public visitation. Revegetation work would contribute to stabilise the site and augment future opportunities for signage and interpretive material to help visitors gain an understanding and appreciation of the mining history and heritage of Captains Flat.

The proposed activity would not have a negative impact on identified heritage fabric and values, so long as the identified mitigation measures are implemented.

11 References

Australia ICOMOS	1999	<i>Australia ICOMOS Burra Charter</i>
GHD	2020	<i>Lake George Mine, Captains Flat Detailed Design Report</i>
Grinbergs A. & McGowan B.	2006	<i>Lake George Mine – Assessment of Cultural Heritage Values.</i> Report prepared by Alistair Grinbergs Heritage Solutions for the NSW Department of Primary Industries.
Heritage NSW	2001	Assessing Heritage Significance. <i>NSW Heritage Manual.</i>
	2002	Statements of Heritage Impact. <i>NSW Heritage Manual.</i>
Palerang Shire Council	2014	<i>Palerang Local Environmental Plan</i>
	2015	<i>Palerang Development Control Plan</i>

Appendix A **Detailed History of Lake George Mine**

History of Lake George Mine & Captains Flat

Introduction

The histories of the Lake George Mine and the town of Captains Flat are so intricately interwoven that they must be addressed together as one cannot make sense without understanding the other.

There were two distinct periods of significant mining activity at the site, the first from 1881 to 1899 and the second from 1937 to 1962. Prior to 1881 mining was intermittent and largely confined to small scale alluvial mining operations along the Molonglo River. There was no town or village at Captains Flat, with miner's living in small camps along the Molonglo from the falls to Foxlow Station.

From 1881 mining activity along the Molonglo River increased with the small scale prospecting endeavours giving way to somewhat more elaborate operations that focused on the ore bearing reefs and required more elaborate processing with investments made by a number of companies in crushing plants and furnaces, however a range of factors lead to a decline in the profitability of these operations as the century drew to a close. After 1899 the town of Captains Flat lingered on until mining recommenced in 1937 and continued for 25 years until the mine finally closed in early 1962. The 'deconstruction' phase of the mine continued for another year and had a significant impact on the Captains Flat community. Consideration is also given to the post mining rehabilitation work, a task which is ongoing to the present day.

The importance of the Captain's Flat mine during the post 1937 phase cannot be overstated. While dwarfed by the mighty Broken Hill field (which was not only the largest mining field in Australia, but one of the largest in the world), the Lake George Mine was one of the largest base metal mines in NSW, if not in Australia. The Mount Isa and Mount Lyell fields were larger but were primarily copper producers. For example, in 1943 - 8,579 and 8,633 tons of lead concentrates were extracted from Mount Isa and Mount Lyell respectively compared to 11,850 tons from Captain's Flat. In 1945 there were no lead concentrates from Mount Isa and 6,298 tons from Mount Lyell compared with 7,944 tons from Captain's Flat. The Captain's Flat mine became fully operational in 1939, just prior to the commencement of World War II. Base metals such as lead were of great strategic importance and were highly valued as a source of foreign exchange (and in particular USD\$).

Consideration of the two periods is set out in three sections:

- Mining;
- Class conflict and labour relations; and
- Town and community (including social, cultural and sporting associations).

The First Period 1858-1936

Mining

The first account of mining in the Captain's Flat area was in May 1858 at Foxlow. In August it was reported that a payable gold field had been found and that one of the claims was worked by 16 Chinese miners. The property owner had provided rations, and by mid August a considerable amount of wash dirt was stacked for washing. Several hundred men had left Long Flat and Major's Creek for Foxlow but after prospecting for a few days had returned, for apparently the ground could not be worked because of the quantity of water. By late September there were between 18 and 20 men on the field about 5km from where the ground had been first worked, and they were believed to be doing well. In 1871 there was a report of applications for miner's rights for the Foxlow Reefs, which were near the head of the Molonglo River 2.5km above Foxlow House, the stone having assayed at 2.5oz of gold and 0.5oz of silver per ton. These mines may have been in the Captain's Flat area, but they could not have been very successful as there are no further reports on reef mines until 1881. In April 1875 prospectors claimed that they had obtained payable gold for more than six months, and that large quantities had been sold in Braidwood. A party of Chinese had been working the ground, which was known as the Foxlow goldfield, for some time and were apparently doing very well. A subsequent report referred to a deed of agreement with the owner of Foxlow stipulating conditions in the event of a lead being found. By early 1876,

however, the prospectors had given up the ground, having had to bail out water every morning.¹ There were further reports of reef mining in May 1881, when two tons of quartz was sent to Major's Creek for a yield of 0.5oz a ton. A report in July referred to a party "paddocking" on the Molonglo River about 1.6 km above Foxlow station, and several parties prospecting in the alluvial deposits near Captain's Flat. McNeill's Prospector's claim appeared to be the main one. The party had spent £70, which was a considerable amount of money as they were described as 'only poor men'. About 6km of the reef had been taken up, much of it by moneyed men who were biding their time, leaving the work to others. One party had constructed a race and had commenced sluicing. It was commented that the field was not for those without capital and that people should await the erection of permanent machinery. Provisions were cheap and plentiful.²

In May 1882 a crossing over the Molonglo River was under construction in anticipation of the arrival of Holtermann's crushing machinery at Captain's Flat. Sheds were being erected and it was expected that everything would be completed and in working order within three months. The crushing plant had 12 head of stampers. Work on the Prospectors' claim had been suspended, however. About a mile south of the Prospector's was Harkness and Co's claim. Owing to the limited gold saving devices the miners were losing about half of the yield when sluicing the finer parts of ore from the reef. A report some months later described Captain's Flat as a 'morass of ten or twelve acres (4.0-4.8 hectares)' through which ran the Molonglo River; at the boundary fences of the Yorkdale Estate there were prospector's holes lying like 'open graves' all along the river flat. There were also old water races and small patches of stripped alluvial soil. Near the township the soil had been stripped by McNeill and Hohlan, who had cut a water race along the slope of the southern range bordering the township had worked at their claim for about two years. It had paid them well. At the site of a recent copper discovery about 0.8 km away, the ore was yielding from 75 to 80 per cent copper. A gold discovery had been made at the Coffee claim, 0.8 km east from the copper lode. On a tributary of the Molonglo there was a deep dam, and near that a tunnel and a deep shaft. The gold was very fine and could not be separated without mercury, the owners, Emmerson and Harkness having used sluicing and a blanket, but the process was very wasteful. Mr Blatchford from Araluen had arranged to erect a 16 head stamper to crush the ore and facilitate gold recovery.³

In September it was reported that the discoverers of the copper claim had sold it to Sydney interests for £3,300. A correspondent stated that the Coffee claim was to be the 'hill of renown' in the future. Blatchford's and Emmerson's leases were on opposite sides of a ravine from which the stone was conveyed by about 100m of tramway to Blatchford's stamper. By 1883 about £600 to £700 of gold had been won from Emmerson's lease. Blatchford's claim had yielded from between 20 to 30oz a week before the reef was lost. At Montgomery's seven acre (2.8 hectare) lease, two shafts had been sunk and a road cut for conveying the stone to Holtermann's battery. Late in 1884 there were reports of alluvial gold in the Molonglo River being worked by a steam engine provided by the owner and a centrifugal pump, the miners paying the owner a royalty. During the year considerable work had been done on Blatchford's claim, most of it while waiting for rain, the lack of which had caused the battery to be idle for the first six and a half months of the year. But the first signs were emerging that something was amiss. Much of Blatchford's ore was refractory and intermingled with iron, which could not be treated with ordinary processes and arrangements were being made for the use of other machinery.⁴

By the following year it was obvious that a change in processing techniques was necessary, for there had been further difficulties caused by the presence of silver and lead in payable quantities. Blatchford discontinued operations and visited Sunny Corner to examine the smelting process in that locality. Believing it to be satisfactory he made arrangements for the erection of a water jacket furnace, and formed a company with a capital of £60,000. Although he employed about 30 men, mining had been suspended because of the preparatory work. Elsewhere, work had been suspended on Montgomery's claim during the last six months of the year because of the lack of water, and little prospecting work had been done on the leases held by representatives of the late Mr Holtermann.⁵

Early in 1886 there were 300 miners at the two main mines, the El Capitan (Blatchford's) and the Kohinoor (formerly Montgomery's), both of which were equipped with blast furnaces. The El Capitan was the larger of the two mining concerns. Many of the miners had worked in Nevada and Sunny Corner, while others were from Araluen and other further afield mining centres. During 1886 and 1887 the mining operations were, however, plagued by intermittent shut downs of the furnaces, sometimes for repairs and at other times because of shortages of raw material such as timber, coke and iron. The latter was a consequence of the teams bogging down on the bad roads, as most materials were conveyed by bullock dray from the railhead at Bungendore. Another difficulty was lack of capital, and in November 1886 it was commented that people were 'suffering great privations rather than leave, knowing that eventually when a start is effected there will be sure prosperity'. All the while, alluvial mining continued. In 1886 it was remarked that the nearby gullies were frequented by

fossickers who were making more than tucker wages with average earnings not far short of £3 a man'. The whole of Captains Flat was riddled with shallow trial holes and resembled a 'newly made cemetery of unfilled graves'.⁶

Disruptions were also caused by changes in ownership and management and occasional attempts to reconstitute the companies. In September 1886, Sydney interests were reported as having purchased the Kohinoor, the El Capitan and Holtermann's battery. The Kohinoor was under new management again in July 1887. In early 1888 no smelting was undertaken at the El Capitan pending steps to acquire more capital. The mine was eventually reconstituted a few months later as the Commodore, and was managed jointly with the Vanderbilt, both companies using the same assaying and smelting facilities. Mining at the Kohinoor was also suspended following the termination of a tribute agreement, but later that year it was acquired by investors with substantial capital resources, and active work resumed soon thereafter.⁷

1889 was a relatively prosperous year. Work had been carried on very successfully at the Commodore with a significant amount of ore delivered to the furnaces, and smelting had been conducted more or less continuously at the Kohinoor, where an extra water jacket smelting furnace had been erected. At the Kohinoor, a reverberatory furnace was also under construction to treat the sulphide ores, as the silver ore was now regarded as very refractory. A 20 head battery and a Huntington mill were also under construction for the treatment of an expected large body of gold bearing ore. When in full work it was expected that this mine would employ about 250 men.⁸

By early 1890, the increasingly refractory nature of the sulphide ores had led to a change in the method of treatment. The silver required roasting prior to smelting, and operations were to be curtailed until such time as a calciner was erected. A number of roasting stalls were built, but they were very dependent on dry weather, and they were not particularly successful. At the Commodore Vanderbilt a second hand de-sulphurising furnace had been bought, but it too had been unsuccessful. These vicissitudes continued into the following year, and by March the Commodore Vanderbilt was smelting with only one furnace, with another lying idle. At the New Kohinoor (formerly the Kohinoor) the only processing was the extraction of gold.

In March 1891 it was commented that both companies had worked their mines in the wrong direction, relying on the gossan to make lead bullion as at Broken Hill and Sunny Corner. If they had proven the mines by testing if there was copper, which there was, then they would have only had to decide whether to smelt with the blast furnace or the reverberatory furnace to make copper matte. But there had been a misconception in the nature of the ore, the mode of treatment, extravagance in the construction of the works and errors of judgement in laying them out.⁹

In 1893 steps were taken to rectify the earlier production problems. New furnaces and treatment methods were introduced by both companies and there were about 200 miners employed in both ventures, with the Commodore Vanderbilt now reconstituted as the Lake George Copper Mining Company. The main mineral now extracted was copper rather than silver, and there were about 25 teams on the road carrying coke from Bungendore. Towards the end of the year the furnaces were running continuously and progress had been made at the Lake George mines in the erection of a new copper treatment plant. At the New Kohinoor a new smelter had been brought in and more men were employed in early November. The ore was now roasted in a calciner prior to smelting. By now, however, there were new challenges in the form of depressed metal prices, for the world wide economic depression of the 1890s was in full swing. In November the men at the New Kohinoor accepted a reduction in wages on condition that the old rates would be restored when conditions improved. In September 1894 it was commented that everything at Captains Flat was dull, flat and unprofitable, and both mines had shut down their furnaces pending an amalgamation.¹⁰

By September 1895 an air of optimism had returned, and by the middle of 1896 the amalgamation had been effected and the share price had risen sharply, largely as a result of a steep increase in copper prices. Mining was now to be directed primarily to copper. Steps were also to be taken to reconstitute the company. It had been concluded that the property must be worked on a very large scale, with a plant capable of treating a much larger quantity of ore and reducing it to a much richer product than at present. A large London-based company was to provide the necessary working capital, and it was predicted that there could be 1,000 men and boys employed by early 1897. A direct pyritic smelting process similar to that employed at Mt Lyell in Queenstown, Tasmania was to be adopted, with the plant having a smelting capacity of 2,500 tons per week as against the present output of 625 tons. It was expected that the mine would also be a large gold producer, and a large cyanide plant was also to be erected. A report in late 1896 stated that the 'forlornness which was so apparent among the men for the last five months is gradually drawing back once more, and now with fresh faces,

announcements of men being given employment, and the town becoming busier daily, the result is that we are getting younger daily'.¹¹

The adoption of the pyritic process was an important milestone. It had been invented by Robert Sticht, an American metallurgist and mining engineer who commenced working for the newly formed Mount Lyell Mining & Railway Co in Queenstown Tasmania in 1893. He persuaded the company principals in Queenstown to abandon blast furnace smelting in favour of the more efficient but 'fickle' process of pyritic smelting. In 1902 Sticht proclaimed the Queenstown smelters as the first successful pure pyritic smelting operation in the world. The use of this process at Captain's Flat was bold and innovative, and it was probably only the second time that pyritic smelting had been used in Australia.¹²

In the pyritic smelting process the ore was treated by the heat generated from its own oxidation, without the aid of extraneous heat. This was achieved by the aid of a hot blast and the addition of from 1.5 to 5 per cent of coke, by weight of the charge, thus saving on the fuel and labour costs of roasting or calcining. The air was forced into the main air pipe by blowers and forced over a stove and heated to very high temperatures, before passing through the blast furnaces. In the furnaces the sulphur in the ore was burnt by the hot blast, and converted into fuel, the sulphur in the pyritic ore doing its own smelting.¹³ At Captain's Flat there were three hot air stoves located between the blower house and the blast furnaces. The process was referred to as partial pyritic smelting as some coke was used, a practice which soon also became the norm at Mt Lyell. The slag from the smelting process was dumped below the smelter on the north and west slopes of the hill on which the smelter stood and in full sight of the town, where it remains (or the remnants thereof) to this day.¹⁴

Erection of plant and equipment proceeded steadily throughout the early part of 1897. However, not all the miners shared the company's confidence, for while men were flocking to Captains Flat from all parts of Australia, a good many of the old miners were leaving for Sydney where they obtained ready work on the sewers at a much better rate of pay. In March, 20 men left for Sydney in one week. The plant was extensive and included a smelting plant with a large smoke stack and a tramway between Elliott's shaft and the smelters, with a viaduct across the Commodore Gorge. A blacksmith and engineer's shop, which included four forges, with modern machinery such as lathes, drilling, punching and screwing machinery, were constructed near Elliott's shaft. There were three hot air stoves and four furnaces, each capable of smelting from 100 to 120 tons, and an elevator was constructed for lifting the copper matte from the floor of the furnaces to the concentrating furnaces. Four hundred men were directly employed in and about the mines, with this number to increase when all the furnaces were blown in. It was estimated that there was enough ore to give employment for 100 years.¹⁵

The new found prosperity came to a sudden end, however, for a year later all miners had been retrenched and the officials given four weeks notice. Mining was to continue in the northern section pending the future of the pyritic treatment process. There were now only about 80 men employed in smelting and these would only be needed until the present stocks of coke and limestone were consumed. It appeared that the company had not verified the quality and quantity of the ore and the adequacy and efficiency of the reduction process. By October large numbers were leaving the district. There were representations to the local member from the progress committee protesting against the suspension of labour to the company as it was considered that the leases would yield from one to five ounces of gold per ton, which would give employment to a number of men. This matter was raised in Parliament and suspension was granted for two months to allow the Company to experiment with new treatment methods.¹⁶

By early December mining and smelting had recommenced, and several months later the Company's shares rose sharply. However, in August 1899 a large number of hands were again laid off. The sulphide ores were now of too low a grade to warrant smelting, and the furnaces were closed down. By October only a few miners were working, and they were engaged in erecting a cyanide plant, the future being seen to rest where it had started, with gold mining and processing. Many of the furnace hands left for Dapto and Burruga. There was still a strong feeling that the town would recover in a few months, but the reality was that base metal mining was finished, and would remain that way for almost another 40 years.¹⁷

The cyanide also had operational problems and in June 1900 it was closed because of the inefficiency of some of the equipment. These difficulties allowed the company to successfully apply for a suspension of labour on a number of occasions over the next few years, and a full complement of men was never employed. In 1902 there was again much criticism of the Department of Mines for granting suspensions, particularly as there were a number of men reported as willing to take up the leases and work them on a cooperative basis. By 1903 there were only 12 men at work, most of whom were prospecting, and two years later much of the machinery was removed because of the refractory nature of the ore. Over the next 30 years there was to be rarely more than

ten men working at the mines.¹⁸ There was little change to the pace of life at the mines, the Department of Mines' *Annual Reports* often merely telling of continuing efforts to dewater the mine and to maintain the existing equipment.

Class, Conflict & Labour Relations

Labour relations were not an issue until the advent of large scale mining and processing in the mid to late 1880s. Prior to that time the leases were worked either by small syndicates or cooperatively by groups of working miners. In this latter period Captain's Flat was institutionally and socially different in character to other base metal mining communities in southern NSW, such as Currawang and Frogmore. At the former in particular, there was a strong Welsh presence, and both mining communities were ethnically more cohesive and influenced strongly by the hegemony of the mine managers. There was no union representation, although there were lodges, and political debate was scant. At Captain's Flat the mine managers had only a limited authority in the town, for almost all the mine employees were members of the Amalgamated Miners' Association and the progress committees were active at a very early stage in the town's development. Union and localist concerns were, however, closely aligned and community discussion and debate had an edge to it that was absent almost entirely at Currawang and to a lesser extent at Frogmore. At Captain's Flat - public meetings were used extensively as a forum for debate and also for the expression of localist sentiments. Discussion and debate were generally more expressive politically and more conscious of national issues.

For instance, in 1888 there was a visit by the local MLA, E. O'Sullivan, Garvan MLA and a Dr Fitzpatrick, at which a crowd of about 45 miners asked for and received an address by O'Sullivan on protection, mining claims, the land bill and general politics. O'Sullivan fitted in well with the mining fraternity, for alone of all the local politicians he had been a strong labour supporter and had launched several newspapers in which he espoused his views. The *Mining on Private Property Bill* was a hot topic, as it was elsewhere in major mining centres throughout New South Wales, and in 1893 a well attended meeting 'of all classes in the community' was held to elect delegates to represent the Captains Flat community at the forthcoming conference in Sydney. At a subsequent report on the conference residents were advised of the necessity of communicating with other leagues to agitate for a fair and equitable bill. In another debate later that year James McInerney, Secretary of the Goulburn branch of the Shearer's Union, accompanied by W.G. Spence, addressed electors at a public meeting.¹⁹

One of the more famous meetings concerned the fate of the Lucknow miners. In 1897 a large public meeting heard Messrs Hughes MLA and Brown MLA speak on behalf of the miners. Money was collected and the men agreed to pay 2s 6d a week from their wages. A much-awaited debate on this issue was held the following year between O'Sullivan and Hughes, who was accompanied by Griffiths MLA, the Labor member for Waratah, before an audience of 500. Federation was another important issue at Captains Flat. In 1898 O'Sullivan addressed a large gathering of miners on the subject of Federation, and the following year those in favour of the bill held a torchlight procession on the night of voting, with much excitement at the victory of the federal cause.²⁰ Disputation over wages, working conditions and the use of non-unionised labour occurred only occasionally.²¹

Consistent with this level of political awareness, there were frequent visits by O'Sullivan and his political opponents, particularly at election time. In January 1897 O'Sullivan visited Captains Flat to inquire into local needs such as the bad state of water supplies, and the need for public buildings, such as a police barracks, court house and post and telegraph office. But by the late 1890s he was encountering increased opposition. For instance, he won the 1898 election, but the Free Trade candidate obtained a majority at Captains Flat booth. At times he also came in for direct criticism, for there were occasions when he was perceived as out of step with local sentiments and concerns. In 1892 dissatisfaction was expressed at the way he had voted on the Broken Hill affair, and the following year he was criticised for his infrequent visits.²²

After the closure of the mines in 1899 there were occasional visits by Captain Millard and Dr Blackall, and subsequently by Colonel Ryrie. In 1906 Ryrie visited Captains Flat to give thanks for his election to the Legislative Council and was enthusiastically received by a large audience. At a subsequent banquet he queried why the squatter, farmer, shearer and labourer could not live together in harmony, and severely denounced bigotry in any shape or form. Ryrie was very popular at Captains Flat, as elsewhere, and in 1907 it was commented that many of those who had thrown their lot with him had hitherto voted 'Labour'. His ascendancy is clearly indicative of the over-riding of traditional class allegiances by localist ideology. Ryrie's popularity contrasted with that of Messrs Chapman and Millard, who were sometimes chided for their absences.²³ By this time the Captains Flat community was very different to what it had been some ten years previously. Many

residents were living at subsistence levels, and there were food shortages and occasional concerns at the numbers of pigs, horses, goats and sheep that were depleting the grass in the vicinity of the town and the fate of the town common.²⁴

Conflict between parents, teachers and the authorities over education matters were commonplace in most mining communities, particularly on the goldfields, which the authorities regarded as more ephemeral and less deserving of financial assistance. Most conflicts occurred at either the early stage or in the declining years of a mining community's existence, when its future was more in doubt. An added factor in the latter was the increasing level of poverty and economic uncertainty, which heightened feelings of insecurity and neglect. One of the more traumatic conflicts at Captain's Flat occurred in 1913 over the fate of the school piano. In 1913 an application was made for music to be taught in one of the school's spare rooms, the parents having obtained a piano by time payment, but this was declined. The parents wrote again in February 1914 and representations were made to Miller MLA for a personal approach to the Minister, but the Department still objected. Eventually lessons were held in the school during the winter months, but with summer approaching the teacher refused permission. Several public meetings were held, with one correspondent remarking that there 'never had been anything since I have been here that has caused so much friction, in fact the whole place is fighting it like as if the gates of hell is opened here'. At the time there was no properly constituted Parents and Citizen's Association, and the town was a mere shadow of its former self.²⁵

Class sentiments were more commonly given expression in the various progress committees, which we set up ostensibly for the betterment of the community. Sometimes the ire of the committees was directed at the authorities, but often it was a reflection of internal divides in the community itself. A committee was established very early on in 1886 and almost immediately it approached O'Sullivan on a number of matters of local importance, such as the establishment of a better mail service, a public school, better roads and the presence of a mining registrar and a permanent policeman. The selection of a site for the school was a vexed question, for the temporary site was very close to the hotel and in swampy ground with diggers' holes all around. A much more suitable site had been selected by the committee, but the Inspector had refused to look at it. A police station and petty sessions court were, however, established shortly thereafter. A new progress committee approached the authorities in 1887 requesting the establishment of a money order office, but the request was refused, and the matter was subsequently taken up by O'Sullivan following a public meeting.²⁶

In 1889 the progress committee (s) was riven by class conflict. A public meeting was held for the purpose of forming a new progress committee, but there was a very poor attendance and a deal of opposition by those living in the less salubrious environs of the township that was known pejoratively as "Bogtown", who felt that the failure of the previous committee through party feeling would be repeated. A further meeting was held, and some of the candidates were elected, but not long thereafter, another public meeting was convened to protest at the alleged unrepresentative nature of the committee. After considerable discussion it was decided to appoint delegates from those parts of the district that were not represented on the committee to consult and devise a remedy. Even after this process a satisfactory arrangement could not be arrived at, and another meeting was called at which it was decided to reconstruct and elect a representative committee. On this occasion the results were accepted unanimously.²⁷

One explanation for the tensions in the progress committees was the prevalence of poor health and the generally lower standard of living conditions at Bogtown, though there are few reports on these conditions in the early years. For instance, in 1895 influenza was very prevalent and there was also a shortage of vegetables, and in 1897 there was an attack of scarlatina, which caused the school to be closed until the end of the following week. Many people were struck down by influenza in 1898, and by early 1899 there was considerable sickness in the town through want of water. Whooping cough and other ailments were widespread among the children, several of whom died. Pollution contributed to some of these illnesses, for on one occasion some residents were forced to shift their homes because of fumes from the calciners, and subsequently concerns were expressed at the effect of the smoke and fumes on the residents of Bogtown.²⁸ Fortunately, in the 1890s Captains Flat was blessed with the services of one, and sometimes two, resident doctors.

Town & Community

There are no reports on the size and disposition of the mining communities in the area prior to July 1882, when abandoned huts or the ruins of miner's cabins were reported all along the river flat upstream from Yorkdale, these obviously being the remnants of earlier pre 1882 mining camps. Inhabited miner's huts were located near

the current mining area some kilometres upstream near the site of the crushing plant, where there were several buildings in course of erection, including a store and a large boarding house. There were 50 men on the field. Rations were purchased with gold from Mr Harrison of Yorkdale. By November there were several neatly finished and beautifully clean looking houses in which several of the miners lived with their wives and children close to Holtermann's battery and dotting the side of the distant hills were the homes of men who were working the alluvial or who were employed in connection with the crushing machines. A blacksmith's and carpenter's shop, miner's huts, tents and gardens with some new houses had been erected near Blatchford's machine site. In January 1883 Holtermann stated that he expected Captains Flat to be a lasting goldfield. There were about 80 miners, two crushing machines and an expected population of about 500.²⁹

In May 1886 buildings at Captain's Flat were 'springing up in all directions', with building sites scarcely available. Until then there had been only a few humpies, but a number of substantial houses had since been constructed and Captains Flat was gradually becoming a canvas town. There was a public house, 'The Flat', but it had not yet acquired the status of a hotel, and there was a sprinkling of very mediocre stores. Hoskingtown, on the road to Bungendore, was described as a 'sleepy little hollow, blessed by a church, an inn, a bush school and a few weatherboard barns and cottages'. By August a new boarding house had been built close to the hotel and the shops included a baker, butcher and three or four stores. In August 1887 O'Sullivan, MLA, stated that the population was about 350, which included many families, several more stores, a police station and a mining registrar.³⁰

Over the next few years the population and infrastructure grew rapidly. In 1888 the 'rising township' had six or seven stores, three hotels, besides boarding houses, two baker's shops, two butcher's shops, two private billiard rooms, a barber's shop, tailors and shoemakers, and a post and telegraph office. O'Sullivan had written to the Minister for Public Instruction requesting that a larger school be built.³¹ In February 1889 the postmaster estimated the population to be 530 and increasing daily. In July O'Sullivan estimated that there were 1,000 living at or near the town, and the Postmaster put the town population at about 800. Whatever its size the town was big enough to be divided along class lines, with "Bogtown" near the smelters decidedly more down market than Newtown. A police court and two skating rinks were built during the year.³²

From hereon, however, the town was to experience a stop-start existence. By late 1890 business prospects had deteriorated, and there were a number of parents whose school fees were in arrears. The teacher reported that none of those in town were in a position to pay, and that several of them were in a state of extreme poverty because of the cessation of work at the mines some five months previously. At the post office the decline in business was such that the postmaster was removed to another location and the messenger appointed in his stead. The money order and savings bank facilities were retained.³³

By December 1891 the town's fortunes had turned around again. According to the postmaster, business was increasing very much and likely to continue. A petition forwarded later that year provides some idea of the range of businesses. Of the 30 signatories, there was a tobacconist, blacksmith, two hotel keepers, a billiard room proprietor, fruiterer, bootmaker, grocer, accountant, brewer, baker and three storekeepers.³⁴ There was another upturn in mining activity in 1893, an account in August stating that there were three pubs and about as many stores, with Nomchong from Braidwood expected to open a general store soon. However, this revival was again short-lived, for by March 1894 there were reports of a great exodus to other mining fields, in particular the West Wyalong goldfield, and by September Captains Flat was described as 'dull, flat and unprofitable'.³⁵

In late 1895 Captain's Flat entered a new growth phase. Mining and commercial activity was on the increase and the town was crowded with strangers from 'all parts of the colony', most of whom were miners and nearly all of whom were obtaining employment. The business people were prospering and sites for houses were being taken up gradually, nearly all selecting Newtown. Concerns at the chemical smoke and fumes assailing the inhabitants of Bogtown were an indication of this increased level of activity. In November 1896 it was commented that 'the forlornness which was so apparent among the men for the last five months [is] gradually drawing back once more...' There were 'fresh faces, announcements of men being given employment and the town becoming busier daily...' Reflecting the increase in population, school enrolments almost doubled between 1895 and 1896.³⁶

Captain's Flat reached its zenith in 1897. By May there were three hotels, four stores, three butcher's shops and two blacksmith's shops, one correspondent commenting that, although Captains Flat was nearly dead two years ago, it was now rising in importance.³⁷ A few months later new cottages and business premises were under construction in Newtown, Bogtown and Coppertown. Mrs Goggins, the owner of the Captain's Flat hotel, had made considerable improvements to the hotel and was building several shops. Her hotel was one of the most

important establishments in the town. She was regarded as a 'mother' to the miners, many of whom boarded at her hotel, and she was a patron of many sporting clubs. There was a large sprinkling of Braidwood people among the rapidly increasing population. Furner's store was the largest and most commodious of the business places, followed by McDonagh's, and one of the bakers, Coffey, had opened a confectionery business.³⁸

In September O'Sullivan estimated that by using a yardstick of four to every family within a three kilometre radius, there was a population of 2,000. If farmers, selectors and wood carters who lived outside this radius were included there would be 2,500. As a sign of this burgeoning prosperity a new town had been laid out at Copper Creek, and a new public court and police station were to be established. The postmaster estimated that 2,000 people were on the field, and stated that the town was crowded with speculators.³⁹ Copper Creek was reported to be turning into a little village, with the buildings appearing to be permanent, and there were large numbers from Braidwood, Araluen, Majors Creek and surrounding districts in the town.⁴⁰

A year later, however, this burst of prosperity was severely checked by the closure of the mines. Because of earlier laudatory statements about the longevity of the mines many men had spent their savings in making their homes at Captains Flat and there was much bitterness at the closure. In some quarters, however, there was still an air of optimism, presumably on the basis that Captains Flat would recover as it had in the past, and many men were delaying their departure in the hope that something would shortly be done to provide employment. All storekeepers, butchers and hoteliers were still open, the new post office building was ready for business, and in December construction of the new courthouse began.⁴¹ The mines and smelter re-opened not long after, and by mid-1899 a fresh fish and oyster saloon and a tailoring shop had been opened. Disaster struck in September, however, for the mines and smelters closed again, and this time the closure was to be permanent, with a further exodus of people and businesses. Reflecting these wild swings in fortune, the school population fell by two thirds between 1897 and 1898.⁴²

Following the closure of the smelters in 1899, Captain's Flat went into a long period of decline. In May 1900 it was remarked that things 'seemed to be gradually growing worse and worse'. Business was 'simply paralysed, coach loads of coach loads are leaving almost daily and it is very long time since we saw the Flat in such a low state'. By the following year the town was described as 'dead to the world, people going away in dozens, houses being sold for practically nothing to country people for building purposes are being pulled down on all sides'. To add to the difficulties of the unemployed, there were complaints that the men working on relief had had to wait for their money, some families practically starving or only surviving on credit. The relief work had, in any event, only been for about two to three weeks.⁴³

The closing of the Burruga mines caused a return of some residents late in 1902, but the reopening of these mines led to a further exodus early in the New Year. In February monies were granted for relief work on the local roads, and by May people were being pestered with offers to sell their houses at sacrificial prices. The total population was about 200. To add to this gloom the continued dry weather meant that the residents were lucky to get meat once a week, and they were subsisting on hares, rabbits and wallabies, a hunting and gathering state not far removed from that experienced by their colleagues at the Cowra Creek gold fields.⁴⁴

While there was an occasional resurgence of hope with every new, but invariably short lived burst of mining activity, there was an overriding air of pessimism. In 1906 it was commented that the 'inertness of this place is becoming more and more apparent', and the following year the town was described as 'lifeless as it had been for the last few years'. The population had by then gradually dwindled away so that those who were left could generally find enough employment to 'keep starvation away'.⁴⁵ In 1908 the licence for the Miner's Arms was renewed for a further three years, for it was well patronised and taxed for accommodation at race time and court days. It was estimated that there were about 500 persons within a radius of 15 miles.⁴⁶ In 1909, Mrs Hogan, a widow with four young children, was appointed as postmistress.

By 1911, however, Captains Flat was described as gradually 'becoming less and less. One house after another was pulled down and taken away to Queanbeyan or elsewhere for erection'.⁴⁷ Despite these parlous conditions, the prospects of renewed mining seemed to be always around the corner, and there remained a handful of commercial enterprises and other institutions. For instance, in 1912 Captains Flat possessed one hotel, one large and one small general store, a post and telegraph office, courthouse, police station and public school.⁴⁸

Although it was clearly in serious decline, Captain's Flat was still one of the larger mining settlements in the Southern Mining Region. But very few of its residents were mining, and in May 1922 Captain's Flat was described as a deserted village. The correspondent wrote:

...a large chimney stack was felled at one of the abandoned mines. The bricks will be used at Queanbeyan. Two of these huge pillars have been standing for years on the side of the hill overlooking the village, appearing as if sentinels watching for the advent of the speculator who would re open the mine. He never came. One sentinel now remains to keep watch. The prospect of a revival of the mining industry here is growing more remote.

Regional Impact

In its prime, Captain's Flat had a significant employment effect, and compensated substantially for the lack of activity at the gold mining settlements in the Braidwood District. In November 1897, when the Captain's Flat mines were at their peak, it was commented that there were many well known faces from Braidwood, Araluen, Majors Creek and surrounding districts, all of whom seemed 'well contented with their lot'. They had 'a chance of earning and saving a little money', something that had been difficult to do 'for some considerable time past in their own immediate districts'. Reference was also made to the presence of four butcher's shops in the town. The meat supplied was 'of a first class description', not only reflecting credit on the butchers, 'but also on those instrumental in fattening, that is the Braidwood graziers. It was commented that nearly all Captains Flat market was supplied from these sources, 'showing that a considerable amount of the Flat money found its way into the Braidwood district'.⁴⁹

Another insight into Captains Flat's regional impact is illustrated by the complaints in 1893 concerning the lack of money spent on the road to Braidwood through Harold's Cross compared to that through Parker's Gap. There were many selectors in the Harold's Cross and Ballalaba area, and in the former location there were 30 selectors whose chief market was Captain's Flat.⁵⁰ Extensive use was made of carters, not only for local timber supplies, for which there were a number of sawmills, but for the haulage of supplies and raw materials such as iron, limestone and coke from the rail head at Bungendore. Carters were also needed to transport the ore from the mines to the smelters and to transport the finished product to the railhead. There were 30 teams in operation in 1889 and 25 in 1893.⁵¹

Conversely, the sudden and unexpected closure of the mines also had a substantial impact. The first wave of miners to leave in June 1898 included many from the Braidwood district, and there was 'a great deal of destitution among the families unable to get away ...' In October there was 'quite a stampede from the neighbourhood', with everything seeming 'to wear a woe-begone appearance, many leaving for Gundagai, Cobar and the Snowball gold fields'. As a measure of the regional importance of the mines, and in the hope that the stoppages were temporary, unemployment relief was provided. There were 140 unemployed men, 53 of whom were provided with work on the roads for three weeks at 5s to 6s a day.⁵² In October 1899 roadwork was again allocated to the unemployed, reports indicating that all had been catered for and that the town now had a busy appearance. It was not to last.⁵³

Social life, Sporting & Cultural Institutions

One of the most important institutions at Captains Flat was the public school, which superseded the house to house school in 1886. It was erected in 1889 following representations from O'Sullivan concerning its inadequate size and inappropriate location. An evening school was established in the same year, using the existing public school building.⁵⁴ Religious activity was also important, although the first mention of ecclesiastical matters was not until 1893, when the Anglican bishop arrived to consecrate the burial ground and lay the foundation stone for the new church. Roman Catholic and Wesleyan churches were not built until 1897, and the first mention of the Presbyterians was not until 1899. They held their services in the Wesleyan church. A convent was built later that year following a visit by Mother Mary McKillop, Foundress of the Order of the Sisters of St Joseph.⁵⁵

Sport was also very popular and there was a full array of sporting bodies and facilities. The first reference to a cricket club was in 1886, and the first football match played at Captains Flat was in 1895. Both sports would have been played on the recreation ground in the centre of town.⁵⁶ A gymnastic club was formed in October 1893, probably using a hired hall, and in November a preliminary meeting was held of those interested in the formation of a racing club for Christmas meetings. From thereon the Boxing Day race meetings were a regular sporting feature. In 1897 a pony and galloway racing club was formed and in the following year the athletics club was reopened in Goggin's hall. A meeting of the tennis club was held in 1899 to renovate and repair the court.⁵⁷

There were also a number of more culturally inclined bodies, most of which used church and hotel halls, such as Mrs Goggin's and Cooper's. In February 1895 a public meeting was held with the aim of establishing a School of Arts, for which a progress committee had been formed and a number of books already received. In addition, there was a progress association, a branch of the Amalgamated Miners Association (AMA) and a dramatic club, which was subsequently transformed into a social club.⁵⁸ The Captain's Flat Early Closing Association was formed in 1898, and a band and the Band of Hope were established in 1899. A minstrel troupe was also formed in 1899 with the idea of holding entertainments regularly for the benefit of different institutions.⁵⁹

Following the closure of the mines and smelters many of the social institutions formed in the 1890s continued. More remarkable, some new ones were added despite a dwindling population. For instance, there was still a progress association and Anglican, Roman Catholic and Methodist churches, and in 1900 there was considerable discussion on the need for a rifle corps and in 1906 the Sino-Japanese war led to attempts to form a rifle club.⁶⁰ Cricket, tennis and rockley (a form of women's cricket) matches were held frequently, with the Britannia Rockley Club active as late as 1904. Horse and bicycle races meetings were also held regularly, a bicycle club having been formed in 1905.⁶¹

The Second period 1937 - 1962

Mining

In 1927 the National Mining Corporation of London commenced a thorough testing of the lode with an option to purchase. Its interest was then transferred to the Lake George Metal Corporation. In 1930 the NSW Parliament passed legislation to provide for the construction of a railway from Captain's Flat to Bungendore, but with the onset of the Great Depression and low metal prices, plans for further development of the mine were delayed. In 1934 there were again some glimmerings of hope, and investigations were commenced to determine the value of the pyrites contents within the ore for use in the manufacture of commercial sulphur and super phosphate. Most sulphur used in Australia was imported. The experiments were conducted using the Leese process and in 1935, 20 tons of pyrites were shipped to England for treatment.⁶²

The results were successful and in 1937 Lake George Mines was incorporated in London with a capital of £1,110,000 to acquire and develop the leases held by the Lake George Metal Corporation. It was expected that if the present favourable metal prices held while the company reached its optimum production then an annual profit of £1,250,000 would be realised. The ore body had been tested extensively to a depth of 800' (244m) and ore reserves were estimated at over two million tons, with a prospective ore body of five million tons. The ore body was highly complex and consisted of a mixture of lead, zinc, copper and iron sulphides. It was proposed to treat 1,000 tons of ore per day, the first section of the plant beginning with a capacity of 500 tons.

Elliot's No.2 shaft was sunk to 750' (365m) and a new general shaft for skip haulage was sunk and connected by a conveyor tunnel. Drives were installed at the 300' (91m), 400' (122m) and 600' (183m) levels. Mechanical loaders and scrapers were used and electric locomotives were being installed.

Mine working was to be by the cut and fill system of ore extraction, with three winzes sunk from the surface as passages for the delivery of back fill to the stopes. It was proposed to rail 80,000 tons of iron pyrites yearly to Port Kembla for the large scale manufacture of sulphuric acid and superphosphate. 367 men were employed during the year, of whom 167 were occupied on the surface. Treatment was to be by the selective flotation system, yielding lead, copper, zinc and iron pyrites concentrates with tailings going to the residue dams. The treatment plant was to be built of steel and concrete and consist of a large jaw breaker, Symons vibrating screens, Symons cone crusher, concrete storage bins, two ball mills, Akins classifiers, Dorr thickeners, sub-aeration flotation machines and filters for dewatering the different concentrates. Lead and zinc concentrates were produced initially. All units were to be driven by electric power procured from the generation station at Burrinjuck dam and later through the State power grid.⁶³

Work continued in 1938 in preparation for an initial mining rate of 15,000 tons a month. The general shaft was sunk to 850' (259m) and equipped for skip haulage, and further work was conducted in the Elliott's section and in connecting that section with the general shaft at the 600' (183m) level. Construction at the mine commenced in January and the dam on the Molonglo River in February. By the end of the year the dam was built to a height of 42' (18m), which allowed for an impounding of 85 million gallons (386 million litres) of water. But mill construction was delayed due to slow deliveries of structural steel and a shortage of skilled workmen, and the

equipment was not installed until September. Power from Burrinjuck was connected to the mine in December, continuing supplies being dependent on the water level in that dam. The company's diesel driven power service was not sufficient for its full needs but could be used to augment a limited supply. It was expected that the railway would be completed to a point 12½ miles (20km) from the mine by January 1939. 1000 tons of concentrates would be trucked weekly by lorry to the railhead and then railed to Port Kembla and the lead and zinc concentrates shipped overseas. The pyrites concentrates would be treated at Port Kembla.⁶⁴

Production commenced in 1939. The milling plant was operative at an initial capacity of 500 tons and ore hoisting commenced on 10 January. One of the main impediments to mine production and development was the acute shortage of skilled miners, with the result that the initial objective of 700 tons per mine working day was not achieved until September. Because of difficulties in obtaining shipping in that year a large percentage of the production was stockpiled at the mine. Originally the mine was prepared for "flat back cut and fill stoping", with mechanical handling of the ore and filling by mechanical scrapers, but this did not prove entirely satisfactory in the narrow part of the lode and a change to rill stoping was effected. Most of the development work was in the Elliott's section; the main exception was the drive at the 600' (183m) level to explore Keating's ore body. Development of the Elliott's, Central and Keating's ore bodies was carried out from the general shaft, which was located centrally and through which the total mine output was hoisted. A number of working levels were driven out from the main shaft to intersect the ore bodies. The general shaft was enclosed by an 87' (26m) steel head frame and was timbered throughout with steel bearers at vertical intervals of about 100' (30m); access to the general shaft was via a tunnel adit. Elliott's No. 2 shaft was used for ventilation purposes and for bailing water in emergencies, and Elliott's No.1 was used as a waste pass. Ventilation was later provided through the North and Keating's air shafts. From 1939 on practically all shaft sinking was by two shifts on a five day working week.⁶⁵

Most of the mine's output was hoisted during the night shift in 5.5 tons capacity skips, after replacing the cage with skips. In the day and afternoon shift one skip and a cage operated in balance to assist in hoisting development rock from waste pockets. The cages accommodated 20 men. An electric signal system was used in the shaft with call buzzers at each main level. Most of the ore was trammed on the day and afternoon shifts with only one train operating on the night shift. Ore from the various levels was dumped from the skips into a hopper bin and then fed directly to a jaw crusher where the ore was reduced to a 5" (12.7cm) product. The crushed ore was transported from the jaw crusher to the Symons vibrating screens and cone crusher to the storage bins and from there to the classifiers and ball mills by conveyor belts, and from the mills to the Dorr thickeners and flotation plant by Wilfley pumps. Residue from the flotation process was pumped through pipes to earthen dam storage areas where the solid material settled out and the water was either drained away for reuse or ponded to evaporate. There were a number of different workshops, the main one being the steel shop, which was located next to the general shaft tunnel adit. It was equipped with oil fired furnaces, the fire bricks of which needed replacing every six months, and shank furnaces, which had a life of three years. Other shops were the rock drill and blacksmith's shops.⁶⁶

The flotation process was first developed at Broken Hill in the early 1900s for the handling of complex ores and was so successful that its use became standard mining practice throughout the world. It was described thus:

*Chemical reagents in carefully measured quantities are mixed with the ore in the presence of oil, and on aeration the valuable metallic compounds adhere to the bubbles created. The metals not required in the first stage do not adhere to the bubbles but remain in the material passed on the next stage. Long batteries of electrical agitators whip the troughs of crushed ore, chemical ore and air into an unlovely frothy mass. Horizontally revolving blades skim off the bubbles into flumes flushed with water. The concentrates flow into tanks where the water is drawn off, leaving the concentrates virtually dry. In the first stage of chemical treatment lead concentrates are recovered...In the second stage, on treatment with different reagents, but under the same mechanical conditions, zinc concentrates are produced. The next stage produces iron pyrites.*⁶⁷

Mine drainage was to provide a continuing challenge, and one that probably endures to the present day. The mine water was not confined to any particular horizon but seeped through the lode along its entire length. Extra water was also introduced for drilling purposes, making a total water flow of 130 gallons (591 litres) a minute. Pumping was done through the general shaft using a variety of pumps. The water was stored in underground dams located at the 750' (228m) and 312' (95m) levels, from where it was pumped to the surface. To minimise the acidity of the mine water, a neutralising agent in the form of milk of lime was prepared at the mill and piped to the underground dams. The handling of sludge also presented a problem. Fine material from stoped areas found its way through chute openings and blocked main haulage level drains with slimes. The condition was aggravated where excessive water was used for wetting down. This extremely fine material was stowed underground in mud dams or removed in trucks to the surface. Dust levels were minimized by a number of

measures, including attention to water tubes in machine drills, blowing out drill and blast holes with water rather than air, watering faces with hoses after each blasting, and water spraying of material hauled by mechanical scrapers. Dust tests were conducted regularly. The pollution problem reached new heights of intensity when the tailings dams burst in October.⁶⁸

Production and development continued during the war years. In 1940 the general shaft was sunk to a depth of 952' (290m) below the collar to permit the construction of an ore pocket to serve the 750' (228m) level and in preparation for the driving of the 910' (277m) level. The 600' (183m) level was driven to Keating's orebody and work proceeded in preparing the orebody for stoping. Stoping was also carried out on other levels. Both the Keating and the central orebodies yielded substantial tonnages of development ore. The most important work in 1941 was the further opening up of the Keating orebody where development work had exposed a large tonnage of ore. Shaft sinking ceased during the year and in 1942 the mine was not developed to any extent as the men were required to maintain production of important base metals. In 1943 and 1944 shaft sinking was resumed and a considerable amount of work done on drives and stopes to prepare the ore bodies for stoping. By 1945 the main shaft had been sunk to 1374' (419m).

The war had a significant impact on the economics of the mine. Lead and zinc concentrate had been sent to Belgium, and then with the German occupation of Belgium, France and the Netherlands in 1940 the zinc was sold to the British Ministry of Supply to be used largely in the production of brass and the lead was shipped to the United States. Despite heavy tariff duties the US market generated large reserves of foreign exchange earnings which assisted in the war effort. It was estimated that with the US market the company could create enough foreign exchange to purchase about ten million gallons (45.6 million litres) of petrol annually. The pyrites concentrates were sold locally for fertilizer production and were a means of saving foreign exchange.⁶⁹

Between 1939 and 1942 shipping space was almost unprocurable and large quantities of concentrates were stockpiled. From 1943 onwards, shipping improved and by the end of 1945 the stockpiles had been reduced considerably. Because of the steep rise in shipping, smelting and marketing costs in 1941 financial relief had to be obtained by the NSW Government in the form of reduced power and freight charges. This assistance was dispensed with in 1942. In that year the copper section of the plant was completed and production of copper concentrates began in August. Other work included the building of a new tailings dam in 1940 to allow for an improvement in the air-drying of the material. The storage capacity of the Molonglo dam was increased during 1942 by adding a further 10' (3m) to the main wall. Workforce numbers were more or less stable ranging between 439 and 456. Pollution of the Molonglo River continued unabated. In March 1943 the river was described as 'getting into a very dirty state from slime', and other products from the mine. It was in such a state that the water was useless to graziers for stock purposes, as the stock would not drink it.⁷⁰

In 1946 the main shaft was sunk to 1,434' (437m) with work on drives, cross-cuts rises and winzes continuing. Skilled labour shortages continued to be a problem, however. Even more critical was the impact of coal shortages. These resulted in a scarcity of railway trucks in the last half of the year which forced the curtailment of deliveries of pyrite concentrates. An additional 14 staff cottages were completed and plans were in train for the erection of a further six staff and 30 worker's cottages. Of the latter, eight were completed in 1947. The main shaft was sunk to 1538' (469m) and work on a ventilation shaft commenced. 1948 was a difficult year. Mining operations were seriously curtailed in September by an industrial dispute over the lead bonus. The miners were seeking a review of the lead bonus system more in conformity with the Mt Isa bonus which was about £6 a week. Currently the bonus stood at £1 a week. A proposal by the company to offer the miners 20% of the company's profits was rejected by the unions' membership. The disruptions began on 6th September 1948 and there was a complete cessation in all operations on 12th October. By the end of the year work had not resumed. This disruption meant that there was insufficient ore to keep the mill running at full time.

During 1948 progress was, however, made on a number of other fronts. Work on the ventilation system was sufficiently advanced to allow the mine to be cleared of fumes and smoke during the half hour shift interval; the charges were fired at the end of each shift. The air shaft was timbered and provided with an emergency manway and an Aerex exhaust fan, which was erected at the shaft head. Plans were also in train to conduct sludge from the various levels through diamond drill holes to a collecting sump planned for the 1390' (424m) level. Sludge pumps would be installed to remove the material from the sumps to the surface in a single lift. The sludge would then be delivered to the mill for treatment and recovery of concentrates. At the mill the introduction of sulphur dioxide in the flotation system had resulted in a cleaner separation of copper concentrates and a higher recovery of lead, but it was noted that further research was needed to improve recovery rates on all minerals. Wages paid to the men employed underground varied from £2 to £7 per shift; the highest wages of

between £6 and £7 were paid to those on contract. The remaining workers' cottages were erected during the year and work commenced on the erection of a new bunkhouse and 20 steel-framed cottages.⁷¹

Industrial disruptions continued to seriously disrupt production in 1949. The bonus strike continued for the first four months of the year and work was not resumed until 3rd May 1949. During the strike many men obtained work in Canberra and Sydney. But on 22nd June operations were again suspended as a result of the Australia-wide coal strike and were not resumed until 15th August. However, the bunkhouse was completed and occupied, new shower rooms and lavatories were installed and septic tanks constructed to service the bunkhouse and mess block. 23 new steel frame cottages were almost completed by the end of the year. There were no disruptions in 1950. By the year's end the main shaft had reached 162' (494m) and the number of employees had increased to 526. Construction of a new tailings filter plant was also begun. Twenty four worker's cottages were completed and occupied and new underground and surface change houses were also completed. In 1951 the main shaft was extended to a depth of 1758' (536m) and a further shaft was sunk from the 1230' (375m) level. The number of employees increased to 595 and nine new cottages were built. Construction of the tailings filter plant continued.⁷²

In 1952 the main shaft was deepened to 1854' (565m) and the internal shaft sunk to 504' (154m). The number of employees continued to increase to 611 and two new cottages were built. But there were some ominous signs. Substantial falls in world prices of lead and zinc together with steep increase in operating costs posed a threat to future profitability. It was considered that some underground work and surface drilling may have to be discontinued and the NSW Government approached for a reduction in rail freight and power charges. The economic position of the mine worsened in 1953. Heavy losses were incurred with lead and zinc prices at very low levels. Prices fell further in early 1954 and it was considered that prospects for continued operations were dim without government assistance. Cottage building was at a standstill, although additions to the underground and surface change houses were completed. There was some industrial unrest in 1953 and the average number of persons employed fell to 557. The main shaft was sunk to 1939' (591m). As 1954 wore on the economic position of the company worsened. All operations were suspended at the end of June as a result of an industrial dispute over the deepening of the general shaft by an outside contractor. No settlement was reached before the end of the year and the property was maintained by staff. Only 304 men were employed. The industrial dispute ended on 1st February 1955 and steady work was maintained for the rest of the year. Separate agreements were entered into with the main unions on the field.⁷³

From 1956 onwards market and mining conditions became increasingly difficult. In February, production of pyrites concentrates was suspended due to a falling off in demand for superphosphate. It was lamented that plants using imported brimstone were still operating whilst pyrites' furnaces were closed down. 522 men were employed. In the last half of 1957 the world price of lead and zinc fell to such an extent that the continuity of operations was seriously threatened. To counter the low prices, production was increased, but it was stated that this level only be maintained at the present rate of 18,000 tons a month for a limited time. At one period of the year the sea freight rate for zinc concentrates shipped to Europe had reached the crippling rate of 200s sterling per wet ton. The increased production rate was maintained throughout 1958 and enabled the company to survive the period of low metal prices. However, towards the end of the year restrictions were imposed by the United States on the importation of Australian lead and there were concerns that export controls may be imposed by the Commonwealth Government. More ominous was the lack of immediate success in locating further ore bodies. The main drive at 2030' (619m) was extended to 3000' (914m) in an attempt to locate the Kohinoor ore body, which had been indicated by surface drilling. However, it had intersected a strong flow of water and driving was suspended. Keating's ore body appeared to have bottomed on the 1870' (762 m) level but it was intended to prospect below that level.

The search for further ore bodies continued during 1959 but with little success. At the 2030' (619m) the main drive was extended to 4000' (1219m) and the heavy flow of water encountered in previous years was sealed off by cementation. In 1960 diamond drilling at the end of the drive failed to locate any ore of economic importance, and further prospecting from underground was abandoned. It was estimated that the present ore bodies would be worked out within the next two years. A survey by the BMR had located a promising anomaly two miles south of the present workings and this was to be tested in the following year. Mining of the sub level stopes in Keatings was almost completed but due to deterioration of the weak footwall the rill system was abandoned for the flat back method of working. Thousands of tons of slag from one of the old slag dumps were placed around the banks of the slime dams to prevent erosion and minimize pollution of the Molonglo River.

During 1961 no development work was undertaken; the labour force was devoted almost entirely to the extraction of ore from the remaining work sites, which were rapidly approaching exhaustion. No underground

drilling was undertaken and surface drilling did not disclose any new ore bodies. To further complicate matters serious ground movements interfered with normal mining operations and prevented further mining in some sections, further reducing the 'already fast diminishing ore reserves'. A large fall of ground occurred in the Elliott's Section and it was decided to fill the stope and bury the fallen ore. However heavy rain caused water to run into the filling passes which delayed the filling operations and caused further deterioration to the stope. The men were withdrawn for safety reasons and following further falls the stope was abandoned. Later in the year serious ground movements occurred at the No 16, 20 and 22 levels. These were 'so alarming' that all the men were withdrawn from these levels. Local falls of ground later occurred in the stopes. The movement eventually settled and mining resumed north and south of the affected areas. On 20th October 1961 men were withdrawn from a stope above the No 2 level in Keatings. This section collapsed through to the surface on 28th October. Circulars were sent to all residents of the town warning them to keep away from the affected areas. With the present low price of lead it was estimated that the mine production needed to be 16,000 tons a month with a minimum grade of 5%. By the end of the year this target was becoming increasingly difficult. In anticipation of the mine closing salvage operations were commenced to retrieve equipment no longer in use underground. Protection of the surface slime dumps against collapse was done by strengthening the walls of the dumps with slag and rock.⁷⁴

During 1962 mining operations were only carried out for 37 days due to the exhaustion of the ore bodies. No underground development work or diamond drilling was undertaken and prospecting and exploration was discontinued following negative results from prospecting carried out by State and Federal authorities. All stocks of concentrates, except low grade sulphur bearing materials, were cleared by the end of the year. When the closure was announced there were 169 men working underground and 178 on the surface. Salvage operations began immediately and all openings to the mine were either filled in or sealed. While using an oxy-acetylene torch preparatory to sealing the main shaft with a concrete slab the shaft timber caught fire and burnt the shaft out from the surface to the water level, as well as burning out the timber in the surface adit. The entrance to the adit was covered with earth and the shaft sealed, and it was proposed to seal the walls of the slime dams adjacent to the Molonglo River with a bituminous compound to prevent erosion and possible contamination.⁷⁵

While mining may have ceased, a negative aspect of its legacy continued for many years in the form of pollution and contamination. During the life of the mines four million tons of ore were milled to produce zinc, pyrites, lead, copper and gold, and 2.5 million tons of mine waste were stockpiled in evaporation dams and slimes dumps, which covered an area of 15 hectares. The dumps contained significant quantities of heavy metal and were extremely acidic, with very high levels of salinity. Over the years the evaporation dams were continually built up with fresh material until the slime dumps reached a considerable height. There were six slimes dams, three of which were collectively called the northern dumps and three the southern dumps.⁷⁶

Environmental pollution had been a concern since the 1890s but the first official report of pollution was not until 1911, when the Premier of New South Wales drew attention to a report that drainage from the mines was causing serious pollution of the Molonglo River. Investigations then revealed that the water was acidic. When the possibility of further mining operations at Captains Flat was raised in the 1920s the prospect of increased pollution was discussed by the Commonwealth and NSW Governments. To counter this problem, conditions were included in mining leases for the area, which required the lessee not to pollute the Molonglo watershed. There was, however, a continuous discharge of mill waste water and mine water into the Molonglo. This level of pollution was aggravated by the collapse of mine waste dams in 1939, 1942 and 1945. The slime dams were reinforced in 1961 and in 1963 following the mine closure the surfaces were sprayed with 70 cubic metres of tar. Following the closure of the mine in 1962 the main shaft filled with water and overflowed into the Molonglo River through the air shaft at the northern end of the workings, causing further pollution.⁷⁷

The pollution problem was twofold, the continuous seepage of water into the underground workings and its discharge into the Molonglo River and the threat posed by the tailings dumps and dams. J. Fitzgerald, Chief Investigations engineer, Australian Department of Housing and Construction, stated that the underground workings had been incompletely backfilled with quarried rock, as settlement problems had precluded the use of the finely ground tailings for back filling. The tailings were stored in the southern and northern dumps, 10% in the former and 90% in the latter. The largest threat was posed by a high dam in the northern dumps area which was structurally unstable and slowly moving in a downstream direction. In 1966 and again in 1968 the NSW Department of Mines attempted to minimise pollution by filling in and sealing the ventilation shaft to prevent discharge of mine water and draining and grading and reinforcing the southern dumps to improve their stability and prevent erosion. These actions were partly successful, but the concern for further pollution due to increased erosion and dump instability remained. It was also feared that construction of the Googong dam would adversely affect pollution levels by reducing the diluting effect of the Queanbeyan River. A joint Commonwealth

and NSW working group was formed to prepare a report examining the situation and outlined guidelines for a solution to the problem. As a result of ministerial level discussions in 1974 a Joint Government Technical Committee was formed. The Committee recommended that the dumps be reshaped and that water running into the mine be diverted. The reshaped dumps were to be covered with consecutive layers of clay, rock and soil, and sown with grasses. Reshaping involved a reduction in the height of the main solids dams and construction of terraced slopes with reduced grades to minimize scouring. Some of the workings were filled in and Forster's Creek, which flowed through Keating's collapse, was diverted around the central mine area with concrete drains.⁷⁸

Class, Conflict & Labour Relations

Labour relations were to be important sticking point in the post war industrial environment and were to impact substantially on the mine, miner's families and all other residents of the town. The rate of remuneration was governed by arbitration awards established for each occupation. Additional allowances were also in force, such as, special locality allowances, shift-workers' allowances and war loadings. From 1st July 1947 all employees of the company, both contract workers and wages men received a "lead bonus" in addition to their other earnings. This bonus was based on a schedule under which the realised prices of lead and zinc determined the amount of weekly bonus payable. A pro rata amount of bonus was paid in respect of any part of a week worked and employees also received the bonus during annual holiday periods and statutory sick leave. Realisation prices of metals were published each month and the amount of bonus for any given month was established by the prices obtained during the preceding month.

A Staff Provident Fund was inaugurated by the company on 1st June 1947, and staff officers became eligible to join on completion of 12 months service. Contributions by members amounted to 2.5 % of salary and were augmented by an additional 5% of salary which was paid by the company. The return of a member's contributions was assured; payment of additional benefits being subject to certain service qualifications. Insurance of the company's liability under the Worker's Compensation Act was provided for by a fund which insured up to a specified maximum amount for any one accident. Liability in excess of the specified amount was undertaken by a firm of underwriters.

Rules for safety observance were rigidly enforced, and a persistent effort was made to secure the co-operation of workmen, who had their own Check Inspectors paid by the company under a monthly agreement with the Australian Workers' Union (AWU). In addition, the services of a full-time Safety Director were made available from December 1947. Foremen and shift bosses attended weekly safety meetings, which were conducted by the mine superintendent or his assistant. A General "Safety First" meeting was held once a month, at which supervisors from the mine and other departments attended to discuss accidents and their prevention, together with representatives from the various unions. Mechanical safeguarding was practised wherever possible and improvements constantly sought. Protective devices such as hard hats, goggles and visors, gloves, shin-guards, safety ropes and belts were employed and their use insisted upon. Guard rails and danger signs were placed at dangerous openings and mine officials and miners educated continuously in safety methods and accident prevention.

Several safety aspects received priority from the outset. For instance, a Safety First Committee, comprising representatives of management and employees was established in 1938 and met regularly to discuss safer working methods. A competitive spirit was enshrined by the grant of state lottery tickets to parties who worked a specified number of shifts without accident. Protective hard hats were compulsory and together with gloves were provided for underground employees without charge from the outset.⁷⁹ Other changes were, however, much slower in coming. For instance, additional safety measures such as safety boots with steel capped toes had proved beneficial and avoided serious injury in several cases, but appear to have been a later introduction, possibly post-war. Life-lines and safety belts also appear to have been a later addition.⁸⁰ The mine first aid station was located on the surface near the mine entrance. An official of St Johns Ambulance was in attendance day and night, with an ambulance car at the ready to transport hospital cases to Queanbeyan. A medical practitioner was also in attendance at his residence near the Casualty Clearing Station, which had accommodation for four patients. Telephones were located at all main level stations and principal waste pass stations underground. Despite all these precautions there were 10 fatal accidents at the mine and one at the mill between 1939 and 1948.⁸¹

Some housing accommodation and recreational facilities were provided by the company. By 1948 there were 152 cottages on and around the mining leases and township subdivision for rental by employees. Staff members occupied 49 of these houses and wages employees, 103, with more cottages planned. A boarding house with accommodation for 132 single men was provided by the company, and 40 shillings per week was charged for board and lodging. Rents of sub-division cottages for employees and their families ranged from 14s to 19s per week. Electric light, water, firewood and sanitation were additional charges. Senior members of the staff occupied 5 to 6 roomed bungalows. A staff mess was also provided for single men, who were charged 36 shillings per week for board and lodging. An additional charge of 5 shillings per week was made for laundry service. Since the end of the war recreational facilities had been provided, including a tennis court, swimming pool, cricket pitch and billiard tables. A club house was in course of erection.⁸²

The Captain's Flat work force was highly unionised and there were several serious industrial disputes, in particular those of 1948-49 and 1954-55. It was also a politically literate and aware community, and visited regularly by various political candidates at election time. In the midst of the 1948-49 dispute the town was visited by Robert Menzies, who was then leader of the United Australia Party. He addressed a meeting of 300 people at Molonglo Park to explain the differences between socialism and liberalism. Afterwards he thanked the crowd for giving him such a good and attentive hearing. The meeting was attended by a good number of striking miners. In 1981 Robert Darby stated that the strike was in marked contrast to the 1954 dispute as the mine management did not take a vindictive stand against the workers. The *Women's Weekly* reported that miners occupying company houses would not be evicted if they fell behind with rent as a result of the strike. It is noteworthy that the first debate held by the debating club in 1944 concerned the arguments for and against an extension of Commonwealth powers. A citizens 'Yes' committee was organized to campaign locally and in surrounding areas for the 'Yes' vote in the forthcoming referendum on that question.⁸³ The main political forum for the community was the progress association and the Yarrowlumla Shire Council, for it was within the latter's walls that vital questions of community health and welfare were decided.

On 4 May 1953 O. Kemp, from the Captain's Flat Industrial Committee described the situation between management and union officials as a cold war. To combat falling metal prices the company had taken a number of measures to ensure the mine stayed open. One of the more significant decisions had been the cutting of bonus payments in January of that year. According to Tom Kerr the lead bonus had been as high as £10 a week and the union readily agreed to concede on this point to keep the mine open, on the basis that it would be reinstated once the situation improved. Some time later there were several retrenchments. The company agreed to take some of the men back provided they worked at the mill. Kerr commented that the mill, affectionately referred to as Siberia, was one of the worst places in the world to work. According to Kerr the company began to institute intimidation tactics in all sections of underground work, such as forcing the men to do more jobs than they were supposed to do. Following further meetings between management and unions the union members worked without a single pit top stoppage; usually there were about two a week. Several weeks later a rolling strike of 24 hours each week was instituted in protest at management's refusal to employ additional storemen underground. According to management the union had been informed earlier that the issue of employing additional storemen would be referred to the Arbitration Court, but the strike took place before that could happen. The rolling strike developed into an indefinite strike following the dismissal of a storeman who had been directly involved in the dispute, which then spread to about 250 AWU members. Reinstatement of the member was achieved following an order from the NSW Industrial Commission, though on the matter of policy the order was only partially favourable to the men. The dispute had lasted for ten working days.⁸⁴

Industrial conditions in the town were commented on from the pulpit by the Rev. Fr. M. J. Crow of St. Brigid's church, Captain's Flat. In referring to the miners' reduced remuneration he stated that the lead bonus as paid prior to the year's end was less in the nature of a gift than a just wage. The loss of most of the bonus had caused considerable hardship, which had even affected the well being of the church from a fall off in contributions. A mood of 'sullen resentment' had spread in the town which would lead to sharply defined and bitterly opposed factions, with 'families disunited and sectarianism rampant'. He invoked a trinity of God, capital and labour and called on an equitable division between the latter two. Part of a just wage should be enough for a worker to 'provide for himself a modest fortune which he can bequeath to his heirs'. On conditions in the town he commented that:

We live in a village which offers few amenities, a place of small houses, which will shortly prove inadequate to accommodate four children, a filthy water supply, no dance hall, a picture theatre which sits 300 of a 2000 town population, unsealed streets, no sewerage and roads which make owning a car a dire liability.

Father Crowe also remarked that those living at Captains Flat needed higher wages because opportunities for female employment were extremely limited and parents should be able to send their girls to colleges to allow them to find employment otherwise closed to them. High wages may also give make it possible for families to open small businesses which would give employment to their sons and daughters.⁸⁵

Another strike commenced on 13th July 1953 following the dismissal of the president of the local AWU branch, Mr Tom Kerr. He was dismissed for 'threatening a foreman with violence on the job'. A special AWU meeting that day unanimously resolved that Kerr was being victimised for his consistent defence of members' working conditions. The local AWU committee, union organiser, Mr Kemp, and witnesses to the incident approached the general manager, Mr J Ireland, to discuss the issue. They were informed that the company would withdraw the dismissal notice providing that Kerr undertook to leave the town. The committee took the suggestion as an insult and agreed to go on strike until Kerr was reinstated. Within 24 hours no union labour was employed on the field. The dispute was heard by the State Industrial Commission at Captain's Flat and evidence was taken from both sides. At a private conference a settlement was reached on the basis of Kerr's unconditional reinstatement. Following this a Board of Reference was set up comprising two representatives each from the union and the company, and chaired by the company's assistant general manager, in whom the union members had considerable confidence.⁸⁶

Several months later Mr S.T. Hopkins, Vice-president of the Captain's Flat AWU Branch and Senior Vice-president of the ACT Trades and Labor Council, provided an overview of industrial conditions on the field. He stated that conditions on the field were equal to or better than other fields with the notable exception of the lead bonus. Conditions such as the bonus could not be written into awards. Payment of the bonus was won following the 1948-49 dispute and then stood at £5 per week, reaching a peak of £10 in the 1950-51 period, and then declining to £6 15 shillings in January 1953. Because of depressed markets and increased costs the company announced that the bonus would be reduced based on a change in the basis of calculation. This meant a reduction to £6 15 shillings and was accepted by the unions. However, by March the bonus was only £1 15 shillings. He stated that management had been implacable in its dealings with the miners, and in particular the AWU, resulting in a number of pit top and stop work meetings.⁸⁷

More industrial trouble began to brew at Captain's Flat in November of that year following a pit top meeting of AWU members who decided to take no further part in the Board of Reference. A 24 hour stoppage had been called the previous day in protest at the placement of a staff member and his family in a house previously used exclusively for mine workers. A two day a week stoppage was also called as a protest against a management decision on 'smoke money', which was an allowance paid to underground workers who were unable to begin a shift until smoke from explosive charges fired by the previous shift had cleared. If they managed to lift the full face in the remaining time of the shift, they were paid for a full normal shift on top of that. From now on they would receive only the normal shift pay irrespective of waiting time and whether the full face was lifted or not.⁸⁸ Tom Kerr was elected to the Yarrowlumla Shire Council in December of that year.

There were further 24 hour stoppages in the period leading up to Christmas. The most serious one concerned the availability of skipmen during the Christmas period when the mine work was confined to maintenance. There were several versions of events. Tom Kerr from the AWU stated that 150 unionists were suspended for resuming work with non-union labour. Following the suspension the men applied for accrued holiday pay, but this was withheld. Previously the skipmen had made a claim for the continuance of their average rate of pay while working over the Christmas shutdown. But the company refused and then refused to pay for their annual holiday. The general manger replied strongly to these statements and denied that the company had engineered stoppages of work to deprive workers of their Christmas pay. He was particularly critical of Kerr, stating that the record of stoppages over minor matters had escalated since Kerr had adopted a direct action policy as opposed to arbitration. As a result Captain's Flat had become known as one of the worst labour camps in Australia despite earnings and working conditions the envy of all other camps. A letter from Kerr, reacting to these statements, was published in the *Queanbeyan Age*. In it he challenged the mine manager to a debate. The mine reopened on 25th January 1954.⁸⁹

A serious mine accident at in March of 1954 prompted Tom Kerr to write to the *Queanbeyan Age* describing Captains Flat as a town of 'doom, gloom and despair with a seeming hoodoo hanging over it', with strikes, lockouts and threatened shutdowns and an appalling safety record induced by speedups, all of which was management's fault. This view did not go unchallenged. Two writers, one of whom was a miner, spoke of the virtues of the contract system. The other writer described Kerr as 'a most unhappy man' and suggested that if other places be more fair he 'pack his bags and hasten there'.⁹⁰

In May of that year there was further trouble brewing at the mine over the company proposal to let a contract for the deepening of the main shaft to a Norwegian firm. The union claimed that the work should be done by the miners, and that if there was a labour shortage to set aside the contract and accept the Norwegians as workmen. The first batch of men from the Norwegian company was scheduled to arrive at Captains Flat on 15th June and start work the next day. Several days later the company notified its intention to issue dismissal notices to all miners and put the mine and plant on a caretaker basis until the shaft contract and other development work could be proceeded with. The mine's own shaft crew were to be fully occupied in sinking another shaft. On 25th June 300 men were dismissed, although 140 men on safety, essential services and maintenance gangs were still to be employed. Officers from the Departments of Labor and National Service and Social Services arrived at Captains Flat shortly thereafter to receive applications for unemployment benefits and place unemployed men in other jobs.⁹¹

In an attempt to end the deadlock a Committee of Neutral Citizens, which included Rev. Fr Crowe, Rev. G.F. Pyke, Dr Rickard-Bell and Mr J. Brown, hotelkeeper, was formed to invite representatives to a meeting. But not long after all hope of an early settlement faded when a combined meeting of the AWU and FEDFA members in late August decided to declare the mine 'black' to all unionists in Australia. The decision followed an unsuccessful meeting between the unions and management at which the Citizen's Committee was present. An offer by the Committee to chair the meeting was rejected by the company, whose manager appointed himself chairman. According to the committee the company was in an uncompromising mood and the meeting doomed from the beginning. The committee considered approaching the State Government but did not pursue the idea; the Minister for Mines later declared in Parliament that he was prepared to mediate in the dispute if requested. By September the prospect of unemployed miners finding temporary work as cane cutters in northern NSW was mentioned⁹²

In late October a report circulated that an agreement had been reached between the company and the unions concerned at a conference before a Full Bench of the Arbitration Court in Sydney. The union representatives agreed to recommend to their members to lift all embargoes on the letting of the contract to sink the main shaft. It was also agreed that any disputes over re-employment of labour or working conditions be referred to arbitration without any work stoppages. Two weeks later the agreement was put to the members at Captains Flat. Half of those present rejected it and half abstained. Rev. Fr. Crowe addressed the meeting and urged a return to work. Further conferences were held before a Full Bench of the Commission and at which the unions affirmed that no bans existed on the contract work proceeding. Notices to that effect were circulated by the AWU throughout the town. Following a further agreement between the company and the unions it was agreed to reopen the mine on 1st February 1955. The agreement dealt with dispute settling procedures, new contract schedules, shift work and overtime and many other matters over which friction had arisen in the past. A subsequent article in *the Queanbeyan Age* saw the agreement as heralding a new era for the town. Average earnings were high and most underground workers were paid on contract and earned between £5 and £6 a shift. Surface workers received award rates with special loadings and all employees received the lead bonus which at current prices would be about £3. The company had erected 186 homes for married workers and provided single quarters for another 195 at moderate rents.⁹³

Industrial disputation was not only confined to the miners, for in May 1955 a dispute arose over the dismissal of 17 year old T. Cusack, a shire employee, for loafing on the job. Two months later the Council agreed to reinstate all men involved in the dispute to their former positions with the exception of Cusack, who was to be given a job away from Captains Flat. In August the ganger in charge was suspended for using abusive language. He was later reinstated and an inquiry held into the matter. A Shire Councillor stated subsequently that mine relations were better than they had been for many years. The councillor was broadly correct. There were still strikes and stop works but they were relatively minor compared to those of the past. For instance, in late May 1956 there was a seven day stoppage over the use of staff labour on union work on a weekend, and in August a 24 hour stoppage was called over the miners being asked to carry out their own timber work. In February 1957 the company chairman stated that by far the most favourable factor at the mine was the change in labour relations. A strike commenced in late May in protest against the dismissal of a number of AEU unionists who refused to work unless they were paid additional money for working underground. The dispute ended a few days later pending an investigation into the claim by the NSW Industrial Relations Commission.⁹⁴

A factor in the improved relations may well have been the realisation that the company was facing a difficult time with high freight charges, rising costs, low metal prices and limited reserves. The latter was common knowledge in the town. Labour relations came to the fore again in November 1957 following on from the company chairman's letter to the townsfolk. In a subsequent meeting in December the manager stated that the company wished to increase production from 16,000 to 18,000 tons per annum to offset the impact of lower metal prices

for lead and zinc. Since July production had been lost on eight days as a result of stoppages. He called on the miners to resolve the disputes quickly, to tighten discipline and reduce absenteeism. He hoped that certain restrictive practices applied by some of the unions would also be removed. The company's pleas must have had some effect, for the incidence of disputes fell in the months ahead. But they did not disappear. There were brief stoppages in September and December 1959 and a three day stoppage over contract rates was held in March 1960.⁹⁵

Town & Community

By 1937 the town was only a shadow of its past. That was, however, soon to change, for it was projected that the population would increase dramatically to about 2,000 and that the mine would continue for many years. State Cabinet approved the construction of the Bungendore to Captain's Flat railway in March 1937. As the costs of town and infrastructure development would be beyond the Yarrowlunla Shire's capacity the NSW Government had recognised that State funding would be needed. At the suggestion of the Minister for Works and Local Government, Mr Spooner, a board of five members was appointed in May 1937 to formulate proposals for the layout of the township and the development of roads and essential services. Two members were to be appointed by the Shire and three by the Minister. It was expected that the board would address matters such as roads, water supply, sanitary arrangements and general layout of the town. Haggling over the terms and conditions attached to any assistance provided for road construction was to continue for some time.⁹⁶

A Braidwood visitor commented in July of that year that beyond a few new buildings and signs announcing the erection of up-to-date premises there was no untoward indication that the visitor was in a prospective city. The hotel appeared to harbour mostly 'swarthy, foreign looking men exuding a pungent odour of gum-leaves and eucalyptus'. But on the top of the hill there were signs of much greater activity. Thousands of tons of ore had already been extracted and plant and machinery buildings were being erected nearby. A few weeks later a correspondent for the *Braidwood Review* was lauding Captains Flat as a 'new Broken Hill'. Three weeks later again a writer for the *Sydney Morning Herald* described the town of 280 people as 'consisting of a single straggling main street - an unprepossessing array of cottages and empty shops'. He conceded, however, that it was 'the most important development in the NSW mining industry for many years'.⁹⁷

The pace of development was rapid and with it there was a raft of immediate decisions to be taken on matters of public welfare and town development. For instance, it was decided early on that the site of the township would continue to be in the valley. The heavy traffic now taking place on the existing roads meant that they were to receive immediate attention. Water supply was another immediate problem, particularly given the future water needs of Canberra. At one stage it was suggested that storage dams in the headwaters of the Queanbeyan River should be constructed for the dual purpose of supplying Captain's Flat and maintaining a steady flow into the Molonglo River at Canberra. The possible need for a hospital was also mooted; the company had already declared its intention to build an emergency dressing room and have an ambulance available. Another concern was to ensure the enforcement of building regulations to prevent the erection of sub-standard dwellings as had occurred in many other mining towns. Some estimates had the population as high as 5,000, while others stated that the normal multiplier for mining towns was five times the number of miners, which would have put the population at 2,000-2,500. The latter calculation was more realistic. Captain's Flat would still, however, be one of the largest towns in the Southern Tablelands. In the boom years its population would be about one quarter of Queanbeyan. By January 1938 there were 40 cottages, a number of shops and large quarters for 64 single men. Another singles men's quarters was to be constructed. A decision had also been taken to construct a weir across the Molonglo River.⁹⁸

A rather telling commentary on Captain's Flat was made in January 1938 by a visitor who referred to themselves as Nullah. They described the workers' cottages as very nice with new appliances ready to be installed, but was less impressed with other aspects, stating that:

Everything would be beautiful if the surroundings were in comparison. Huddled together as they are down in a gorge and built on a swamp with every likelihood of being flooded, the site for the future town did not appeal ... with no provision made even for a small garden. A miner's wife's life will be very monotonous ...

They described the site as miserable and inconvenient. 'Just imagine a workman clambering up and down those gorges at all hours to get to his work: not very soothing on his nerves after a hard day's toil'. They believed that the site for the town should have been in the vicinity of Copper Creek, but that had been reserved for the 'tall poppies', and very little consideration given to the employees who had to do the heavy manual toil underground and on the surface.⁹⁹

There were many teething problems. Housing and sanitation were among them. Most of the buildings did not comply with local regulations, which stipulated that the walls could not be built from galvanised or corrugated iron. There were also insufficient sanitary conveniences and natural water courses were polluted with refuse. Council agreed that there was an urgent need for a sanitary service and for this purpose two carts from Queanbeyan were to be made ready and painted. Correspondence had been received to the effect that while the earth closets may be unsatisfactory they were superior to nine out of ten in Queanbeyan. But progress was rapid. By April the company had erected a mess hall capable of seating 180 people, the old residents commenting that the buildings were far and away ahead of those in the 1890s. Movement was also afoot to augment the casualty station, with the company making two acres (0.8 hectares) of land available and agreeing to contribute to its maintenance.¹⁰⁰

By the middle of the year the estimated cost of infrastructure expenditure was such that the NSW Government offered to provide substantial assistance to the Shire. For instance the road from Captain's Flat to Carwoola would be built by the Shire and that between Carwoola and Queanbeyan by the State Government. Other roads to be improved or reconstructed were those to Bungendore and Braidwood. Concerns over sanitation again surfaced in August, with one report referring to Bogtown conditions. A large number of tents and temporary dwellings had been erected and many residents were living in very unsanitary conditions. Toilets were under construction on a special camp reservation and all campers were to be ordered to that area as soon as the work was completed. Some protests were voiced by the men camped along the river who were working on the dam, but it was insisted that if there was a danger of the river being polluted then these men too would have to move. Extensive improvements and alterations to the public school were also approved. But the growth of the town did not please everyone, with one councillor commenting that as far as the ratepayers were concerned it would not matter if the town were shut down tomorrow for it contributed nothing to Shire's revenue and only added expense and worry.¹⁰¹

A wonderfully impressionistic account of the town prior to 1937 and as it was now emerging was penned by a writer to the *Sydney Morning Herald* in July of that year. It is quoted in full:

A year ago at Captain's Flat all was desolation. Under the grey slag heaps of the old copper workings a few tumbledown wooden shacks, dirty, unpainted and unlovely straggled on up the gully between bare, forbidding hills, or huddled about the solitary hotel. Today, thrusting up in midst of the old shanties, is an aggressively new block of shops, whose modern frontages gaze at the dusty, unmade main street, with the inevitable bored cows drowsing in the shade of the trees. Beside an open air barber's shop – the chairs exposed to the four winds of heaven - workmen are busy on a big new establishment. Nine new shops have been built with the last three months, and others are proposed or are already in the course of construction. The Union Bank of Australia, now occupying temporary quarters in a wooden shack, is building new quarters on the corner of the main street. A cinema hall is to be built shortly, and probably a hospital. The post office has been enlarged and a substantial courthouse-cum-police station.

Speaking of the old hotel the writer described the 'low, dingy bar-room crowded to the doors with roughly-clad miners, and the accents of Cornwall and Wales mingling with a solid stream of good Australian profanity, sweat and tobacco smoke' Last year, according to the writer, Captain's Flat was definitely a "tough" town. There were big two-up schools in the main street, constant brawls, and occasional free-for-all fights for good measure, when the bulk of the male population would betake their differences in a convenient paddock and settle them in traditional style. But times have changed, the company has seen to that.¹⁰²

But whatever progress was being made in the town and mine, little was apparently happening along the Braidwood Captain's Flat road, in particular the Cooma stretch. In October 1938 it was described by a Mr Izzard as consisting of 'corrugations, potholes, drains, washed out, bad watercourses, in affect everything but a decent travelling surface'. The part before Ballalaba was 'absolutely the worst stretch of the road, and would not only shake out the false teeth ... but is liable to shake anyone out of a car'. The following month Councillor Hassall stated that the Shire received continual complaints from people who were compelled to use the road and who 'were smashing springs, shackles, etc'.¹⁰³ The other momentous event in 1938 was the commencement of construction of the present hotel – with its 32m long bar reputed to be the longest in Australia.

There was little outside interest in Captains Flat during the War Years. People's minds were understandably focussed elsewhere. Complaints on services or lack thereof, however, continued to be conveyed to the Shire Council by the Progress Association. In May 1940 there were complaints concerning inadequate street lighting, people swimming in the dam, and the non-collection of sanitary fees. Electric power and freight concessions of up to 50% were granted to the mine in October and extended in April 1941. In May it was proposed that a

garbage service be run in tandem with the sanitary service. The company advised the Government in June 1942 that it no longer needed the mining concessions; without which it would have needed to close the mine. Its re-opening would have been long delayed for 'no one would have been game to re-open it'. As a measure of the basic state of much of the town's facilities, by 1944 there was still no town water supply or street lighting and improvements were still needed to many of the roads. A hospital movement was inaugurated in that year to raise funds for the construction of a hospital; about 60% of the costs were to come from private fund raisings, the rest from the NSW Government.¹⁰⁴

With the war's end improvements continued to be made, albeit slowly. In March 1949 there was a call for an adequate sewerage system to replace the existing pan system and do away with the 'offensive and insanitary conditions caused by the lack of adequate house drains'. The Shire Council agreed to take steps to implement a sewerage system and to obtain information on the prospects for implementing a town plan. Movements were also afoot to obtain a loan for improvements to Molonglo Park, to erect a soldier's memorial and a swimming pool. It was admitted, however, that any further improvements depended upon the life of the mine and industrial harmony. Building of the hospital had been ongoing since 1944. In September 1949 it was decided that the Captain's Flat District Hospital Board would take over the administration of the clearing station. However, dissatisfaction with the slow rate of progress on construction of the hospital led to the resignation of the full board in February 1950. The hospital commenced operations in July of that year. At one stage the hospital had difficulty in obtaining trained nurses, despite the very comfortable nurses' quarters, but more serious was the cutting of the Government subsidy in 1954. At the time it was pointed out that patients who were normally treated at the Braidwood, Queanbeyan or Canberra hospitals were being admitted to the Captain's Flat hospital.¹⁰⁵

Despite obvious improvements in some areas and the construction of many dwellings by the company, even as late as 1951 the housing situation was regarded as unsatisfactory. A survey by the Shire health inspector in December 1949 found that of the 382 dwellings in the town, 98 were substandard and in normal times would have been condemned. The erection of houses for tradespersons, teachers, police officers and railway staff was at a standstill, although the company had built about 200 good standard houses for its own employees. The Shire Council approached the NSW Housing Commission on the matter but was rebuffed in April 1951. A further approach was mooted at the time. The roads still left much to be desired, even as late as 1953. Foxlow Street was sealed only in the middle and not from kerb to kerb causing difficulties in very wet and dry periods from mud and dust. The northern part of the street was also unsealed as was the steep driveway into the hospital and the southern part of the street where it merged with the Jerangle Road. In January of the following year G.V. Burnett, a Shire councillor and staff employee at the mine, described the Queanbeyan - Captain's Flat road as 'an entirely inadequate cross-country trail'. Council agreed to approach the NSW Government on the matter.¹⁰⁶

A major program of works was authorised for Captain's Flat in March 1954, which included road sealing, guttering, kerbing and foot paths. And in May the Shire announced a scheme for cheaper homes at Bungendore and Captains Flat. But the closure of the mines in June 1954 came hard on the heels of many other disputes and again led to concerns about the future of the mine and town. The two Captains Flat councillors, Messer's Kerr and Burnett, sponsored a move at the July Shire meeting to have the possibility of introducing new industry to Captains Flat thoroughly investigated. At the same meeting, however, it was questioned whether the program of public works should go ahead in view of the mine possibly shutting down. In a report later that month it was stated that most of the men were employed, but some had taken work in Canberra and Sydney at reduced wages. Where the men had not yet found work the families were finding it increasingly difficult to make ends meet. Frequent mine stoppages over the last few years had affected some businesses; two grocery stores had closed and some families had left town.¹⁰⁷

A picture of doom and gloom was painted by the Federal Labor member for Eden-Monaro, Allan Fraser, in a radio broadcast in August. He stated that life at Captains Flat was paralysed, residents gripped by depression and anxious for their future. The impression was that the company had deliberately brought about a stoppage to force acceptance of worsened working conditions and to exclude from future employment men who had been active in trade union leadership. Tom Kerr announced his intention to resign from the Shire Council stating the present employment situation at the mine. The Citizen's Neutral Committee stated that the unions' decision to 'black' the company would speed up the exodus of families from Captains Flat and a number of families had departed over the last two weekends.¹⁰⁸

The dispute was resolved in 1955 and many now felt that Captains Flat could look forward to many years of progress. In July the Shire Council proposed to write to the NSW Housing Commission to investigate the need for more rental homes in the town. Previous representations to the Commission had been unsuccessful due to an impression that the town was dying out. A number of sub-standard homes had been closed and demolished at Captains Flat over the last eight years, but this work had come to a stop because there were no means of housing the displaced occupants. Late that month a Shire councillor stated that the life expectation of the mine was improving as the lower levels were reached and urged the introduction of a full sewerage scheme in the town. In November the Council approved construction of a drainage scheme for part of Foxlow Street. It was to be designed as part of a sewerage system if the Council decided to install the latter at any time in the future. Subsequently it was suggested that the proposal be amended to assist the hospital in disposing of its sullage water. As further signs of progress that year the convent opened new additions to its premises in September and in December there was a move by union members to band together for a cooperative society with a butcher's shop as their first venture. The shop was sold to them by one of the town's two butchers.¹⁰⁹

But it was not long before the town news was again laced with negatives as uncertainties emerged concerning the mine's future. In September 1956 it was remarked that the hospital was facing a grim year from an acute cash shortage arising mainly from the delays in collecting patients' accounts. There was also a seeming spate of fatal injuries in the mine. Two miners were killed from rock falls, one in October 1956 and another in March 1957. In November a miner was killed in a mine explosion. The first hints of problems on the mine's future were in February 1957 when it was announced that the mine had ore reserves for another seven years. A subsequent drop in the price of lead and zinc caused further concerns, for the company was now operating at a loss. In November the company chairman took the unusual step of writing to the town residents calling for more production in an effort to allow the company to break even on its operations. A public meeting involving a cross section of the town community and the mine management was held the following month to discuss the mine crisis.¹¹⁰

Despite uncertainties over the town's future the town maintained a vibrant sporting and social life and there was still plenty of energy to express concerns over matters of housing, roads and the like. For instance, in 1958 the health inspector reported on the appalling housing conditions of a railway man, his wife and two children who occupied two tents while using a former stable as a kitchen and using a dilapidated sanitary closet. He stated that Captain's Flat was the only town of its size in NSW that had been completely neglected by the Government Housing Authority. But a visitor in the following year waxed eloquent on the modern facilities in the town, such as the school, the picture theatre and well equipped clubs, the hospital and sporting facilities. He described the town as an 'intriguing place, whispering one moment of bullock teams and the days gone by, and the next instant reminding you that it is very up-to-date'. Tragically, in the same issue of *the Queanbeyan Age* two men were reported killed in a rock fall at the mine. It was the mine's worst single accident. Several days later the NSW Minister for Mines, Mr Simpson visited the mine. It was the first visit by a State Minister for eight years. He expressed his surprise at the size of the mine operations and the numerous amenities at the mine and in the town.¹¹¹

Later that year it was announced that the hospital would close due to staff shortages. It was proposed that a staff bonus scheme be re-introduced to compensate for the reduced recreational facilities at the town. There were also repeated calls for improvements along the Queanbeyan road at Whisker's Creek crossing, and along the Jerangle road; in several sections the road was so narrow that two vehicles could barely pass. Continued flooding of the Molonglo River on the Bungendore road near the Briars was also causing problems. In April 1960 Councillor Ireland described the condition of the Queanbeyan road as deplorable. Perhaps there was better news on the health front. An analysis of Captain's Flat water revealed that it was not dangerous to health, although it was discoloured by rust from the steel pipes. It was stated that few people used the water because of health concerns. There were also concerns at the flooding of the bowling green and adjacent areas from the Molonglo River.¹¹²

By mid 1960 the focus was shifting strongly towards the town's future, and in July a symposium was arranged by the Captain's Flat Citizens Committee on the subject. The symposium was to clarify the future prospects of the mine, to give consideration to the possibilities of transporting the local work force with housing to nearby towns and try and face the problem of keeping the town's amenities should the company vacate the town. The company manager had informed the committee that the mine would close down in 1963. But all was not well, for six weeks later the symposium was abandoned. The committee had been set up by a number of businessmen and graziers of the district. However, the exclusion of some businessmen and union representatives from the committee, together with an alleged attack on Mr Fraser, the Federal MP, after he indicated that he would be

unable to attend, resulted in an immediate boycott of the committee and its activities by all unionists in the town. A new committee was subsequently elected.¹¹³

A summary of developments regarding the committee and of the observations made by many people in the town and of information obtained from the original committee were outlined in *the Queanbeyan Age* of 26th July 1960. It was a most despondent report, which commenced by describing the present outlook as 'gloomy and pessimistic' and stating that it did not seem worthwhile for any industry to be established unless some sort of substantial government subsidy could be obtained. Several options were outlined. The establishment of a limestone industry was out of the question. The existing deposits were not of a particularly high grade and limited in extent. A large timber concern was a physical impossibility. The main area of timber was Tallaganda State Forest, but it would not be possible to increase the supply of timber to existing mills; it was clear that the forest was being heavily over cut. The present rail services between the town and Bungendore were very poorly patronised and would need reviewing. Neither was the Housing Commission in a position to purchase or acquire residential properties. The costs involved in purchase and transportation would make the proposition uneconomic. The roads were a problem and would discourage most entrepreneurs even if all other factors were adequate.

It was also highly improbable that the work force of the mine, who had received very high wages compared to other unskilled occupations, would consider for a moment becoming basic wage earners. No one would stay if all they could obtain was half their current remuneration. The mining work force would gravitate to other well paid mining or labouring jobs. In addition the physical environment was very limiting. There were no good roads, poor soil, a short growing season, very little extensive level land, and few good homes in comparison to elsewhere. Neither were there any great markets or tourist attractions nearby and the town did not lie on any important arterial route. There seemed little hope for the 'material elevation of the town'. The only hope lay in the cooperation of the federal government in building roads and campaigning for an industry, or from the importation of migrants who would be prepared to work hard at a manual task for the basic wage. But even more important was the time factor. If any concern large enough to employ all the workers at Captains Flat was to be established and ready in time for the mines closure, then construction of the plant should have been under way already.¹¹⁴

The matter of finding jobs in Canberra or establishing other industries continued to be under active discussion at the state and regional level and by mid June 1961 discussion had turned to finding additional ore deposits to prevent the pending closure of the mine. It was foreshadowed that unless new deposits were found within the next two or three months then the mine would close as early as mid 1962. The future of the mine and the town had been front page news for some time, and was a major preoccupation of Allan Fraser, MHR. He had already met with the mine management and unions and conceded that the reports to date were not encouraging, although it was too soon to say yet that the mine would close. The NSW Government was meeting half the cost of drilling and the mining management stated that Government had given the company the 'utmost cooperation'. The future of those employed at the mine was also receiving close attention from L.J. Tully MLA.¹¹⁵

Allan Fraser's first approach to Prime Minister Menzies met with a rebuff, for the road was regarded as a state responsibility. In the meantime there were further complaints about other roads, in particular the Harold's Cross Road which was used for carting timber by saw millers to Captain's Flat, and the Captain's Flat - Braidwood road. As if this was not drama enough a major controversy was brewing over the Captain's Flat sanitary contract. The contractor had noticed a lack of toilet paper in the children's toilets at the Catholic school, with the children being forced to use other means to clean themselves, including handkerchiefs. He complained to the Health Inspector and the department but they advised him that there was nothing they could do as there was no law compelling the provision of toilet paper. The contractor pointed out that the miners had toilet paper so why not the children. There were also problems with overflowing urinal pans, which were often filled through a careless hosing down of the toilet block. The contractor offered his resignation but this was not accepted pending an investigation. The inquiry stated that the controversy was the result of a building up of trivial matters that should never have come before the council or the public, and that it certainly did not warrant anyone losing his job over it.¹¹⁶

By November 1961 Allan Fraser was again urging the Commonwealth Government to assist in reconstructing the road from Captains Flat to Queanbeyan, particularly as the test boring for further ore deposits had been unsuccessful and the closure of the mine was imminent. The town was clearly now in wind down mode. The Southern Tableland County Council stated that it may buy the electrical installation assets of the mine when it closed, and the Yarrowlumla Shire deferred consideration of further improvements to the pool. It was considered that they were not warranted due to the position of the mine. There was a somewhat myopic view that the town

would not be a ghost town as there were grazing and timber industry interests that would keep the town alive, but then that all came down to a definition of what constituted a ghost town.¹¹⁷ The town's future depended largely on the improvements to the road link with Queanbeyan.

In February 1962 a conference was held in Canberra to discuss the road link. Those present included the NSW Premier, Mr Heffron, J Tully MLA, J Seiffert MLA, Councillor P Osborne, the Shire President and representatives of local business and clubs. The Premier said that his Government would go ahead with arrangements for the reconstruction of the road, and that a formula for paying for it would be worked out between the State Government, the Shire, the Main Roads Board and the Commonwealth Government. He would ask the Prime Minister at the Loans Council meeting to make a substantial contribution to the road as it had done for the Canberra Bateman's Bay and Cooma roads. The state of the road was now headline news, particularly following an accusation by Tully, MLA that the 'Liberal' Shire President Mr Osborne had prevented the road from being sealed. In a strongly worded reply Mr Osborne refuted this accusation. He had, however, urged the Premier not to underestimate the cost of road works. Several days later Tully announced that the NSW Government was to make an immediate grant of £50,000 for the road. It had been agreed at the earlier meeting that £150,000 was needed to commence the project, the Shire to contribute £16,200, DMR £33,200 and the State and Commonwealth Governments £50,000 each.¹¹⁸

The road issue received heightened attention following the closure of the mine on 11th March 1962. Several days later Commonwealth social service and labour officials visited the town to give on-the-spot assistance to those made redundant by the closure to enable them to register for employment and for unemployment benefits. Of the 350 employees all but 70 had been made redundant. Those retained were to be employed in salvaging equipment from the mine and preparing the plant and machinery for disposal. There was already a general exodus of men to Queanbeyan and Canberra, with others going to the South Coast and the Snowy Mountains. It was expected that most families would stay on for the time being while the men were employed elsewhere. Later that month a special bus service to Canberra and Queanbeyan had commenced, dropping the men off at their respective places of employment and picking them up in the afternoon. The company was having problems retaining the 70 men needed for mopping up operations as they were also accepting jobs in Canberra. Homes in the town were being occupied by servicemen who were unable to obtain accommodation in Canberra and Queanbeyan. A report in early April stated that 90 per cent of the men had found alternative employment and that there was no slacking off in business in the town as the men did not have time to spend their money in the other centres. A subsequent report put the unemployment at about 20 per cent, with the Shire contributing money for relief work, which would employ about 20 men. Some men were also getting employment at Wollongong, Port Kembla and other distant mining centres. On 20th March the Prime Minister was visited by a deputation, which included Allan Fraser, concerning road funding.¹¹⁹

But there was no hiding the fact that the town was in decline. In April the resident medical officer left the town and the pharmacy had closed down during normal day time trading hours. An arrangement had been made for a Canberra doctor to visit the town twice a week. Many were also demolishing their homes and transporting them elsewhere. They were charged a deposit of £25 refundable on proof that the site was not left in an untidy condition. Ironically, the two issues uppermost in people's minds were similar to those 25 years ago; housing, employment and the state of the roads, the latter not to get people to Captains Flat but away from it. Reconstruction work on some sections was to be done on the cheap, the Council accepting lower standards than those usually adopted for modern traffic in order to minimise cost. But the good news in mid May was the announcement that the Federal Government was to contribute £50,000 to the road work. Allan Fraser, MHR, stated that the Prime Minister, Mr Menzies had taken 'a keen personal interest in the problem of Captain's Flat and its potentiality as a satellite of the National Capital'. He was very thankful for the efforts of the Shire President Mr Osborne and in particular the 'indomitable efforts of Councillor Tom Kerr'.¹²⁰

Local residents were very happy at the news of the federal grant. One correspondent waxing eloquent at the potential of Captain's Flat for pine forest plantations, brick manufacture, lime quarries, the exploitation of iron ore deposits and other minerals, trout fishing and tourism. With the road issue to an extent resolved, attention turned to the housing removals. A motion was put to the shire Council by Tom Kerr that all applications for removal be submitted and considered by the full Council. He stated that if the removal of homes went on unchecked there would 'simply be no Captain's Flat'. He was not so concerned about the houses on the mine property but rather those in the town. Most councillors were of the view that what individuals chose to do with their own homes was their own concern, but saw no harm in the motion. A private survey in August of Captain's Flat put the population at 832. Eight homes were listed for sale in *the Queanbeyan Age* on 25th September. The highest price, for a five bedroom house, was £350. Some days later, Mr Tully, MLA for Goulburn, told State parliament that between 30 and 40 families had purchased homes at the town for about £300 each, and that

70 per cent of the work force had found work in Canberra. Some Canberra army workers had also bought homes in the town, thus avoiding the high rents and other costs associated with living in the city. He stated that there was not one vacant home, and took the opportunity to put in a plea for the introduction of a septic toilet system at the public school.¹²¹

Despite this optimism the reality was a little different. On 20th November it was announced that the hospital would close the following week, all attempts at finding a doctor having failed. The Hospitals Commission considered that the cost of maintaining the hospital, in view of the little use it was receiving, was too high. But finding a doctor was not the only problem, for three nurses had already left and the remaining three were scheduled to leave shortly. The cook and matron were also leaving. Concern was also expressed at the damage caused to culvert posts by contractors removing homes to Queanbeyan.¹²²

The final stage in the life of Captain's Flat as a mining town took place with the giant sale of the company's mine assets in early February 1963. More than 400 attended the sale on the first day, although the crowd thinned out on succeeding days. The auction was to last all week and was expected to realise between £100,000 and £150,000. Prices realised for the more expensive items had, however, been very disappointing. Scrap metal dealers were the most active buyers. Meanwhile it was not only the hospital that was in trouble but the ambulance service. A deputation of Ambulance Branch Service members from Captains Flat told a District meeting that the ambulance was being used as a taxi service for transport to doctors in Queanbeyan and Canberra and for physiotherapy and other treatment, and that there was a problem in collecting fees. The service was now running at a loss.¹²³

The fate of the mining town received close scrutiny from over the border in Canberra. In an article in the *Canberra Times* on 8th February 1963 it was stated that the town was facing the grim prospect of becoming a ghost town as the equipment went under the auctioneer's hammer that week. Less than 10 of the 30 odd shops in the main street still opened daily, and the following Saturday the town was to lose its only chemist. But there was hope, declared the *Times*. People with jobs in Canberra were taking advantage of cheap homes and moving back, and the population of the town had steadied at about 1,050 people. A director for the hospital board, Mr Dahlenburg, stated that Captain's Flat's future was as a 'kind of suburb of Canberra'.¹²⁴

Despite the decline in the town there was plenty of life left in some of the residents. A dispute between Tom Kerr and the Shire President, Mr P. Osborne, surfaced in late February and early March, when Kerr accused the Council of going slow on reconstruction of the road. He also accused the Council of collaborating with the company for the destruction of the town. Kerr had walked out of the Shire meeting when the council declined to increase the Captain's Flat Local Fund rate. Osborne strongly refuted these comments. A meeting of the Captain's Flat Progress Association passed a vote of confidence in Kerr. In March it was announced that an English doctor had accepted the position of resident medical officer. Although the hospital had been closed for some time it was still fully equipped and could be reopened and operating at short notice. This would also be the 'salvation for the ambulance'. The Shire Council also agreed to visit Captains Flat in April to get first hand knowledge of the town's problems. A special meeting was held with representatives of local organisation, who informed the Councillors that the two most urgent works were improvements to the water supply and the removal of silt from the river. It was feared that heavy rain could result in severe flooding of the centre of the town due to siltation at the rear of the park.¹²⁵

But these hopeful signs soon faded. The committee of the Queanbeyan District Ambulance Service announced on 13th May that the Captain's Flat ambulance would close down no later than 30th June for financial reasons. Several days later it was announced that the NSW's Hospital Commission had dismissed the entire hospital board and appointed an administrator. The new doctor, Dr Lunt, had arrived only a few days earlier. It had been confidently expected in the town that the Commission would approve the early re-opening of the hospital following the arrival of Dr Lunt. But two weeks later Dr Lunt had disappeared. He had seen no patients or opened a practice and there was some speculation whether he had acted on information he had received from the Hospital Commission. Meanwhile the demolition of homes in the town continued. One particular contractor was described at a Shire meeting as 'ruthless'. Not only was damage caused to roads and guide posts, but street trees had been lopped and some even removed.¹²⁶ The fate of the trees seemed to mirror the town's situation, as both houses and people continued to disappear. For many years to come Captain's Flat was to remain in a steady of decline.

Another institution to fade with time was the railway. The main purpose of the railway had been to serve the mine. Passengers were still carried however and a separate station and platform was built to cater for the town's needs as distinct from the mine traffic and freight. A rail motor took residents into Queanbeyan on Saturdays.

The company made use of the railway for the removal of mine tailings until the end of June 1963 and in November 1964 steps were taken to close the line as the remaining goods traffic was negligible. In January 1964 the Monday rail motor connection with the down Cooma Mail which also connected with the down Canberra Monaro and the up morning train from Canberra to Goulburn ceased. The goods service was reduced to once a week from 12th April 1964. During 1966-67 there was only a small amount of traffic handled and the last train ran on 28th August 1968.¹²⁷

Regional Impact

The importance of a revived Captain's Flat in the 1930s was not lost on Braidwood residents, particularly the pastoralists and agriculturists. From the outset there was considerable agitation by the Tallaganda Shire for an upgrading of the Braidwood to Captain's Flat road which it was stated would be used 'to convey practically the whole of Captain Flat's fruit, vegetable, meat and primary produce when the mines began working. The road was described as 'nothing short of a nightmare'. Several days later the Minister for Works and Local Government, Mr Spooner, came in for considerable criticism from the *Braidwood Review*. It was stressed that not only foodstuffs but also timber for the mines and buildings was transported along the road. With work on the mine under way there was no excuse for further delay. At a meeting of the Tallaganda Shire Council in August the advisability of a three mile deviation of the existing Captain's Flat to Braidwood road through Major's Creek was debated. Councillor Hassall stated that the deviation would serve four important centres, namely Araluen, with its 'sub-tropical climate' which was capable of producing practically anything in the way of fruit, vegetable and fat stock, Reidsdale, which was famed everywhere for its butter and cheese, Jembaicumbene and the timber sawmill at Monga. Others disagreed with the deviation on a number of grounds including cost, but there was no doubting the importance of the Captain's Flat market, one councillor reminding the meeting of the role that the town had played as a market some 40 years ago.¹²⁸

The regional importance of the new mining venture within the region generally was evident from the outset. Work was to start on road improvements, with the majority of men drawn from the labour bureaux of Goulburn and other towns on the main railway line. The majority of the local unemployed were expected to find work on the Captain's Flat railway line, the bill for which had been passed in the NSW Parliament in December. Mr Vincent, the Minister for Mines, stated that the Captain's Flat lode was second only to Broken Hill and that the life of the mine would be 30 years. M.R. Gillespie penned a poem for the *Canberra Times* which expressed well the sentiments among many local and other more distant battlers at the time.¹²⁹

0 we've loaded up the waggon and we're off to Captain's Flat! (The team's a hack and three old draughts, all pretty lean at that).

For we've years of drought behind us, and dreams of wealth ahead - Dad says the farm's a failure, so he'll tackle tin or lead we've tied the chairs and table on, and Mum feels queer inside, (She hates to leave the old place 'cos she came here as a bride).

Dad, he's an old-time fossicker, and Jim can take his shift, While Kevin-well, poor Kev's a lad who'll always sort of drift...(You see a brumby threw him when he worked at Cuppawong).

And tho' his body grew quite big his head stayed kind o' young.) Mum wants to take her chickens, and Tib the old grey cat... Says things like that will make her feel at home, at Captain's Flat.

0 we've camping gear and tucker 'cos the trek'll last for days, Across the old Molonglo...'way where those last hills haze. For we've years of drought behind us, (Our stock don't run to fat!)

So we've loaded up the waggon and we're off to Captain's Flat!¹³⁰

The regional impact of the towns' decline was rather different to the events of the early 1900s. Allan Fraser, MP, stated that attempts to persuade secondary industry to establish itself in the town had been unsuccessful, and his present aim was to enable the men, if they wished, to take part in the 'rushing development of Canberra'. The population was then 55,000 and it was expected to be 100,000 eight years hence. Acute housing shortages in Canberra were a problem, and there was a very poor road from the town to Canberra, but he felt that this could be overcome. To be able to add 400 to the Canberra work force without any need to provide immediate housing would be a substantial boon. It would also mean a substantial saving in unemployment benefits.¹³¹ Thus

the town's decline was to be a boon to Canberra, enabling construction work to proceed more rapidly. The provision of cheap housing at Captains Flat also helped relieve temporary housing shortages in Canberra, particularly for Defence personnel.

Social Life, Sporting & Cultural Associations

The relationship between the mine and the town went much further than the provision of employment and housing and underpinned much of the town's social life as well. In her book *Boom to Bust - and Back Again*, Susan Pryke, states that it was the mining company that re-built Captain's Flat by providing much of the housing and other accommodation, water and electricity. When fire destroyed the Savoy picture theatre the company erected a new one. The company also donated a substantial amount of money to the building of the swimming pool, built a golf course and club house, and donated funds to the bowling club. On the other hand the Shire approached the town with mixed feelings, and this was reflected by the fierce and bitter debates that took place between Council members on matters affecting the town. The Shire's responsibility for sanitation and roads was unlikely to generate much enthusiasm, and it took until 1956 for the major streets to be surfaced and for kerbing and guttering to be provided. The council also contributed to the swimming pool and built a children's play ground, tennis courts and a tree nursery.

Captain's Flat had a vibrant social and sporting life, even in the War years. A musical and dramatic club was established and in June 1944 a debating club was initiated. At the first concert of the music group crowds lined the approaches to the hall and many were turned away, the hall 'being packed like the proverbial tin of sardines'. The hall was also packed for first meeting of the debating club in June. A children's health centre was opened in August. Arbor Day was celebrated in that year with the planting of fifty exotic trees on the school playground.¹³²

In 1956 wide interest was shown in the establishment of a youth centre in the town. The headmaster of the high school commented that the bad state of the Captain's Flat roads meant that the community was isolated and that youths in the 13-15 year age group were thrown on their own resources with the risk of juvenile delinquency. The police sergeant put something of a dampener on the proposal by stating that the incidence of delinquency was not particularly high. In January of the following year, it was announced that a new cinema was to be built and paid for by the company. The theatre opened in August of that year with over 350 people attending the opening ceremony. The old Savoy theatre was to be used by town organisations as a dance hall and for youth purposes. In July the town was regaled by a visit of the Governor General, Sir William Slim. Almost the entire town turned out to watch a wreath laying ceremony at the War Memorial. The Governor General then went on to officially open the new RSL building before proceeding to the Lake George Mine and inspecting the surface workings.¹³³

Several writers have referred to the 'countless victories' of the rugby league team. It could boast the scalps of all other contenders in the local competition, which included teams from Queanbeyan and Canberra, and won several premierships. The *Redmen*, as they were called, won their first premiership in the Group 8 competition against Goulburn, although finishing the game with only eleven players. In 1952 the team won the grand final against the Causeway, successfully defending their premiership again the following year. In 1957 they beat Queanbeyan, the junior team also winning the Group 8 grand final as well. With the decline of the town the team could no longer compete in Group 8 and entered the Group 19 competition. They won in 1978 against the Canberra Camels and again in 1979 against the ANU. In the 1950s there were also Boy Scout and Girl Guide companies with a Brownies pack and Cubs. The churches were also well represented and included buildings for the Anglican, Methodist, Catholic and Presbyterian congregations. In addition to the RSL and Worker's clubs the Kerr family billiard hall was converted into a worker's club in the early 1950s.¹³⁴

References

- ¹ *Goulburn Herald*, 29 May, 4, 11, 25, 28 August, 29 September 1858; *Queanbeyan Age*, 21 September 1871, 21 April, 15 May, 14 August 1875, 19 February 1876; *Australian Town and Country Journal*, 11 March 1876.
- ² *Goulburn Evening Post*, 31 May, 21 July 1881.
- ³ *Goulburn Evening Post*, 13 May 1882; *Queanbeyan Age*, 28 July 1882.
- ⁴ *Queanbeyan Age*, 22 March 1883, 28 November, 5, 19 December 1884; *NSW Annual Report*, 1883, p.83; 1884, p.82.
- ⁵ *NSW Annual Report*, 1885, p.77.
- ⁶ *Queanbeyan Age*, 29 April, 1 July, 3, 24 August, 1886, 7, 18 September, 11 November, 21 December 1886, *NSW Annual Report* 1886, p.76; 1887, p.81.
- ⁷ *Queanbeyan Age*, 7, 18 September 1887, 29 February, 19 March, 4 April, 23, 30 May, 27 June, 3 August 1888; *NSW Annual Report*, 1888, p.91.
- ⁸ *Queanbeyan Age*, 29 May 1889, *Braidwood Dispatch*, 11 May, 3, 24, 27 August, 26 October, 6 November; *NSW Annual Report*, 1889, pp.91-92.
- ⁹ *NSW Annual Report*, 1890, p.97; *Queanbeyan Age*, 5 February 1890; *Australian Town and Country Journal*, 28 March 1891.
- ¹⁰ *NSW Annual Report*, 1894, p.27; *Cooma Express*, 12 August 1893; *Braidwood Dispatch*, 28 October, 11 November, 9 December 1893.
- ¹¹ *NSW Annual Report*, 1895, p.24; *Queanbeyan Age*, 21 September 1895, 18 July, 15 August, 9 September, 5 November 1896.
- ¹² Ian McShane, 'Sticht, Robert Carl (1856-1922)', *Australian Dictionary of Biography, 1891-1939*, Smy- Z, Vol.12, John Ritchie (ed), Melbourne University Press, Carlton, 1990, pp.93-94.
- ¹³ D.D. Peters, *Modern Copper Smelting*, Hill Publishing Company, New York, 1907, pp.372-425; Carne, *The Copper Mining Industry and the Distribution of Copper Ores in New South Wales*, NSW Department of Mines, Geological Survey, Mineral Resources No.6, Sydney, 1908, pp.24-30.
- ¹⁴ *Town and Country Journal*, 7 August 1897.
- ¹⁵ *Queanbeyan Age*, 27 February, 13 March, 5 May 1897; *Town and Country Journal*, 7 August 1897.
- ¹⁶ *Braidwood Dispatch*, 26 October 1898; *Queanbeyan Age*, 1, 22 October 1898.
- ¹⁷ *Queanbeyan Age*, 3 December 1898, 5 April, 3 September, 7 October 1899; *Braidwood Dispatch*, 2 September 1899.
- ¹⁸ *Queanbeyan Age*, 5 March 1900, 12 December 1900, 5 June, 19 October 1901, 1, 10 October 1902, 7 January, 21 February 1903; 4 April, 23 June 1905.
- ¹⁹ *Queanbeyan Age*, 15 February 1888; Bede Nairn, Geoffrey Serle, *Australian Dictionary of Biography, 1891-1939*, vol.11, Nes-Smi, Melbourne University Press, 1988, pp.106-107; *Braidwood Dispatch*, 2, 27 September, 9 December 1893.
- ²⁰ *Queanbeyan Age*, 21 August 1897; *Braidwood Dispatch*, 18 September 1897, 9 February 1898, 28 June 1899.
- ²¹ *Queanbeyan Age*, 21 December 1886, *Braidwood Dispatch*, 29 November 1893; John Dean, Captain's Flat, privately published paper, 2001, p.14, 17.
- ²² *Queanbeyan Age*, 4 April 1888, 8 October 1892, 16 January, 27 July, 3, 6 August 1898; *Braidwood Dispatch*, 27 September 1893, 26 October 1898.
- ²³ *Queanbeyan Age*, 3 June 1904, 27 February, 1 June 1906, 20 November 1906, 22 February 1907.
- ²⁴ *Queanbeyan Age*, 1 October 1902, 19 March 1907, 17 March 1908.
- ²⁵ J. Pola to G. Miller, MP, 17 February 1914; petition to Minister for Public Instruction, undated; W. Ballard to G. Miller, MP, 15 September 1914; W. Ballard to Minister for Public Instruction, 16 September 1914; G. James to Chief Inspector, 17 October 1914, 4 November 1914, Department of Public Instruction, 5/15292.2, SRCNSW, Sydney.

- ²⁶ *Queanbeyan Age*, 27 May, 24 August 1886; J.McDonagh to Postmaster General, 2 February 1887, E. O'Sullivan to Postmaster General, 17 August 1887, SP 32/1, Box 106, NAA, Sydney.
- ²⁷ *Braidwood Dispatch*, 27 July, 6 November 1889.
- ²⁸ *Queanbeyan Age*, 12 October, 23 November 1895, 27 August 1898, 11 March, 27 September, 7 October 1899; E. Keys to W. Cooper, District Inspector, 29 March 1897, Department of Public Instruction, 5/15292.2, SRCNSW, Sydney *Braidwood Dispatch*, 11 October 1893.
- ²⁹ *Queanbeyan Age*, 28 July, 17 November 1882.
- ³⁰ *Goulburn Evening Penny Post*, 29 May 1886; *Queanbeyan Age*, 24 August 1886; 27 May 1898; E. O'Sullivan to Postmaster General, 17 August 1887, SP 32/1, Box 106, NAA, Sydney.
- ³¹ *Braidwood Dispatch*, 29 August 1888; E. O'Sullivan to J.Inglis, Minister for Public Instruction, 27 August 1888, 5/15292.2, SRCNSW, Sydney.
- ³² E. O'Sullivan to Postmaster General, 16 July 1889, W. Arrowsmith to the Secretary, GPO, 7 February, 18 July 1889, SP 32/1, Box 106, NAA, Sydney; *Braidwood Dispatch*, 11 May, 27 July 1889. According to the NSW Department of Mines the population, including children, was 650. *NSW Annual Report*, 1889, pp.91-92.
- ³³ J. Filshie to the NSW Department of Public Instruction, 29 September 1890, 5/15292.2, SRCNSW, Sydney; Inspector Tucker to Secretary, GPO, 4 December 1890, SP 32/1, Box 106, NAA, Sydney.
- ³⁴ T. Stokes to Secretary, GPO, 31 December 1891, SP 32/1, Box 106, NAA, Sydney; petition from Captain's Flat residents to the Minister for Public Instruction, undated, but in July 1892, 5/15292.2, SRCNSW, Sydney.
- ³⁵ *Cooma Express*, 12 August 1893; *Queanbeyan Age*, 21 March 1894; *Braidwood Dispatch*, 15 September 1894.
- ³⁶ *Queanbeyan Age*, 12 October 1895, 5 November 1896
- ³⁷ *Cooma Express*, 19 May 1897.
- ³⁸ *Braidwood Dispatch*, 7 July 1897; *Town and Country Journal*, 7 August 1897; John Dean, *Captain's Flat*, unpublished private paper, p.33, 37-38.
- ³⁹ *Braidwood Dispatch*, 22 September 1897; T. Stokes to Deputy Postmaster General, 30 September 1897, SP 32/1, Box 106, NAA, Sydney.
- ⁴⁰ *Braidwood Dispatch*, 10 November 1897.
- ⁴¹ *Queanbeyan Age*, 7, 10 September, 1 October 1898; *Braidwood Dispatch*, 12 October 1898.
- ⁴² *Queanbeyan Age*, 19, 27 September, 7 October 1899.
- ⁴³ *Queanbeyan Age*, 12 May 1900, 3 March 1901.
- ⁴⁴ *Queanbeyan Age*, *Queanbeyan Age*, *Queanbeyan Age*, 1 October 1902, 7 January, 21 February, 9 May 1903
- ⁴⁵ *Queanbeyan Age*, 20 November 1906, 22 February 1907.
- ⁴⁶ *Queanbeyan Age*, 24 April 1908.
- ⁴⁷ *Queanbeyan Age*, 5 November 1911.
- ⁴⁸ *Queanbeyan Age*, 26 March 1912.
- ⁴⁹ *Braidwood Dispatch*, 10 November 1897.
- ⁵⁰ Letter to the Editor, *Braidwood Dispatch*, 10 May 1893.
- ⁵¹ *Braidwood Dispatch*, 24 July 1889, *Cooma Express*, 12 August 1893.
- ⁵² *Queanbeyan Age*, 12, 15 October 1898.

- ⁵³ *Queanbeyan Age*, 7, 14, 28 October, 4 November 1899.
- ⁵⁴ New South Wales Department of School Education, *Government Schools of New South Wales 1848 to 1993*, Sydney 1993, p.46; Inspector Dawson to District Inspector Dwyer, Department of Public Instruction, 24 May 1884, petition to the Minister for Public Instruction, July 1889, Inspector Willis to District Inspector Dwyer, 12 August 1889, 5/15292.2, SRCNSW, Sydney.
- ⁵⁵ *Braidwood Dispatch*, 16 September 1893; *Town and Country Journal*, 17 August 1897; *Queanbeyan Age*, 5, 29 April, 16 September 1899.
- ⁵⁶ *Queanbeyan Age*, 21 December 1886, 27 May, 29 November, 9 December 1893, 15 May, 21 September 1895.
- ⁵⁷ *Braidwood Dispatch*, 28 October, 11, 29 November 1893; *Queanbeyan Age*, 20 February 1897, 27 July 1898, 3 September 1899.
- ⁵⁸ *Queanbeyan Age*, 1 July 1886, 6 November 1889, 6 February 1895, 6, 27 August, 24 September 1898, 3 September 1899.
- ⁵⁹ *Queanbeyan Age*, 5 October 1898, 21, 28 October 1899.
- ⁶⁰ *Queanbeyan Age*, 27 February 1900, 27 February 1906, 4 October 1910, 26 March 1912.
- ⁶¹ *Queanbeyan Age*, 25 March 1903, 3 June 1904, 10 February 1905, 13 March 1906, 2 February 1907, 20 March, 29 May 1908.
- ⁶² *NSW Annual Report*, 1934, p.25, 1935, p.24, 1936, p.24; *Queanbeyan Age*, 12 March 1937.
- ⁶³ *NSW Annual Report*, 1937, p.17, 61; 1938, p.53; *Queanbeyan Age*, 2, 30 April 1937.
- ⁶⁴ *NSW Annual Report*, 1938, pp.17, 52-53.
- ⁶⁵ *NSW Annual Report*, 1939, pp.19-20; A.G. Palmer, *Lake George Mines Pty Ltd, Captain's Flat, N.S.W., Mining Methods and Statistical data 1939 to 1948*, GS1948/063, (R00028834), pp.17-25.
- ⁶⁶ Palmer, *Lake George Mines Pty Ltd, Captain's Flat, N.S.W.*, pp.17-24; *NSW Annual Report*, 1938, p.53.
- ⁶⁷ *Cooma Monaro Express*, 10 January 1941.
- ⁶⁸ Palmer, *Lake George Mines Pty Ltd, Captain's Flat, N.S.W.*, pp.41-44; *Queanbeyan Age*, 30 October 1939.
- ⁶⁹ *Cooma Monaro Express*, 10 January 1941.
- ⁷⁰ NSW Department of Mines, *Summary of the Reports of the Department of Mines New South Wales, for the years, 1939-1945 inclusive*, Sydney, 1946, pp.22-24; *Queanbeyan Age*, 26 March 1943.
- ⁷¹ *NSW Annual Report*, 1946, pp.16-17, 1948, 14, 31-32, Palmer, *Lake George Mines Pty Ltd, Captain's Flat, N.S.W.*, pp.41-42; *Queanbeyan Age*, 22 October 1948, *Canberra Times*, 20 October, 4 November 1948.
- ⁷² *NSW Annual Report*, 1949, pp.14-15; 1950, pp.24-25; *Queanbeyan Age*, 7 January, 3 May 1949.
- ⁷³ *NSW Annual Report*, 1952, pp.27-28; 1953, 28-29; 1954, pp.25-26; 1955, p.31.
- ⁷⁴ *NSW Annual Report*, 1961, pp.38-39.
- ⁷⁵ *NSW Annual Report*, 1962, pp.38-39
- ⁷⁶ Barry Craze, 'Restoration of Captain's Flat Mining Area', *Soil Conservation Journal of New South Wales*, 1977, Vol.33, pp.98-105.
- ⁷⁷ Joint Government Technical Committee on Mine Waste Pollution of the Molonglo River, *Mine Waste Pollution of the Molonglo River: Final Report on Remedial Measures, June 1974*, Department of Capital Territory, Canberra, 1974, pp.3-4.
- ⁷⁸ *Mine Waste Pollution of the Molonglo River*, pp.3-4; Craze, 'Restoration of Captain's Flat Mining Area', pp.98-105; B. J, Fitzgerald, 'Mine Water Pollution in the Lake Burley Griffin Catchment', *Captain's Flat Mine Waste Dumps Remedial Works*, Ancold, November 1975, pp.1-2; Helen Hunt, 'You cant' have it both ways at Captain's Flat', *Heritage Australia*, Winter 1988, pp.14-16.
- ⁷⁹ *NSW Annual Report*, 1938, p.52.

- ⁸⁰ *NSW Annual Report*, 1948, pp.31-32.
- ⁸¹ Palmer, *Lake George Mines Pty Ltd, Captain's Flat, N.S.W*, pp.46-47.
- ⁸² Palmer, *Lake George Mines Pty Ltd, Captain's Flat, N.S.W*, p.47.
- ⁸³ *Queanbeyan Age*, 10 August 1943, 28 July 1944, 5 April 1949; *Captain's Flat Mining Record*, 3 October 1981, p.4.
- ⁸⁴ *Queanbeyan Age*, 12, 22, 29 May, 4 September 1953.
- ⁸⁵ *Queanbeyan Age*, 14 July 1953.
- ⁸⁶ *Queanbeyan Age*, 17 July, 4 September 1953.
- ⁸⁷ *Queanbeyan Age*, 4 September 1953.
- ⁸⁸ *Queanbeyan Age*, 27 November 1953.
- ⁸⁹ *Queanbeyan Age*, 18, 22, 30 December 1953, 8, 15 January 1954.
- ⁹⁰ *Queanbeyan Age*, 5, 12, 23 March 1954.
- ⁹¹ *Queanbeyan Age*, 28 May, 15, 18, 25 June 1954.
- ⁹² *Queanbeyan Age*, 31 August, 3, 7 September, 1 October 1954.
- ⁹³ *Queanbeyan Age*, 26 October, 9, 19, 26 November 1954, 25 January, 4 February 1955.
- ⁹⁴ *Queanbeyan Age*, 10 July, 9 August, 23 September, 25 November 2 December 1955, 1 June, 31 August 1956, 28, 31 May 1957.
- ⁹⁵ *Queanbeyan Age*, 2 February, 6 December 1957, 1 September, 6 December 1959, 22, 25 March 1960.
- ⁹⁶ *Canberra Times*, 18 March, 28 May, 27 August 1937; *Queanbeyan Age*, 8 October 1937.
- ⁹⁷ *Braidwood Dispatch*, 20 July 1937, 27 August 1937; *Braidwood Review*, 3 August 1937.
- ⁹⁸ *Canberra Times*, 18 March, 28 May, 28 July 1937; *Queanbeyan Age*, 30 April, 13 August, 21 September 1937; *Braidwood Dispatch*, 6 April 1937, 7 January 1938.
- ⁹⁹ *Queanbeyan Age*, 7 January 1938
- ¹⁰⁰ *Queanbeyan Age*, 12 April, 13 May 1938.
- ¹⁰¹ *Canberra Times*, 16 July, 18 August 1938; *Queanbeyan Age*, 23 August, 18 September 1938.
- ¹⁰² *Braidwood Review*, 26 July 1938.
- ¹⁰³ *Braidwood Dispatch*, 21 October 1938; *Braidwood Review*, 22 November 1938.
- ¹⁰⁴ *Queanbeyan Age*, 30 January, 14 May 1940, 29 April, 30 May 1941, 23 June 1942; 26 May, 20, 30 June, 18, 28 July, 11 August 1944.
- ¹⁰⁵ *Queanbeyan Age*, 4 March, 30 August, 29 September 1949, 21 February 1950, 14 September 1951, 25 August 1953, 29 January 1954.
- ¹⁰⁶ *Queanbeyan Age*, 9 December 1949, 4 May 1951, 3 November 1953, 12 January 1954.
- ¹⁰⁷ *Queanbeyan Age*, 26 March, 7 May, 29, 30 July 1954.
- ¹⁰⁸ *Queanbeyan Age*, 3, 6, 13, 31 August 1954
- ¹⁰⁹ *Queanbeyan Age*, 22 July, 2, 23 September, 11 October, 22 November, 9 December 1955
- ¹¹⁰ *Queanbeyan Age*, 21 September, 12 October 1956, 5 February, 15 March, 18 October, 19, 22 November, 6 December 1957.
- ¹¹¹ *Queanbeyan Age*, 15 July 1958, 12, 15, 19 May 1959
- ¹¹² *Queanbeyan Age*, 1, 29 September, 20 October 1959, 19 January, 12 April, 17 May 1960
- ¹¹³ *Queanbeyan Age*, 7, 14 June 1960.

- ¹¹⁴ *Queanbeyan Age*, 26 July 1960.
- ¹¹⁵ *Queanbeyan Age*, 20, 27 June 1961.
- ¹¹⁶ *Queanbeyan Age*, 18 July, 1, 22, 26 September, 10 October, 7 November 1961.
- ¹¹⁷ *Queanbeyan Age*, 14 November, 1, 19 December 1961, 9, 23 January 1962.
- ¹¹⁸ *Queanbeyan Age*, 13, 16, 23, 27 February 1962.
- ¹¹⁹ *Queanbeyan Age* 13, 16, 20, 27 March, 3, 10 April 1962.
- ¹²⁰ *Queanbeyan Age*, 17 April, 8, 18 May 1962.
- ¹²¹ *Queanbeyan Age*, 18 May, 5, 19 June, 10 July, 28 August, 2 October 1962.
- ¹²² *Queanbeyan Age*, 20, 23 November, 11 December 1962.
- ¹²³ *Queanbeyan Age*, 5, 12 February 1963.
- ¹²⁴ *Canberra Times*, 8 February 1963.
- ¹²⁵ *Queanbeyan Age*, 29 January, 26 February 5, 19, 26 March, 16, 28 April 1963.
- ¹²⁶ *Queanbeyan Age*, 14, 17, 28 May, 18 June 1963.
- ¹²⁷ *Captain's Flat Mining Record*, 3 October 1981.
- ¹²⁸ *Braidwood Dispatch*, 28 May, 31 May, 27 August 1937
- ¹²⁹ *Canberra Times*, 9 November 1937, 7 January 1938.
- ¹³⁰ *Queanbeyan Age*, 3 December 1937; *Canberra Times*, 18 December 1937.
- ¹³¹ *Queanbeyan Age*, 20, 27 June 1961.
- ¹³² *Queanbeyan Age*, 26 May, 20, 30 June, 18, 28 July, 11 August 1944
- ¹³³ *Queanbeyan Age*, 29 June, 8 January, 26, 29 July, 13 August 1957.
- ¹³⁴ Susan Pryke, *Boom to Bust - and Back Again, Captain's Flat from 1883...*, Captain's Flat Residents & Ratepayers Association, Captain's Flat, 1996, pp.31-37; 66-74; *The Captain's Flat Mining Record*, 4 October 1980.



ghd.com

→ **The Power of Commitment**