6.4 Soils

This section summarises the results of a desktop investigation of the soils and geology underlying the proposal area, as well as a Contaminated Soils Phase 1 Assessment which is provided in Appendix K.

6.4.1 Methodology

The desktop investigation of soils included a review of publicly available information to obtain an understanding of the geological formations and soils landscapes within the proposal area. The Contaminated Soils Phase 1 Assessment was prepared (refer to Appendix K) in order to identify potential sources of contamination within or in proximity to the proposal area.

The methodology for the Contaminated Soils Phase 1 Assessment included:

- A review of the land use history of the proposal area through the review of publicly available information including historic aerial photography
- A review of geotechnical investigations for the proposal (Douglas Partners, 2019)
- Development of a conceptual site model to describe potential sources of contamination, pathways by which contaminants may be transmitted through the environment and the receivers that may be exposed to the contaminants
- A qualitative risk assessment based on the conceptual site model
- Identification of environmental safeguards to manage potential contamination impacts.

6.4.2 Existing environment

Soils and geology

Reference to the 1:250 000 scale Singleton Geological Sheet SI/56-01 (Rasmus et al 1969), indicates the proposal is underlain by a number of different rock types including a series of faulted folded sedimentary deposits of the Permian age, generally assigned to the Maitland Group.

The Maitland Group consists of the following identified geological units (in descending geological age):

- Quaternary Sediments gravel, sand, silt clay
- Mulbring Sandstone siltstone and sandstone
- Muree Sandstone sandstone and conglomerate
- Branxton Formation mudstone, sandstone and conglomerate.

To the north-west of the proposal area, the Singleton Coal Measures overlies the Maitland Group and comprises sandstone, shale, mudstone, conglomerate and coal seams, the latter of which has been historically mined. The Quaternary Sediments are associated with the southern section of the proposal area near the Hunter River as it traverses through Singleton.

The 1:250 000 scale Singleton Soil Landscape Map (DLWC 1991) shows that soils in the southern section of the proposal area are part of the Hunter Soil Landscape and are generally fertile alluvial soils, brown clays, black earths and red podzolic soils. The fertile alluvial soils are well suited to cropping and grazing (DPI, 2013). The northern section of the proposal that intercepts McDougalls Hill is associated with the Sedgefield Soil Landscape and is characterised by yellow soloths, black soloths and yellow solodic soils.

Acid sulphate soils are not identified in the proposal area by publically available acid sulphate soils mapping including the Singleton LEP. The results of the geotechnical investigations for the proposal (Douglas Partners (2019)) identified:

- The soils and groundwater below the water table are not acidic
- The bedrock at the bridge over the floodplain and deep excavations at McDougalls Hill presents a low risk as a potential acid sulphate soil source as indicated by the low sulphur and net acid generation test results, and excess acid neutralising capacity
- The bedrock beneath the southern end of the proposal presents a higher risk of potential acid sulphate soil materials being present due to the high total sulphur contents and low pH.

Salinity

Dryland salinity has been observed in the Upper Hunter area, however no salinity hazard maps are listed in the Singleton LEP. The Salinity hazard report for Catchment Action Plan upgrade – Hunter-Central Rivers CMA (Nicholson et al., 2012) identified a high hazard risk of salinity around the township of Singleton, with land along the New England Highway identified as being of a very high salinity hazard.

Contamination

The Contaminated Soils Phase 1 Assessment identified the following potential contamination sources within or in proximity to the proposal area:

- Rix's Creek Mine to the north of the proposal area
- Heavy machinery and equipment maintenance businesses potentially storing fuels and chemicals adjacent to the proposal area in the north and west, including Maitland Diesel Service and Complete Parts and Equipment Solutions
- Motor vehicle servicing and sales businesses potentially storing fuels and chemicals adjacent to the proposal area in the north west and south east, including Singleton Toyota and Lancaster Motor Group
- Caltex Service Station storing fuel adjacent to the proposal area in the north-west
- New England Highway and additional collector roads which connect throughout the proposal area
- Main North railway line which traverses the southern portion of the proposal area and the eastern boundary of the proposal area
- Fill containing potential asbestos containing material and a water main lined with potential asbestos, within the rail corridor in the north-east section of the proposal area
- Mines Rescue Station located to the east of the northern section of the proposal area
- Concrete batch plant adjacent to the proposal area to the east
- The former Singleton Gasworks which is an EPA listed site declared for remediation and is located to the east of proposal area on John Street
- Roads and Maritime Singleton Maintenance Depot located to the west of the proposal area which stores fuels and chemicals and may potentially store waste spoil stockpiles
- Market Gardens within the proposal area, north of Putty Road which may potentially store chemicals and fuels from machinery refuelling and maintenance
- Excess nutrient and microbial loading in the subsurface environment from evaporation ponds within Singleton Sewerage Treatment Plant located south of the proposal area
- Historical storage and use of unknown chemicals/fuels in the operational Singleton Sewerage Treatment Plant
- Agricultural land use, including pastoral land
- Houses and buildings within the proposal area potentially containing asbestos.

The potential contamination sources are shown in Appendix K.

The proposal area includes the following sensitive receptors:

- Human receptors within and adjacent to the proposal area including:
 - Construction workers for the proposal
 - Commuters using the existing New England Highway, surrounding public roads, Singleton Train Station and the proposal during operation
 - o Recreational users of Rose Point Park, the Hunter River and nearby public recreation areas
 - Workers within the commercial and industrial areas of Singleton and McDougalls Hill
 - Agricultural industry utilising land adjacent to the proposal area for market gardens and pastoral use
 - Groundwater users
 - Residents in the surrounding areas.
- Ecological receptors within and adjacent to the proposal area including:
 - Surface water (e.g. Hunter River)
 - o Groundwater
 - o Native vegetation and wildlife
 - Agricultural land.

6.4.3 Potential impacts

Construction

Erosion and sedimentation

The proposal would involve removal of top soil, earthworks associated with filling for the new road and stockpiling of spoil for construction. If not adequately managed, earthworks, stockpiling and transportation of spoil could potentially have the following impacts:

- Erosion of exposed soil and stockpiled materials
- An increase in sediment loads entering nearby watercourses.

With the implementation of erosion and sedimentation control outlined in Section 6.3.4, potential construction related erosion and sedimentation impacts would be appropriately managed and would be minor.

There is a low risk of encountering acid sulphate soils during construction of the proposed works given that excavations would be carried out to a maximum depth of 15 metres and the probability of acid sulphate soils in the area is low.

Salinity

The construction of the proposal has the potential to exacerbate dryland salinity in the proposal area where the groundwater table is impacted by construction works. Given impacts to the groundwater table are anticipated to be minor as described in Section 6.4.3, the proposal is unlikely to contribute to dryland salinity.

Contamination

Existing contamination present within soils or groundwater in the proposal area has the potential to be exposed or disturbed during construction activities. The demolishment of existing houses, buildings and the former rail corridor has the potential to disturb asbestos containing material. The Contaminated Soils Phase 1 Assessment identified that overall there is a moderate risk of contamination from a range of potential contaminants and sources within and adjacent to the proposal area that may present an unacceptable risk

to human health and/or the environment. Contamination risks would be managed in accordance with the environmental safeguards provided in Section 6.4.4.

Soil contamination could occur as a result of any accidental spills or leaks of fuels, oils and other chemicals from equipment and vehicles during construction. To avoid this potential impact, fuels and chemicals would be managed in accordance with the management measures provided in Section 6.4.3.

Operation

During the operation of the proposal, the risk of soil erosion would be minor as all areas impacted during construction would be sealed or rehabilitated and landscaped to prevent soil erosion from occurring.

There are minor contamination risks associated with the operation of the proposal which would be limited to:

- Spills from industrial heavy vehicles such as oil tankers
- Accidents from general motorists causing oil and petrol spills.

Spills and other contamination sources during operation would be appropriately managed by implementing standard emergency spill environmental safeguards.

6.4.4 Safeguards and management measures

Environmental safeguards provided in Table 6-13 would be implemented to minimise potential impacts related to soils and contamination.

Measures to manage erosion and sedimentation are listed in Section 6.4.3.

Table 6-14: Summary of environmental safeguards to minimise impacts to soils and contamination

Impact	Environmental safeguards	Responsibility	Timing
Contamination	The CEMP will include an unexpected finds protocol for potentially contaminated material encountered during construction work.	Construction contractor	Construction
Contamination	 If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. This may include but not be limited to: Diversion of surface runoff Capture of any contaminated runoff Temporary capping. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Roads and Maritime Environment Manager and/or the EPA.	Construction contractor	Construction
Contamination	An Asbestos Management Plan will be developed and implemented to manage asbestos and asbestos containing material if encountered during the construction. The plan	Construction contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	 will include: Identification of potential asbestos on site Procedures to manage and handle any asbestos Mitigation measures if asbestos is encountered during construction Procedures for disposal of asbestos in accordance with NSW EPA guidelines, Australian Standards and relevant industry codes of practice. 		
Soils	An Acid Sulfate Materials Management Plan will be prepared and implemented as part of the CEMP. The Plan will be prepared in accordance with the RTA Guidelines for the Management of Acid Sulfate Materials.	Construction contractor	Construction