6.12 Contamination

This section provides a summary of the assessment of potential contamination impacts during construction and operation of the proposal and identifies mitigation measures to address these impacts. A stage 1 contamination assessment has been completed as part of this REF and is presented in the technical working paper – contamination (Appendix N).

6.12.1 Methodology

The Stage 1 contamination assessment involved the following:

- A desktop review of available information relevant to each of the four design sections to understand the site history, existing environment and potential risk for contamination. The assessment was completed for the area generally within 500 metres of the construction footprint ('the study area') and included a review of:
  - Landform topography, drainage, geology, soils (including erosion hazard, acid sulfate soils risk and salinity potential), hydrogeology and receiving environments in the study area
  - Site history including historical aerial photographs (from each decade from 1950 to 2005 (where available) and available aerial imagery services (Google Earth and SIX Maps)
  - Publicly available information from the NSW Environment Protection Authority, the Commonwealth Scientific and Industrial Research Organisation 'Australian Soil Resource Information System' database and the former NSW Department of Primary Industries groundwater database
  - A review of previous publicly available contamination investigations undertaken for other proposals within the vicinity of the construction footprint
- Site inspection in April 2021 of the construction footprint, nearby land uses and potential areas of environmental concern (areas with known or potential contamination associated with current or historical land uses)
- A high level risk prioritisation exercise to:
  - Identify areas of environmental concern (with respect to contamination)
  - Identify unmitigated risks to environmental and human receptors
  - Consider the nature of proposed construction activities
  - Determine the level of risk that the proposal could intersect areas of potential contamination
- Identification of appropriate mitigation and management measures, or where further investigation or remediation may be required.

6.12.2 Existing environment

Site history

Historical aerial photographs were reviewed for the years 1958, 1966, 1975, 1989, 1994 and 2005. The aerial photography review focused on the study area to identify potential sources of contamination. There are limitations to the depth of this historical review based on the availability and quality of historical imagery for the study area.

A summary of the historical aerial review findings for each design section is presented in Table 6-111.

Table 6-111 Historical aerial photograph review for each the proposals

Site	Year	Description of changes to surrounding area
Little Hartley to River Lett and Coxs River Road	1958	Primarily agricultural (farmland), several farm buildings, bushland, some residential buildings and several churches.
	1966	Increase in agricultural use and construction of water storage dams on farms
	1975	Further increase in agricultural use including clearing of trees and larger water storage dams. New road constructed near Hartley historic village
	1989	Continued expansion of agricultural uses including some additional clearing.
	1994	No major changes. Little Hartley Airfield established.
	2005	No major changes. Some land clearing.
River Lett to Forty Bends	1958	Primarily agricultural (farmland), several farm buildings, bushland, some residential buildings and several churches.
	1966	Increase in agricultural use and construction of water storage dams on farms
	1975	Further increase in agricultural use including some clearing of vegetation
	1989	Continued expansion of agricultural uses. Additional houses constructed adjacent to roads.
	1994	No major changes.
	2005	No major changes.
Forty Bends to Lithgow	1958	Primarily agricultural (farmland), several farm buildings, bushland, some residential buildings and several churches.
	1966	Increase in agricultural use and construction of water storage dams on farms
	1975	Further increase in agricultural use including some clearing of vegetation
	1989	Continued expansion of agricultural uses. Increase in residential land use in Lithgow.
	1994	No major changes.
	2005	No major changes.

Database searches

A search of the NSW EPA Contaminated Sites Record of Notices (under Section 58 of the *Contaminated Land Management Act 1997)* and the list of contaminated sites notified to the NSW EPA (under Section 60 of the *Contaminated Land Management Act 1997)* was carried out in March 2021 and identified one site; the Shell Coles Express Service Station on the Great Western Highway in South Bowenfels, approximately 50 metres north west of the Lithgow end of the Forty Bends to Lithgow section.

A search conducted on 25 March 2021 of the NSW EPA Protection of the Environment Operations (POEO) Act public register (under Section 308 of the POEO Act 1997) indicated there were no sites within the study area that have current environmental protection licences (EPL).

One site, Little Hartley airfield, located to the south west of Little Hartley and shown in Figure 6-55, was identified as a potential PFAS source. Further consideration during the site inspection indicated that there

does not appear to be large scale fuel storage and it is unlikely that aviation fire training activities occurred at the site.

6.12.3 Potential impacts

Construction

Based on the findings of the desktop review and site inspections, a number of potential contamination sources (Areas of Environmental Interest – AEIs) have been identified within the study areas. A high level prioritisation exercise was undertaken to understand the interaction of the construction activities and the AEIs and to categorise (very low, low, moderate, high and very high) the associated contamination risks.

The high level prioritisation for each of the proposals is provided in Section 5 of Appendix N. Construction areas and activities that were identified as having a medium to high contamination impact are outlined below for each proposal. A Detailed Site Investigation would be carried out prior to construction to better understand the nature and extent of contamination in accordance with the NEPM (2013) and other guidelines made or endorsed by the NSW EPA.

Little Hartley to River Lett and Coxs River Road

The following construction areas or activities within the construction footprint for the Little Hartley to River Lett section and the Coxs River Road section have been identified as having a moderate to high contamination impact potential:

- Cutting, bridge construction (potential piling) and construction of water quality control basins near Coxs River Road have a high impact potential to construction worker health, operational users and the environment associated with soil and/or groundwater contamination and contaminated vapour that may be present from underground fuel storage associated with the former service station adjacent to the alignment
- Disturbance of soil stockpiles is considered to represent a moderate impact potential to construction worker health or the environment (if contamination is present)
- Disturbance of soil near and within the former Little Hartley Airfield is considered to represent a moderate impact potential to construction worker health or the environment (if contamination is present)
- If groundwater is intersected within the cut adjacent to the Hartley Cemetery, contamination (if present) is considered to represent a moderate risk to construction worker health or the environment, and operational users if ongoing seepage within the cut occurs
- Disturbance of soil through agricultural areas is considered to represent a moderate impact potential to construction worker health or the environment if waste dumping/burial, sheep/cattle dips, septic tanks and chemical or fuel use and storage are disturbed during construction.

Figure 6-55 shows the location of AEIs within or immediately adjacent to the Little Hartley to River Lett and Coxs River Road construction footprint.

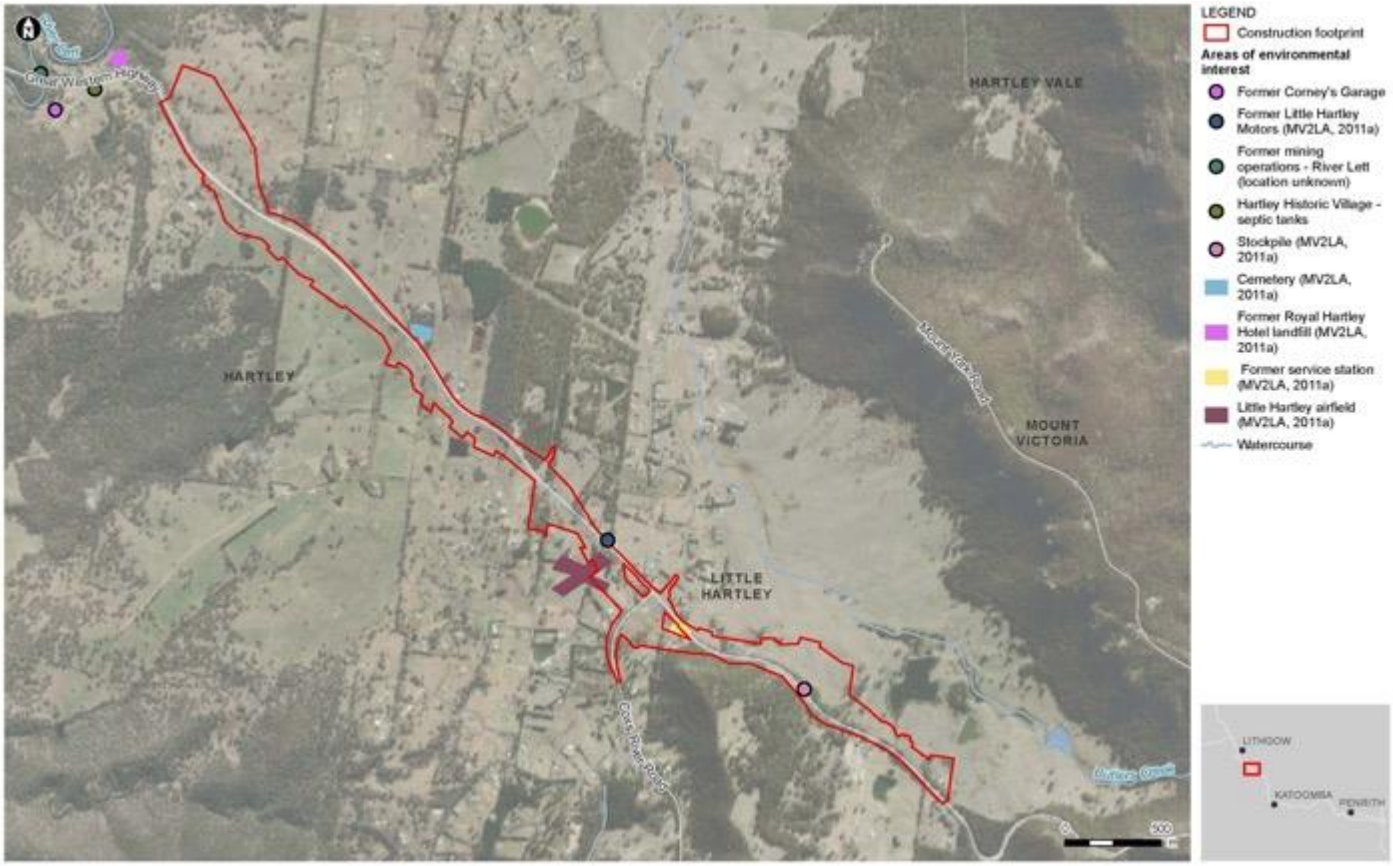

Figure 6-55 Areas of environmental interest within Little Hartley to River Lett and Cox River Road construction footprint

River Lett to Forty Bends

The following construction areas or activities within the River Lett to Forty Bends construction footprint have been identified as having a moderate to high contamination impact potential:

- Disturbance of contaminated soil or groundwater (if present) in the vicinity of River Lett (cutting or construction of the new bridge) or as a result of ongoing groundwater seepage during operation due to historic mining operations (exact location unknown) has been assessed as representing a moderate impact potential to construction worker health, the environment or ongoing operations
- Disturbance of soil stockpiles is considered to represent a moderate impact potential to construction worker health or the environment (if contamination is present)
- Disturbance of soil through agricultural areas is considered to represent a moderate impact potential to construction worker health or the environment if waste dumping/burial, sheep/cattle dips, septic tanks and chemical or fuel use and storage are disturbed during construction.

Figure 6-56 shows the location of AEIs within or immediately adjacent to the River Lett to Forty Bends construction footprint.

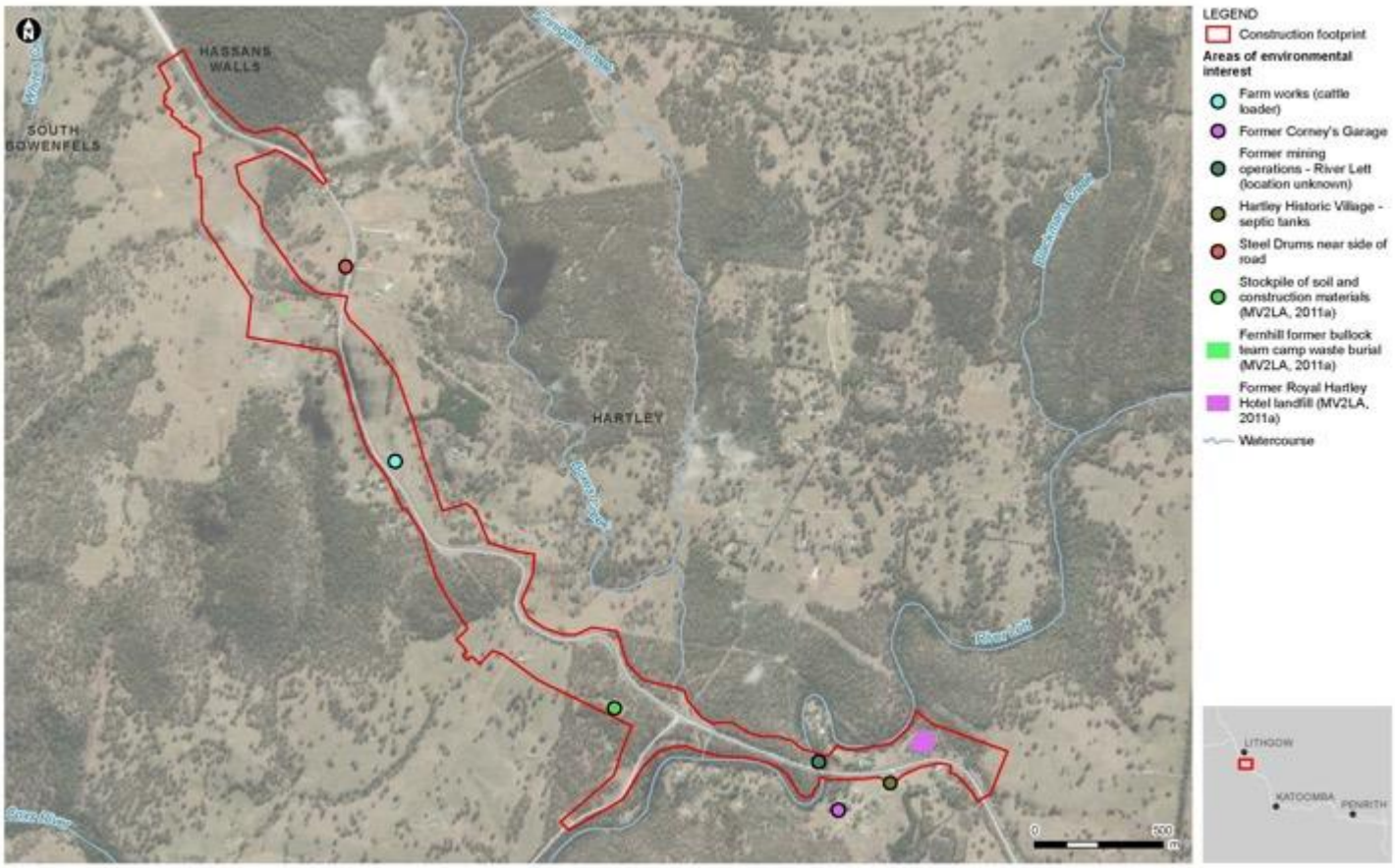

Figure 6-56 Areas of environmental interest within River Lett to Forty Bends construction footprint

Forty Bends to Lithgow

The following construction areas or activities within the Forty Bends to Lithgow construction footprint have been identified as having a moderate to high contamination impact potential:

- Previously reported groundwater contamination from the former service station in South Bowenfels has been assessed as representing a moderate impact potential to construction worker or environmental health
- Disturbance of soil stockpiles is considered to represent a moderate impact potential to construction worker health or the environment (if contamination is present)
- Disturbance of soil through agricultural areas is considered to represent a moderate impact potential to construction worker health or the environment if waste dumping/burial, sheep/cattle dips, septic tanks and chemical or fuel use and storage are disturbed during construction.

Figure 6-57 shows the location of AEIs within or immediately adjacent to the Forty Bends to Lithgow construction footprint.

Figure 6-57 Areas of environmental interest within Forty Bends to Lithgow construction footprint

Operation

Soil contamination

Environmental management plans would need to be prepared and implemented during operation of the proposal where existing soil contamination is to be managed on site, for example reuse of potentially contaminated stockpiled material. Implementation of appropriate environmental management plans would reduce the potential impacts from contaminated soil associated with the operation of the proposal.

There is potential for traffic accidents to result in contamination as a result of spills and leaks from ruptured fuel tanks, spillage of hazardous load being carried by a vehicle (ie fuel, chemicals) and use of firefighting foam or fire retardants after an accident. Potential impacts would be managed via the existing emergency response procedures using Transport emergency response teams.

Groundwater contamination

Where existing groundwater contamination is identified within and/or adjacent to the operational areas of the proposal, appropriate engineering controls would need to be installed to either remove the risk of contaminated groundwater ingress (namely seepage of contaminated groundwater from cuttings) or manage the risk to receptors via appropriate treatment prior to disposal, discharge or reuse. Implementation of appropriate engineering controls would reduce the potential impacts from contaminated groundwater to the operation of the proposal and receptors from discharge.

Potential contamination of groundwater within and directly adjacent to the proposal could occur as a result of spills and leaks of hydrocarbons from vehicles and accidents during operation.

Vapour

Where soil or groundwater contamination with volatile chemicals is present within and/or adjacent to the operational areas of the proposal, appropriate engineering controls would be installed to reduce the ongoing risk of vapour ingress during operation of the proposal. Engineering controls could include surface or sub-surface extraction, or remediation of the contaminated soil or groundwater. Implementation of appropriate engineering controls would reduce the potential impacts from vapour to the operation of the proposal.

6.12.4 Safeguards and management measures

Table 6-112 Safeguards and management measures - contamination

No	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
CN01	Detailed site investigation	A Detailed Site Investigation (DSI) is being undertaken prior to construction to better understand the nature and extent of contamination in accordance with the NEPM (2013) and other guidelines made or endorsed by the NSW EPA.	Contractor	Prior to construction	Appendix N	To be determined
CN02	Management of low risk contamination	Where site investigation data confirms that contamination is likely to have a very low, low or moderate impact potential, the site would then be managed in accordance with Construction Environmental Management Framework.	Contractor	Prior to construction	Appendix N	All
CN03	Remediation Action Plan	If identified as required following detailed site investigations, a Remedial Action Plan (RAP) would be developed for identified risk areas within the construction footprint. Each RAP would detail the remediation works required to	Contractor	Prior to construction	Appendix N	To be determined

No	Impact	Environmental safeguards	Responsibility	Timing	Reference	Locations
		mitigate risks from contamination throughout and following completion of construction. The RAP would be prepared in accordance with relevant NSW EPA guidelines and where applicable, detail remediation methodologies in accordance with Australian Standards and other relevant government guidelines and codes of practice.				
CN04	Site audit statement	If identified as required following detailed site investigations, an accredited Site Auditor would review and approve the RAP and remediation activities and will develop a Site Audit Statement (SAS) and Site Audit Report (SAR) upon completion of remediation.	Contractor	Prior to construction	Appendix N	To be determined
CN05	Residual contamination following construction	Ongoing management and monitoring measures would be documented in an appropriate form, for example an environmental management plan, and implemented for any areas where minor, residual contamination remains following construction.	Contractor	Construction	Appendix N	All

Other safeguards and management measures that would address contamination impacts are identified in sections 6.6 Soils and surface water and 6.7 Groundwater.