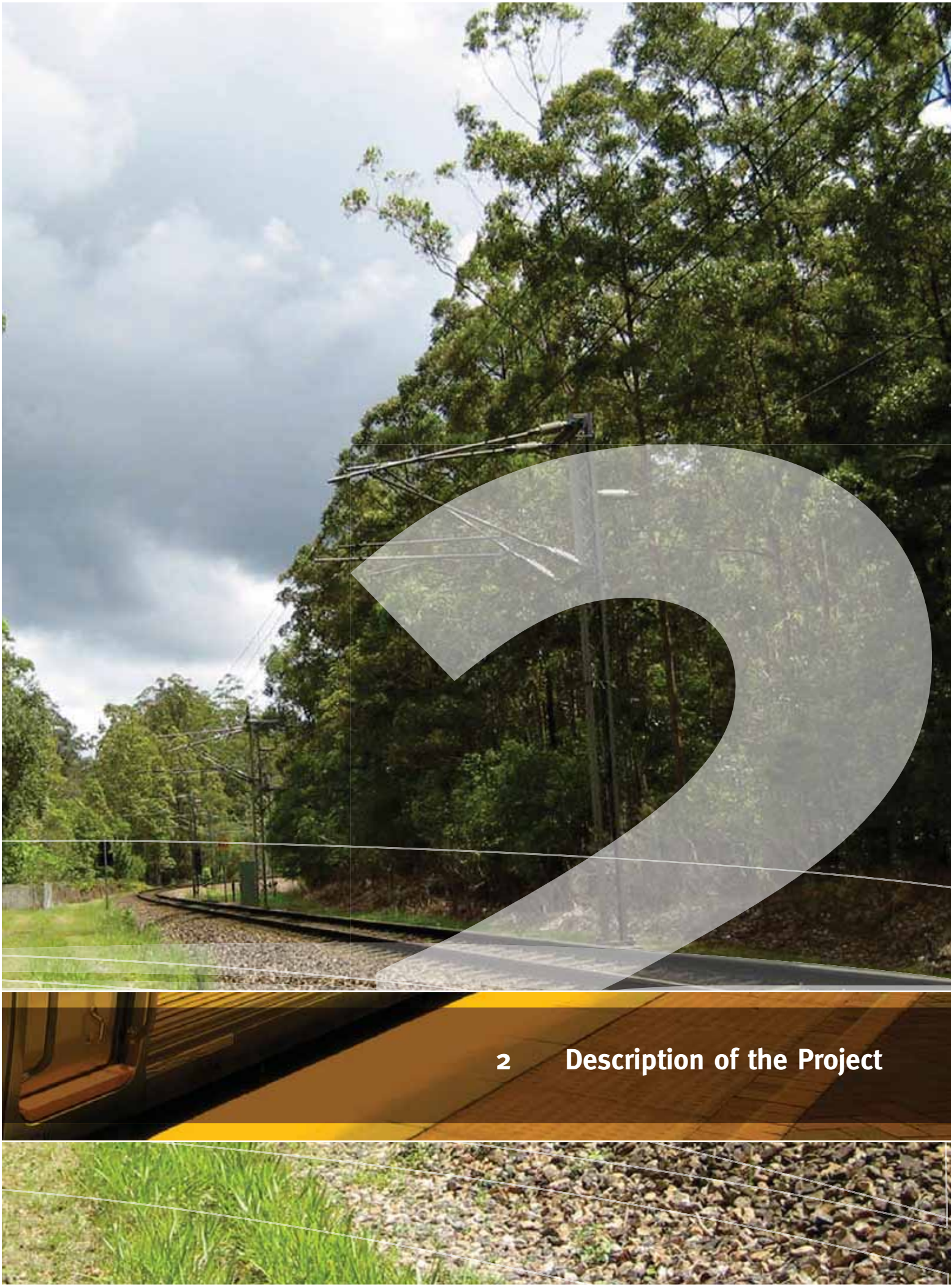

2 Description of the Project

This chapter of the EIS provides an overview of the project including:

- its location
- its physical description
- broad introduction to the land use, environmental, social, economic and transport impacts and benefits
- the route identification process
- the process for construction and implementation
- operation of the railway
- decommissioning of the project.

2.1 Project location

The project involves the upgrade of 22 kilometres of the NCL between Landsborough and Nambour, in the Sunshine Coast hinterland. The NCL runs from Brisbane, along the Queensland coast through the towns and cities of Gympie, Bundaberg, Rockhampton, and Townsville to Cairns.

The project begins directly north of Landsborough station, passing through the towns of Mooloolah (Mooloolah Valley), Eudlo, Palmwoods, Woombye, and ending at Nambour station.

The upgrade of the NCL between Caboolture and Landsborough is being undertaken. No upgrade to the NCL is currently planned to the north of Nambour, as the existing infrastructure is presently considered sufficient to meet current and future demand.

2.2 Overview of the project area

Most of the land within the project area is freehold land in private tenure. Several parcels of State-owned land are also situated in the area. Lands leased include the existing railway corridor and the lawn bowls club in Woombye. There are two national parks within the project area, Dularcha National Park, and Eudlo Creek National Park, as well as the Marie Higgs Conservation Park. Further information about tenure, including supporting mapping, is found in **Chapter 3, Land use and infrastructure.**

Land use in the project area is characterised by residential development clustered around economic and community services centres in each of the towns, ranging from a shop and school in Eudlo to a major shopping precinct in Nambour with several major retail precincts. The density of residential development disperses on the town fringes into a rural landscape, which comprises mostly rural residential allotments. Much of the land between the town centres is protected from urban development through its inclusion in the Regional Landscape and Rural Production Area in the SEQ Regional Plan; and this designation is reflected in the local government planning schemes. This land primarily comprises smaller rural holdings and rural residential uses. Dominant rural activities include fruit farming, dairy and horse studs. **Chapter 3, Land use and infrastructure** describes in more detail the land uses and land tenure in the project area, including mapping.

The project area contains many significant environmental values from an ecological perspective. A large portion of the project area is vegetated to some extent, especially in the southern and central portions between Landsborough and Palmwoods. The majority of this vegetation is recognised as remnant vegetation and is protected under the *Vegetation Management Act 1999*[1]. The vegetation in this area is generally in good condition and well connected and therefore has excellent habitat qualities. The Biodiversity Planning Assessment (BPA) mapping has recognised the significance of the remnant vegetation and has classified a large portion of it as being of 'State significance' or 'Regional significance'. There are two national parks (Dularcha and Eudlo Creek) and a smaller conservation park (Marie Higgs Conservation Park), which are located within the project area. A review of the WildNet database (Department of Environment and Resource Management, 2007) indicates that many significant species are located in the area.

North of Palmwoods, the landscape is dominated by residential and rural uses and there appears to be less vegetation. Vegetation in the northern portion of the site is largely represented in small isolated clumps and along creek lines, including Paynter Creek and Petrie Creek. The Maroochy Biodiversity Strategy recognises parts of the northern portion of the project area as 'mosaic habitat'. Much of the remnant vegetation north of Palmwoods has been classified as Remnant Of Concern and some Endangered regional ecosystems. Paynter and Petrie Creek are recognised as being of State significance in the Biodiversity Planning Assessment mapping, due to their use as core habitat by threatened species (under the Nature Conservation (Wildlife) Regulation 2007). They also play a critical role as a wildlife movement corridor on a local scale. Further information including maps and descriptions about environmental values in the project area are discussed in **Chapter 11, Nature conservation: Terrestrial flora, Chapter 12, Nature conservation: Terrestrial fauna, Chapter 13, Aquatic ecology, and Chapter 21, Special management areas.**

2.3 The project

The project also includes the following:

- maintenance and emergency service access within the corridor
- reprovision of roads impacted by the project
- grade separation options for the provision of grade separated road/rail crossings at Gympie Street North in Landsborough and Mooloolah Connection Road/ Brays Road in Mooloolah
- construction of new stations at Mooloolah, Eudlo, Palmwoods and Woombye
- upgrade of Nambour station facilities, including additional platforms and the upgrade of the disabled access to current standards

1 Several areas within the project area are identified on Department of Environment and Resource Management 'Moratorium Maps' as 'Moratorium Regrowth Vegetation areas'. These areas are likely to be subject to further legislative protection in the future.

- provision of pedestrian access, public transport interchange, car parking and station access
- reprovision of private access to properties whose current access arrangements are affected by the railway corridor
- relocation of public utilities impacted by the project
- tunnels south of Mooloolah and south of Eudlo
- decommissioning of unused sections of the existing railway corridor.

These features are indicated on **Figure 1.2a.**

The project is shown **Drawings C001** to **C028**[2] (four track) and **Drawings C101** to **C128**[3] (two track initial arrangements). Details of road realignments are provided in **Drawings SK001** to **SK012**. Both the four track and the two track initial arrangements are referred to in the description of the project, as explained below:

- The 'four track' arrangement has been the basis of the determination of physical impacts, environmental impacts, and land requirements for the rail corridor.
- The 'two track' arrangement shows what is planned for the construction of the project.

2.3.1 Landsborough to Mooloolah (chainage 81800 to 86200)

The project starts directly north of Landsborough Station, at approximately chainage 81800 and deviates from the existing alignment at chainage 82000, as shown in **Drawing C001**. North of the project starting point at chainage 82200, the project crosses Gympie Street North. Future grade separation of this crossing point is planned, with a proposed arrangement that maintains the road network and pedestrian connectivity shown in **Drawing C001** and **SK001**. Continuing north, the project crosses Addlington Creek, with a fauna passage structure allowing for fauna movement. Two drainage lines are then crossed, with a culvert and fauna culverts proposed at chainage 82600, shown on **Drawing C002**.

The project begins to deviate away from the existing corridor to the east, from chainage 82800, shown in **Drawing C002**.

The project travels on the eastern side of the existing rail corridor through Dularcha National Park, for a distance of approximately 700 metres. It then closely follows the existing corridor for approximately 600 metres, and then shifts to the east, and crosses the existing corridor at chainage 84600, shown in **Drawings C004 and C005**. The project then passes under the ridge at Rose Road, initially in a cut and cover tunnel section of approximately 170 metres, before entering a 250 metre long twin tunnel (two tracks each, separated by 20 metres), approximately 20 metres to the west of the existing railway tunnel.

2 Drawing C001 shows the four track, and Drawing C101 shows the two track arrangements, and so on.

3 As discussed in section 2.3.2, from south of Mooloolah Station to 500m south of the Eudlo tunnel, the initial construction is proposed to be a three track arrangement.

The proposed tunnel arrangements are shown on **Drawings C005 and C006**. Shorter length tunnels were proposed in previous draft preliminary design issues, however the tunnels have since been lengthened with a cut and cover section, and the extent of cuttings to the approaches reduced. This has resulted in a reduced direct land requirement, improved habitat connectivity and reduced extent of earthworks.

Approaching Mooloolah, the project is on the west of the existing railway. A 40 metre long bridge is proposed for the crossing of a tributary of the south branch of the Mooloolah River, shown in **Drawing C006**.

2.3.2 Mooloolah to Eudlo (chainage 86200 to 89800)

At chainage 86200, shown on **Drawing C007**, the project aligns with the existing rail corridor south of the southern branch of the Mooloolah River. A 50 metre long bridge is proposed for this river crossing. The project then continues through Mooloolah, following the existing rail corridor to just north of the existing Mooloolah Station. The project has undergone significant refinement through Mooloolah, since the release of the township options discussed in **Section 1.9** of this EIS.

The proposed layout through Mooloolah allows for the reduction of the corridor's width and an optimal track and station layout, which minimises the land requirements for the project. To achieve this reduced land requirement area, an initial three track layout is proposed from chainage 86400, on **Drawing C107**, to chainage 88600, on **Drawing C109**. This three track configuration passes from south of Mooloolah Station, through the station, and on to a point 500 metres before the next tunnel, at The Pinch Lane. It consists of the construction of a new track on the western side of the existing two tracks. Allowance for a future fourth track is provided to the east of the two existing tracks. This initial three track configuration allows for a central through running track, and an eastern and western side track, serviced by two side platforms. The eastern platform would serve as a future island platform, if and when the fourth, easternmost track is implemented. The initial three track configuration through Mooloolah minimises the footprint of the initial and future station and railway land requirements, by allowing for only three platforms in the ultimate configuration. The existing western track will become a through running track providing additional capacity for express or non-stop services when operational requirements require it.

The initial three track layout is shown in **Drawing C107** and the ultimate four track layout is shown in **Drawing C007.** This proposed layout would allow the land requirements for the ultimate four track corridor to be identified and protected until the fourth track is required and the land resumed. This will allow the retention of the existing commercial property on the corner of Karanne Drive and Mooloolah Connection Road, until the need for the fourth track is identified.

An additional operational benefit of this three track configuration is that this third through-running track (i.e. does not allow for stopping at Mooloolah platforms) could be used as a passing loop, providing additional capacity for express or non-stop services. Alternate platform and track configuration layouts have been considered, however the footprint of these alternatives was greater than the proposed layout through Mooloolah.

As shown in **Drawing C008**, the project is on structure (a bridge) for approximately 290 metres (from chainage 86950 to 87240), passing over a realigned section of Neill Road and the Mooloolah River, to the west of the existing railway. Specific environmental management measures for the crossing of the Mooloolah River are specified **in Chapter 21, Special management areas.**

The project then passes through an undulating area including a drainage line associated with the Mooloolah River, between chainage 87240 and 87750. It then passes under Neill Road in cut, approximately 9 metres below the existing surface level, at chainage 87850, as shown on **Drawing C009**. Neill Road would be reinstated with a bridge over the cutting, in a similar location to the existing road.

Continuing north, **Drawing C009** shows the project passes through another significant cut, between chainage 88100 and 88200, approximately 11 metres below surface level. It then runs parallel along the western side of the existing railway, between chainage 88300 and 89100, on the approach to the Eudlo tunnel, at The Pinch Lane, shown in **Drawing C010** and **C011.** A 240 metre long cut and cover tunnel is proposed (between chainage 89130 and 89370), followed by a 310 metre long twin tunnel (between chainage 89370 and 89680) and a second shorter cut and cover section of 50 metres (between chainage 89680 and 89730). In total, the length of the cut and cover and tunnel section is approximately 600 metres, shown in **Drawings C010** and **C011.** The new tunnel is located approximately 70 metres to the west of the existing railway tunnel.

Proposed grade separation option at Mooloolah

Preservation of a grade separation option at Mooloolah to the south of the open level crossing (OLC) utilising Jones Street has been identified for future implementation at such time as risk and traffic congestion considerations determine the need closure of the OLC. The proposed grade separation option is identified in **Drawing C007, C107**, and **SK003a** and **SK003b**. The proposed grade separation option is an overpass, which starts at Mooloolah Connection Road, follows Way Street to the south, passing through the existing station car park area, and rising on structure to achieve clearance over the railway of 6.7 metres. As the railway is in a slight cutting in this area, and natural surface rises up to the west of the existing track, the overpass is approximately two metres above the ground at its highest point, from the western side. Design speeds on the curve of the overpass are 50 km/hr. The proposed grade separation option then clears the railway, and begins to descend, running parallel to Jones Street (within existing railway reserve) and grading down to rejoin Jones Street, just to the south of Hatten Street. This proposed grade separation option requires traffic on Jones Street to be diverted via Hatten Street, allowing a left in/right out movement at the intersection of Jones and Hatten Street.

Realignment of Neill Road and the Mooloolah river crossing

Neill Road would be realigned under the proposed railway, as shown in **Drawings C007, C008** and **SK003a** and **SK003b**. The realignment of Neill Road has been designed to provide clearance of 5.5 metres, and immunity to at least the 20 year ARI (average recurrence interval) flood event[4]. Neill Road will need to be realigned prior to construction of the rail through this area.

2.3.3 Eudlo to Palmwoods (chainage 89800 to 95900)

Continuing north from the tunnel, the project continues north on the west side of the existing railway. It travels on a section of cut, up to eight metres deep, and then enters a section of embankment, at chainage 90200, shown on **Drawing C012.** It then continues north on a bridge structure, between chainage 90400 and 91000, crossing over Logwoods Road (providing clearance of 5 metres), drainage lines associated with Eudlo Creek, and Highlands Road (providing clearance of 5.5 metres), shown on **Drawing C013**. The new Eudlo Station is proposed immediately north of Highlands Road, between chainage 91000 and 91200, shown on **Drawing C013**. The ultimate four track platform arrangement allows for two side platforms, and an island platform. The initial two track construction (the project) allows for the eastern two tracks, the eastern side platform, and the central island platform (to be configured initially as the western side platform, until such time that the third and fourth tracks are required). The two track platform arrangements are shown on **Drawing C113.**

Continuing north from the proposed new Eudlo Station, the project is on bridge structure from chainage 91280 to 91490 on **Drawing C113**. This bridge section crosses Eudlo Creek, and an associated drainage line. Continuing north, a short section of embankment is proposed, between chainage 91490 and 91510, on **Drawing C114**. A cut section is proposed, between chainage 91510 and 91710, approximately 200 metres long. Eudlo School Road would be reinstated over the top of this cut section.

The project then travels on a short section of embankment (approximately 80 metres) and then enters a section of cut (approximately 280 metres) before entering a cut and cover tunnel section, between chainage 92070 on **Drawing C014**, and chainage 92300 on **Drawing C015.**

4 By comparison, other sections of this road currently have a lower flood immunity than this realigned section area

The existing Palmwoods West to Maroochydore Energex 132 kV transmission lines cross both the proposed rail corridor for the project and the existing railway at approx chainage 92200 to 92300, shown on **Drawing C015**. As noted in **Chapter 1**, the Suncoast power project proposes to duplicate the existing transmission lines in the existing easement. The project does not impact on the existing or proposed location of towers, and passes in cut and cover tunnel under the existing and proposed transmission lines. This area would require careful management during construction.

The project then crosses the Culgoa Road reserve, and continues north on embankment. A property access road passes under the project at chainage 92690, to maintain access to properties on the western side of the project, and to reconnect the Culgoa Road reserve to Paskins Road. The southernmost section of Paskins Road would also be realigned slightly, within the existing railway reserve, but remaining west of the existing railway. These arrangements are shown on **Drawing C015**.

At chainage 92970, the project enters an area of cut, of up to 16 metres, before crossing a drainage line, close to the natural surface level, at chainage 93150, shown on **Drawings C015** and **C016**. The project then continues in a further cut, of up to eight metres, crossing under the proposed realignment of Leeons Road.

The project then travels on embankment for approximately 150 metres, before entering a further area of cut, up to 19 metres at chainage 93700, shown on **Drawing C016**. The project then continues north in minor cut (between one and four metres), crossing the existing Paskins Road. The project then crosses the existing railway, at chainage 94340, at the same level, shown on **Drawing C017**.

Now on the eastern side of the existing railway, the project crosses the existing Eudlo Road, and enters a further significant cut, of up to 14 metres, shown on **Drawings C017** and **C018** (between chainages 94400 and 94880). The project then crosses the existing Eudlo Road again, and aligns with the existing railway, at chainage 95000, on **Drawing C018**.

Eudlo to Palmwoods road realignments

The following road realignments, reconnections or access reprovisions occur between Eudlo and Palmwoods:

- Eudlo School Road - road reinstated over cut section, at chainage 91630, on **Drawing C014**, and **SK004**
- property access and road reserve reprovision - Paskins Road, to Culgoa Road, at chainage 92700, on **Drawing C015**, and **SK005**
- Leeons Road and Toby Court - Leeons Road would cross the project on a bridge structure, maintaining connection to Toby Court. Toby Court would be extended through to Paskins Road, between chainages 93300 and 94300 on **Drawing C016**, and also on **Drawings SK006 and SK007**.
- Eudlo Road - road realigned to the east, shown in **Drawings C017, C018** and **SK008**.

2.3.4 Palmwoods to Woombye (chainage 95000 to 98400)

The project follows the existing rail corridor into Palmwoods for approximately 300 metres, between chainage 95000 and 95300 on **Drawings C018** and **C019**. It then shifts slightly to the east, with the proposed platforms located between chainage 95400 and 95580. The ultimate platform configuration for the four track corridor is two side platforms and an island platform, as shown in **Drawing C019**. The project would involve the construction of two tracks and two platforms. These are currently proposed to be the eastern tracks, the east side platform, and the central island platform, which would function initially as the western side platform, until such time that the third and fourth tracks are required on the western side. The proposed two track arrangements are shown on **Drawing C119**.

Continuing north, the project is on structure, for approximately 880 metres, between chainage 95520 and 96400, shown on **Drawings C019** and **C020**. This structure passes over the following:

- a realigned section of Chevallum Road, at a height of approximately 6 metres (chainage 95520, on **Drawing C019** and also on **Drawing SK009**)
- the Palmwoods Bowls Club car park, at a height of approximately 8.9 metres (chainage 95600, on **Drawing C019**)
- the Kolora Park 'duck ponds' at a height of approximately 12 metres (approx chainage 95700)
- the Woombye – Palmwoods Road at a height of 11 metres (chainage 95780, on **Drawing C019**)
- the existing railway, at a height of 8 metres (chainage 95900, on **Drawing C019**)
- a realigned section of Spackman Lane (chainage 96370 on **Drawing C020**, and **SK010**).

The project then continues in a small cut and then on embankment for approximately 1.5 kilometres (between chainage 96700 to 97110 on **Drawing C020 and C021**), crossing the existing Spackman Lane. It then continues on structure, between chainage 97110 and 97390 (approx 280 metres), on **Drawing C021**, in the area adjacent to Paynter Creek.

Between chainage 97400 and 97850 on **Drawing C021** and **C022**, the project is on embankment. After a small cut, it then continues on embankment and approaches Woombye Station, on the western side of the existing railway.

Road realignments – Palmwoods to Woombye

The following road realignments occur between Palmwoods and Woombye:

- Chevallum Road – As shown on **Drawing C019** and **SK009**, a section of Chevallum Road is proposed to be realigned and regraded within the existing road reserves. The road would

be regraded (lowered) by approximately one metre to achieve 6 metre clearance under the new railway structure. Property accesses along Chevallum Road would be maintained.

- Nicklin Road – the intersection of Nicklin Road and Chevallum Road would be realigned within existing road reserve, which is also shown in **Drawing C019** and **SK009**.
- Spackman Lane – the northern end of Spackman Lane would be realigned, passing from west to the east under the proposed rail structure, shown on **Drawing C020** and **SK010**. This underpass has a clearance of at least 5.5 metres.

2.3.5 Woombye to Nambour (chainage 98400 to 102700)

The project passes the town of Woombye on the western side of the existing railway. It is proposed to realign Back Woombye Road as a road bridge over both the existing railway and the project, removing the existing low height underpass at the northern end of the station. The proposed arrangements are shown on **Drawings SK011** and **C023**. A new station is proposed to the north of the new Back Woombye Road bridge, between chainage 98550 and 98720 on **Drawing C023**. The ultimate platform layout is proposed as two side platforms and an island platform. **Drawing C123** shows that the project would involve the construction of the eastern tracks, the eastern side platform and the island platform would form the western side platform, until such time that the third and fourth track are required.

Immediately north of the station, the project is on structure, crossing Paynter Creek, approximately 20-30 metres to the west of the existing railway bridge over Paynter Creek, shown on **Drawing C023**. Continuing north, the project runs adjacent on the western side to the existing railway, for approximately 400 metres, between chainages 98900 to 99300 on **Drawings C023** and **C024**, and then running within the existing railway reserve for approximately 250 metres, between chainages 99300 to 99550 on **Drawing C024**. The Blackall Range Road bridge would be replaced, as shown in **Drawing C024** and **SK012**. It then continues on the western side of the existing railway for approximately 750 metres, and then again runs within the existing railway reserve for another 450 metres. Between chainages 100800 and 101400 on **Drawings C026,** it again runs on the western side of the existing rail reserve, partly within the railway reserve, on structures between chainage 100860 and 101060, 101120 and 101230 and 101290 and 101340. This section is broken into three structures currently based on the ground levels and preliminary flooding information. The section of bridge between chainages 101120 and 101230 may not be required when detail design flood investigations are completed. Retaining walls are proposed on the western side of the project to minimise the encroachment into Petrie Creek, between chainages 101730 and 101990 and chainages 102020 and102260, on **Drawings C027** and **C028**. A retaining wall is also proposed on the eastern side between chainages 102310 and 102500. A new bridge over Arundell Avenue is proposed, to the west of the existing rail bridge over road.

For both the ultimate four track scenario (refer **Drawing C028**) and the two track scenario (refer **Drawing C128**), a new island platform on the western side, with a through running track between the island platform and the existing platform is proposed. This would provide a total of five tracks at Nambour station, four with platform access (including the existing dock road on the eastern side) and a through running track. North of Nambour station, the railway drops back to a single track corridor.

2.4 Design

Preliminary design has been undertaken and detailed design is anticipated to occur closer to the time of construction, up to two years prior to the construction start.

The following design standards have been established for the project:

- a high speed alignment (i.e. 160 km/hr desirable, 80 km/hr absolute minimum in constrained areas)
- design for two tracks plus access roads for maintenance and emergency services at formation level, allow corridor for up to four tracks
- maximum grade one in 100 in both directions
- planning for grade separated road/rail crossings
- minimise property impacts
- minimise environmental and social impacts
- identify staging opportunities
- identify potential sites for freight refuge/s
- flood immunity for new railway construction suitable for a 100 year Average Recurrence Interval (ARI)
- QR Limited Standard Track Formation Corridor Widths (sheet five of six, drawing no 2571)
- QR Limited Standard Clearances for Proposed Structures (drawing no 2461)
- former Queensland Department of Main Roads (now Department of Transport and Main Roads) standards for road network alterations (Road Planning and Design Manual, former Queensland Department of Main Roads).

Two tracks are proposed for construction as part of the project. However, the Route Identification Report identified a high quality railway corridor with capacity for up to four rail tracks and associated infrastructure and earthworks. This planning decision taken by the Queensland Government allows for the protection of a strategic public transport and freight corridor for the longer term, allowing for a third and fourth track to be developed within the corridor in the future without the need to acquire additional land, if and when further capacity is required. This planning decision also offers a greater level of certainty in the longer term development of land use surrounding the corridor.

Generally a 60 m wide corridor has been identified for the project. In some places, due to terrain or other infrastructure issues, a wider corridor has been identified, particularly where deeper cuttings, wider (and higher) embankments and road realignments are required. Narrower corridor requirements have been identified in places where significant lengths of structure, or particular land use constraints have been identified (i.e. township of Mooloolah), or where the local road network can provide an appropriate level of access for maintenance and emergency services.

The following design objectives and assumptions have been established for stations:

- stations to be located on a straight section
- extend station platforms to 150 metres to accommodate six car trains, with provision for further extension to 175 metres in the future if required (to accommodate seven car trains)
- upgrade pedestrian and disabled access to comply with current standards and the *Disability Discrimination Act 1992* (including lifts and pedestrian overbridges)
- new station buildings at Mooloolah, Eudlo, Palmwoods and Woombye
- car park and access upgrades
- station and car park lighting
- CCTV for stations and car parks
- emergency phone and communications
- provision for interchange connectivity with other public transport modes
- allowance for minimum four metres clearance between structures and edge of platform e.g. pedestrian lifts and stairs.

2.4.1 Energy and telecommunication requirements

Construction

Access to significant sources of power will be required to operate equipment, in particular tunnel excavation equipment, and transport materials, as well as for lighting, potential pumping and drainage and tunnel ventilation purposes. Worksites are proposed to be powered from the existing electricity grid, and be supplemented by generators where access to power sources is not available. Substations will be required to power the new railway, the specific location and number of which will be determined during the detailed design phase. It is anticipated these will be located within the existing rail reserve where possible and consideration will be given to surrounding land-uses to minimise disturbance to residential areas.

The QR Limited Network Access Brisbane Metropolitan System Information Pack (September 2007) sets out the communications requirements for services running in the Brisbane Metropolitan including UHF communications, and control phones at specific stations.

Communications and signalling systems for the project will be developed during the future detailed design phase. It is proposed that any infrastructure to support telecommunications should be located within the future rail corridor, wherever possible. Communications systems will need to conform to the QR Limited's Safety and Security Standard SAF/STD/0014/TEL - Mobile Voice Radio Communications Systems, as specified in the Metropolitan System Information Pack.

Impacts to existing telecommunications and energy infrastructure are discussed in **Chapter 3, Land use and infrastructure.**

Operation of the railway

Energy consumption for the operation of rail services within the project area has been estimated in **Table 2.4.1**. Energy consumption for electric powered trains is measured by calculating energy consumption at the pantograph, including auxiliary loads and recovered energy from dynamic/regenerative braking. Energy consumption for diesel powered trains is measured by litres of fuel consumed.

Table 2.4.1: Predicted energy consumption (by train type)

IMU (electric, kW/h)	
In Down	Out Up
511	496
Tilt train (electric, kW/h[5])	
In Down	Out Up
263	257
Traveltrain (diesel, L)	
In Down	Out Up
78	67
Intermodal (diesel, L)	
In Down	Out Up
163	164
Bulk (diesel, L)	
In Down	Out Up
133	134

(down = travel south to Roma Street, up = travel north)

Based on this table, projected annual energy/ fuel requirements have been estimated at:

- diesel (TravelTrain, Intermodal Freight, Bulk Freight): 2,572 kL
- electricity (IMU and electric TiltTrain): 17,039MW

The greenhouse gas emissions associated with this energy consumption are discussed in **Chapter 16, Air quality.**

Operation of stations

Stations will be connected to the local power grid/ network. Activities that would be expected to consume power at stations include:

5 Note: diesel tilt train has not been estimated

- station lighting (concourse, offices, toilets, car parks and security lighting for access ways)
- ticketing machines
- lifts (x 3 at most stations considered)
- vending machines
- public telephone
- communications.

Power consumption at the stations has been extrapolated from the *South West Rail Link Draft Carbon Strategy* project (unpublished, Arup for TIDC) which provides estimated energy consumption for stations designed at a base case (business as usual) scenario. It is understood that station design for this project may be quite different; however it does provide a basis upon which to make an initial estimation. The actual energy consumption of stations for this project may vary considerably from this estimation dependent on station size and materials used.

The power consumption for each station (without mitigation measures) has been estimated at 399,361.1 kWh per annum, based on work carried out for the Climate Change Impact Statement (CCIS) prepared by Arup (2009) for the Department of Transport and Main Roads.

Alternate energy sources are beginning to be incorporated into station design in Queensland, as evidenced by the new Varsity Lakes station on the Gold Coast line. The Varsity Lakes station has solar heating for hot water, and PV cells to supplement the station's electricity supply.

2.4.2 Water supply and management

Demand for water can be split into two clear stages for the project:

Construction activities

This is anticipated to include:

- cleaning of equipment
- dust suppression
- watering of revegetated areas
- potable water for construction workers (drinking, and supply to construction camps/office)
- in the case of emergency, fire fighting activities.

The project will comply with the QR Limited objective to carefully use water during the construction phase and control water usage by:

- using recycled water for construction purposes and utilising water tankers wherever possible
- sourcing water from council approved depots
- using only certified water transport companies
- preferring drought tolerant and sun-hardened plants for all landscaping
- not using potable (drinking standard) water at all on site for construction activities and landscaping.

The **Environmental management plans** included in **Chapter 22** set out a framework for the management of water resources during construction, including the minimisation of water use through design and selection of appropriate construction technologies and techniques, and the management of potential contamination risks. This includes environmental management measures for the storage of chemicals and fuels and the minimisation of waterborne erosion and sedimentation of waterways.

It is expected that water will be trucked to the construction site. Most water used on the site will be suitably treated to avoid contamination to waterways. Potable (treated) water will be required only for domestic use and will comply with Australian drinking guidelines. Therefore demand on municipal main supply is anticipated to be minimal. Extraction of raw water from watercourses and surface storage will be as a supplementary source only to minimise adverse environmental impacts and reduce demand on watercourses with existing water permits, especially in times of drought. Recycled water will be used where appropriate for cleaning of equipment, watering of revegetated areas and fire fighting activities.

In the case of water supply failure during construction, water-based dust suppression measures could be replaced by covering of exposed areas and limiting vehicle speeds on open roads. It may also be necessary to defer revegetation and cleaning of equipment to restrict water use. Fire fighting equipment will be available in close proximity to the construction areas in case of an emergency.

Operation of the railway

It is assumed that all stations will require a water supply for drinking water, toilets, station cleaning activities and in the case of emergency, fire fighting activities. Although design of the station buildings and features would be undertaken during the future detailed design phase, water saving and harvesting features are currently being incorporated into existing and new railway stations in Queensland, including the new Varsity Lakes station on the Gold Coast line. The Varsity Lakes station has been designed to capture rainwater from the station building, for watering station gardens and flushing toilets. It is anticipated that by the time stations are being designed and constructed, further advances in water saving technology will become standard for new railway stations.

Water supply and waste water requirements have been examined for each of the stations as follows:

- Mooloolah – likely to be readily connected to the existing water supply and sewer
- Eudlo – no water supply or sewer access. The station is unlikely to require toilet facilities.

- Palmwoods – likely to be readily connected to the existing water supply and sewer
- Woombye – the situation is similar to Eudlo, although the consideration could be given to extending the existing water supply and the sewer to service the station
- Nambour – upgrade of existing station, new facilities likely to be readily connected to the existing municipal water supply and sewer.

The existing water supply and sewer infrastructure is shown in **Drawings C029 to C034**. Mooloolah, Palmwoods, Woombye and Nambour are serviced by municipal water and sewer. In Eudlo, municipal water and sewer is not available, as shown on **Drawing C031**.

The need for additional water supply and waste water treatment is anticipated to commence at the time of station commissioning. Therefore by 2026 it is assumed that all stations would be operational. If sections of the project are commissioned in stages, the increased demand for water supply and treatment would come forward for those stations accordingly.

It is recommended that the design of stations incorporate water saving measures, including water sensitive urban design, rainwater collection and reuse, and water saving devices (i.e. low flow taps and toilets) into the future station design and specification.

The environmental management plans also establish design objectives for the minimisation of water use, and the incorporation of rainwater collection into the station infrastructure.

Detailed site layout plans for the project and station areas would be prepared during the detailed design phase, identifying sewage and stormwater management facilities, as well as objectives for stormwater discharge construction and operational stages. These areas are anticipated to be located within the station footprint areas, identified in **Drawings C001-C0028.**

In the case of water supply failure, rainwater harvested at the stations could be used to supplement supply. It may also be necessary to restrict water demand in accordance with QR Limited's procedures.

2.5 Construction

Drawings C101 to **C128** show the main construction elements, including tunnels and bridges, demolition of existing stations, new station locations, and road construction locations, for the construction of the project (i.e. two track construction).

The project is currently proposed to be operational by 2026, in accordance with the *South East Queensland Infrastructure Plan and Program 2008-2026* (SEQIPP), subject to whole-of-government priorities and funding availability. Preliminary cost estimates prepared for the project indicate that at 2008 dollars, construction costs (including land acquisition) is expected to be around $1.7 billion. No construction plan or program has been endorsed by government at the time of writing; however the following assumptions have been made to allow discussion of how the project could be constructed, in order to meet the planned operational timeframe of 2026.

2.5.1 Staging

As discussed, the Department of Transport and Main Roads has not committed to a construction start date for the project. It is considered likely that the project would be constructed in stages. To maximise the benefit of any stage of construction, it is essential that the stage constructed can be connected into the existing railway, to allow for services to use the new section of the railway once commissioned. The following staging options are suggested for the project.

Two stages, south to north

The Caboolture to Landsborough rail project, which is located directly to the south of the Landsborough to Nambour project, is being constructed in two stages, between Caboolture and Beerburrum (approximately 13.7 km) and Beerburrum to Landsborough (approximately 17 km). The Landsborough to Nambour project could be constructed in a similar way, between the following locations:

- between Landsborough and Eudlo, a length of approximately 9 km
- Eudlo to Nambour, a length of approximately 12 km.

To provide a basis for comparison, the Caboolture to Beerburrum upgrade has taken approximately two and a half years to construct, consisting of a 13.7 km section of two track railway, 4.8 km of road realignments, four new rail bridges, and one new road over rail bridge.

The Landsborough to Eudlo section of the project includes:

- four new rail bridges (one of which is 600 metres long)
- tunnels (including cut and cover tunnel sections associated with the tunnels)
- one significant road realignment (Neill Road)
- two possible grade separation options, at Gympie Street North and Mooloolah Connection Road.

The majority of the Caboolture to Beerburrum Rail project has occurred within or close to the existing rail corridor, which would have resulted in constructability penalties (time and cost), and limitations on when construction activities could occur. Approximately 60% of the project between Landsborough and Eudlo occurs away from the existing rail corridor, which will allow construction in these areas to progress without the constraint of having to maintain an operational rail corridor nearby.

The Eudlo to Nambour section of the project includes:

- eight new rail bridges (one of which is 830 metres long)
- one tunnel (including cut and cover tunnel sections associated with the tunnel)
- four significant road realignments (Paskins Road, Eudlo Road, Chevallum Road, Spackman Lane)

- six possible grade separation options, at Eudlo School Road, access to properties at Eudlo (approximate chainage 92700), Leeons Road, Back Woombye Road, Blackhall Range Road and Arundell Avenue.

Approximately 80% of the project between Eudlo and Nambour occurs away from the existing rail corridor, which will allow construction in these areas to progress without the constraint of having to maintain an operational rail corridor nearby.

The construction duration for the tunnel is currently unknown, as construction methods for the tunnels will be determined during future detailed design stages.

It is considered likely that the construction program for a two stage construction program could be similar to the program for Caboolture to Beerburrum, which has taken just over two and a half years. To be operational by 2026, the following schedule described in **Table 2.5.1a** could be considered:

Table 2.5.1a: Possible two stage construction (south to north)

Phase[6]	Stage A (Landsborough to Eudlo Station):	Stage B (Eudlo Station to Nambour)
Detailed Design	2018 - 2020	2020[7] -2022
Construction[8]	2020 – late 2022	2024 - 2025
Commissioning	late 2022	2025

At this early stage of the project, exact construction working hours are still to be confirmed. The basic principle to be observed will be that the construction program in proximity to residential areas would be considerate of the noise, dust, vibration and light impacts of the construction process and of access issues. Consideration will also be given to impacts to environmentally sensitive areas such as national parks by avoiding construction outside of daylight hours. Where the project is in proximity to sensitive receptors, construction will be generally limited to the following times:

- Monday – Friday, 0700 – 1800 hours
- Saturday, 0700 – 1300 hours.

However, construction will occasionally take place outside of normal working hours, in particular where the project could interfere with the operation of the existing railway. When construction is required outside of the 'standard hours', consultation with the affected residents will ensure that suitable mitigation measures are in place to minimise the disturbance and that the affected residents are fully aware of the times, duration and nature of the planned construction activities.

Staging by section

The staging by section concept is described in **Table 2.5.1b**, with reference to **Drawings C106 to C128**.

Staging by sections has been developed after a review of the locations where the new rail crosses the existing rail, at grades that would allow for temporary reconnection.

Table 2.5.1b: Staging by section

Section	Chainages	Length of section	Construction elements, issues
Landsborough to south of the South Branch of the Mooloolah River	chainage 82000 to 86250	4.2km	▪ construction within Dularcha National Park ▪ culverts over Addlington Creek ▪ bridge over tributary of South Branch of Mooloolah River ▪ construction of tunnel section (170m cut and cover, 250m tunnel) ▪ construction access gained via Steve Irwin Way, Tytherleigh Avenue, and Gympie Street north (construction to the south and north) and Mooloolah Connection Road, Jones Street, to the south. ▪ construction of the Gympie Street North grade separation options subject to decisions based on risk and future road traffic congestion
South of the South Branch of the Mooloolah River to south of the Eudlo Tunnel	chainage 85250 to 89000	3.7km	▪ bridge over the South Branch of the Mooloolah River ▪ construction within the existing rail corridor into Mooloolah Station ▪ construction of new station, car parking, lifts, platforms, access ▪ maintaining the existing railway and station operations throughout construction ▪ realignment of Neill Road (could be brought forward as an independent element) ▪ construction of the 290 metre long bridge over the Mooloolah River and Neill Road (south), with specific environmental management measures to be applied during construction (See **Chapter 21, Special management areas**) ▪ construction of the Neill Road (north) bridge over the rail ▪ construction of the Grade separation option at Moolooah subject to risk and traffic congestion in future

6 Subject to whole of government funding priorities and CBRC approval
7 Assumed detailed design team can continue on from design of Stage A
8 Including relocation of utilities and services

Table 2.5.1b: continued

Section	Chainages	Length of section	Construction elements, issues
South of the Eudlo Tunnel to south of Palmwoods	chainage 89000 to 94950	5.9km	▪ construction of the Eudlo tunnel section (140 metres cut and cover, 310 metres tunnel, 50 metres cut and cover) ▪ construction of bridge over tributaries of Eudlo Creek, Logwoods Road, Highlands Road and Eudlo Creek ▪ construction of new station, car parking, lifts, platforms, access ▪ construction of cut and cover tunnel under Eudlo School Road and reinstatement of Eudlo School Road ▪ construction of cut and cover tunnel, chainage 92100 north of Eudlo Station ▪ two significant cuts (11 metres and 18 metres) ▪ construction of Leeons Road bridge over rail ▪ realignment and extension of Toby Court through to Paskins Road ▪ realignment of Eudlo Road
Palmwoods to south of Blackall Range Road	chainage 94950 to 99500	4.5km	▪ realignment of a section of Chevallum and the Nicklin Road intersection ▪ construction of two new stations, car parking, lifts, platforms, access ▪ construction of a 880 metre long bridge over roads, parkland and significant water body (see **Chapter 21, Special management areas)** ▪ realignment of Spackman Lane ▪ construction of a 280 metre long bridge in the area adjacent to Paynter Creek, see **Chapter 21, Special management areas** for details ▪ construction of Back Woombye Road road bridge (over both existing and new rail)
Blackall Range Road to Nambour Station	99500 to 102700	3.2km	▪ construction of new Blackall Range Road bridge over rail ▪ construction in close proximity to operational rail ▪ construction of retaining walls and bridges in close proximity to Petrie Creek ▪ construction of new rail bridge over Arundell Avenue, to west of existing ▪ construction of new platforms, lifts, access, station buildings at Nambour Station.

The staging by section approach has the following benefits:

- ability to commence detailed design for multiple sections at once
- ability to gain incremental operational benefits from early construction of new railway (in particular, in areas where the existing railway has greatest horizontal or vertical geometry deficiencies)
- ability to schedule construction of similar elements sequentially, therefore maximising the efficiency of resource availability and transport requirements (e.g. tunnel sections to be constructed sequentially).

However, this approach could generate complexities during the detailed design phase, increase signalling complexities and require many deviations from the existing railway to the new railway, and cause additional operational risks by frequently changing speed environs.

2.5.2 Pre-construction activities

The following pre-construction activities need to occur for the project to proceed:

Detailed design

As noted in **Section 2.4**, preliminary design has been undertaken to determine the land requirements for the project, and to form the basis of this EIS. Detailed design will occur at a time closer to construction, the staging concepts outlined in **Section 2.5.1** indicate that for the project to be operational by 2026, detailed design should commence by around 2018, to allow enough time for the construction of the project.

Land acquisition

Prior to the construction of the railway, the land required for the project will be acquired by the Department of Transport and Main Roads. At the time of writing, it is envisaged that the land requirements will affect approximately 147 ha and 162 properties. Preliminary land requirements are shown on the drawings and final requirements will be confirmed as part of detailed design.

Property owners whose property has been identified as having a land requirement for the project may be eligible to apply to the Department of Transport and Main Roads for a hardship acquisition prior to formal resumptions being commenced around one to two years[9] prior to construction, in accordance with the *Transport Planning and Coordination Act 1994* and the *Acquisition of Land Act 1967*. The Hardship Acquisition Policy sets out the framework for the acquisition of property from property owners who are experiencing hardship as a result of the State government identifying a corridor for future public infrastructure. The Hardship Acquisition Policy only applies to landowners whose property has a known land requirement for the project.

The properties shown on **Figure 2.5** and listed in **Table 2.5.2** are impacted by land requirements for the project. Properties designated for railway purposes that form part of the existing rail corridor are not included in this list.

9 *subject to whole-of-government priorities and funding availability*

Figure 2.5: Affected Properties

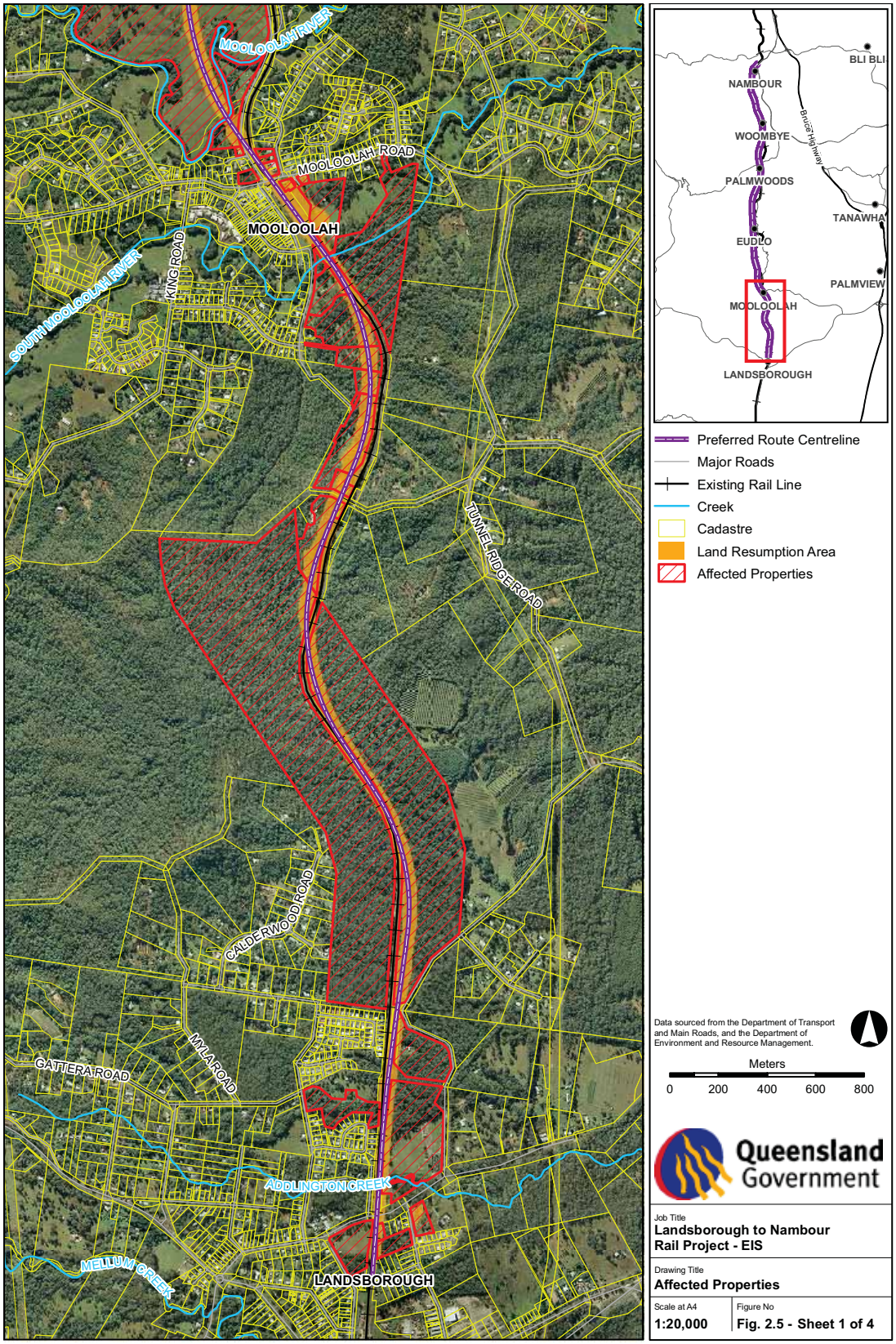

Figure 2.5: Affected Properties

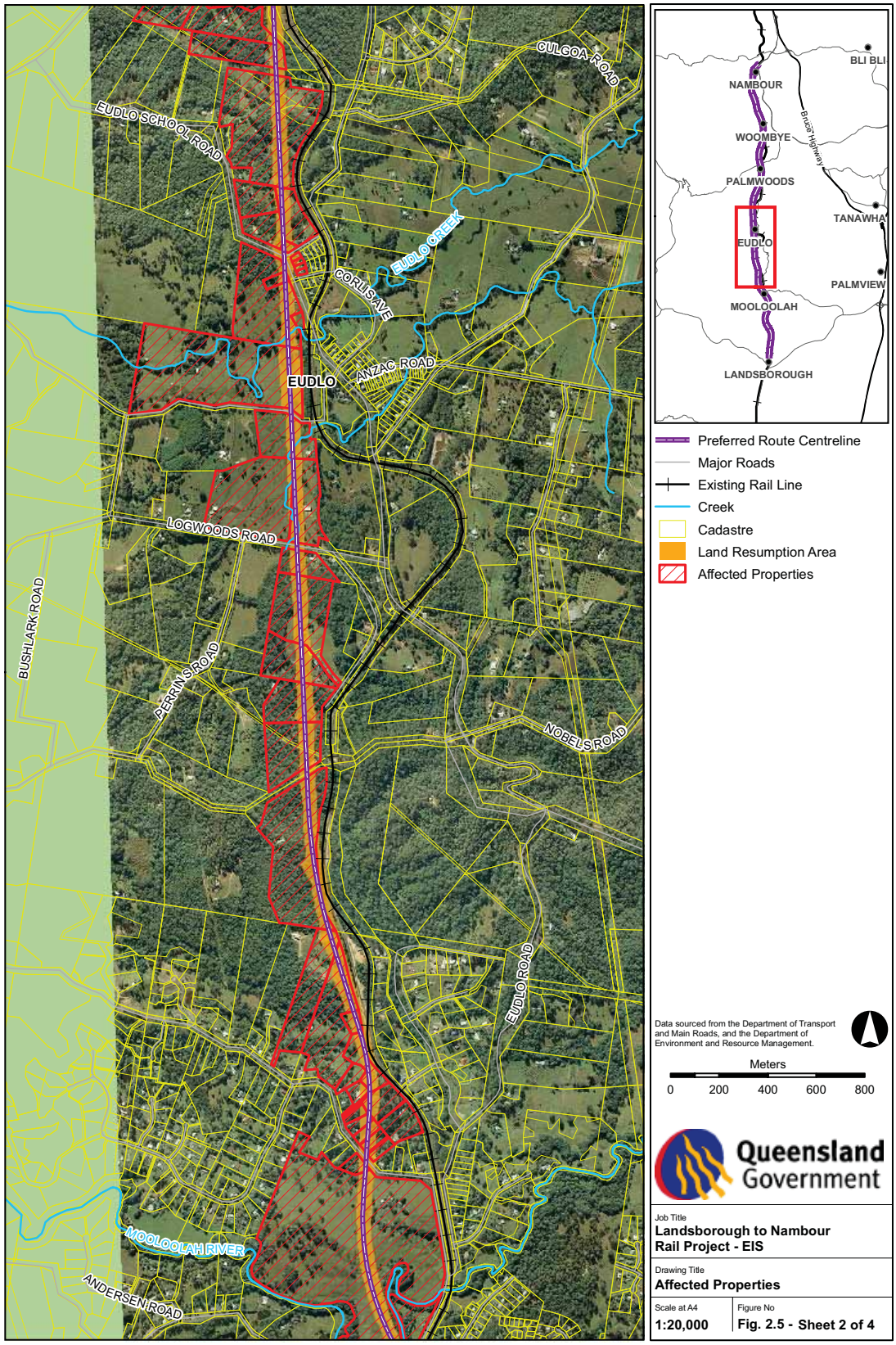

Figure 2.5: Affected Properties

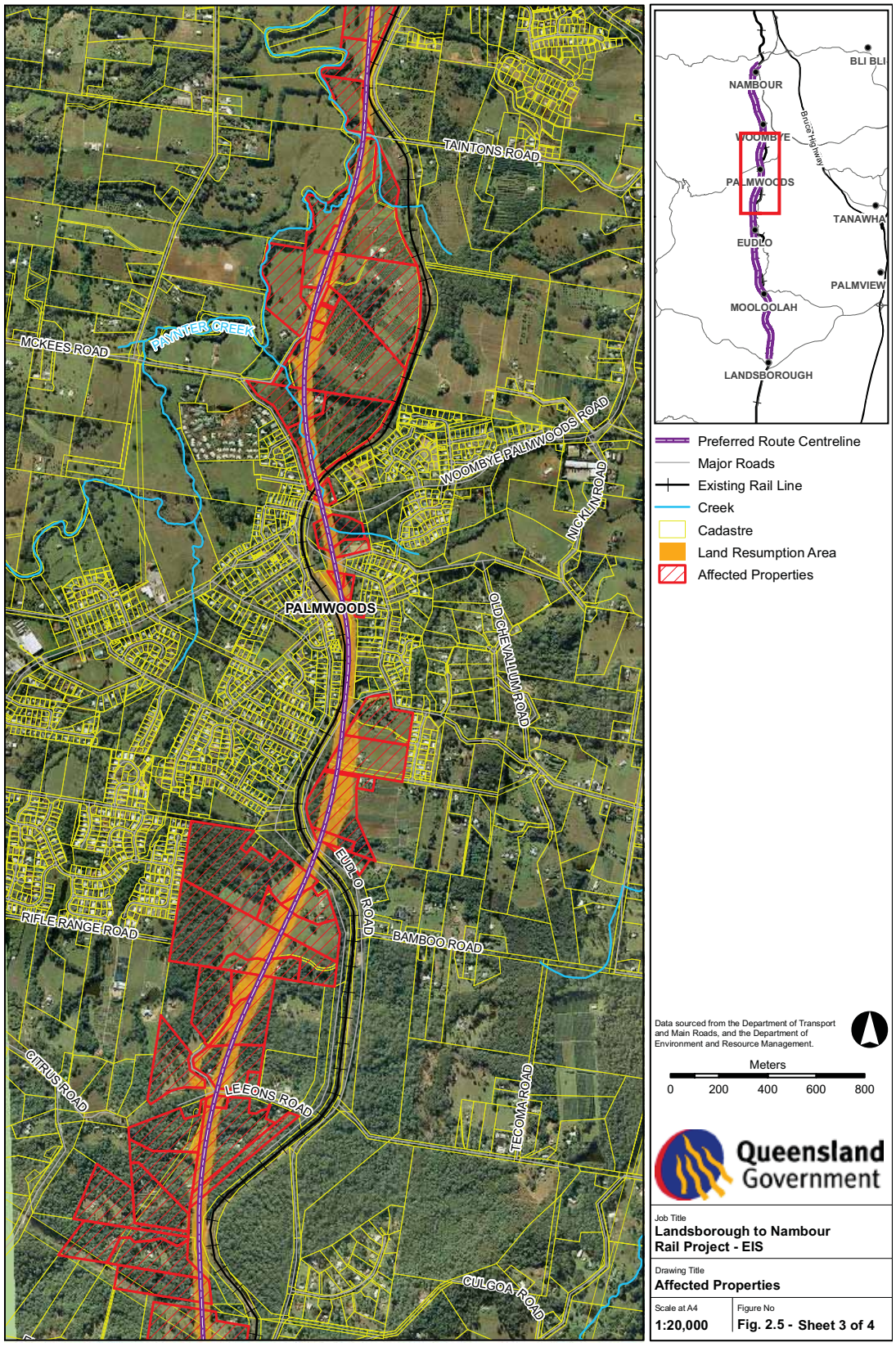

Figure 2.5: Affected Properties

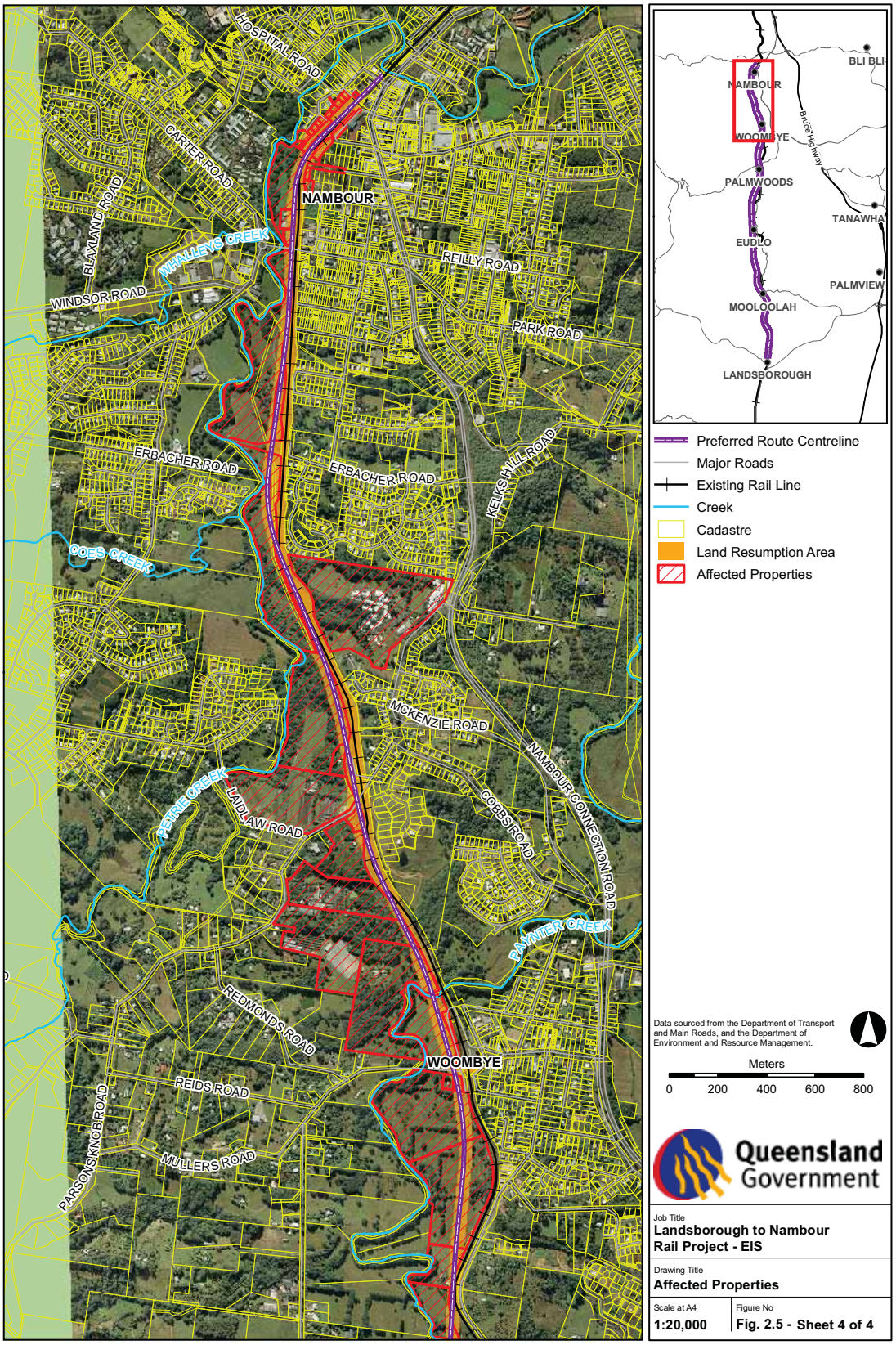

Table 2.5.2: Properties impacted by land requirements for the project

Lot Plan	Tenure[10]
1RP893091	FH
5SP111724	FH
3RP4326	FH
2RP817180	FH
30RP160218	FH
2RP224806	FH
2RP190651	FH
3SP181277	FH
421CP893394	FH
19RP146374	FH
4RP172897	FH
9RP28182	FH
4SP181278	FH
1RP190651	FH
1RP216194	FH
2RP79967	FH
8RP811418	FH
1RP849374	FH
4RP811897	FH
2SP157051	FH
2RP209705	FH
4SP110908	FH
7RP179376	FH
1RP142843	FH
3RP56701	FH
12P4456	FH
18RP146374	FH
18RP28182	FH
6SP111724	FH
1RP62838	FH
2RP62838	FH
4CG2097	FH
1RP92814	FH
2RP94471	FH
1BUP12479	FH
11P4456	FH
2RP188265	FH
2RP215960	FH
4RP911740	FH
20RP28182	FH
4RP204815	FH

Lot Plan	Tenure[10]
5SP110908	FH
1RP218403	FH
11RP181021	FH
31RP160218	FH
2SP194478	FH
3SP194478	FH
17RP28182	FH
1RP28258	FH
5RP179034	FH
8RP881340	FH
1SP157051	FH
2RP849374	FH
4SP115725	FH
6RP179376	FH
7RP881340	FH
693CG2097	FH
765SP120414	FH
2RP893091	FH
2SP108810	FH
13RP835260	FH
4RP181021	FH
4RP845241	FH
3RP817180	FH
2RP28214	FH
3RP56760	FH
3RP845294	FH
16SP159202	FH
1RP908527	FH
4SP134323	FH
21SP205408	FH
1CG233	FH
389CG322	FH
1CG1328	FH
5RP163950	FH
1RP207581	FH
63RP45367	FH
258CP819422	FH
6SP141477	FH
2SP145590	FH
3RP40323	FH
1RP223607	FH

Lot Plan	Tenure[10]
4RP849374	FH
2RP182362	FH
722CG3852	RE
999CG6008	RE
453CG2136	NP[11]
455CG2348	FH
100RP881340	RE
301M332061	RE
711CG6392	RE
3RP893091	FH
43RP26509	FH
3CP906107	FH
7RP43971	FH
5RP907803	FH
2RP181003	FH
6SP156942	FH
12SP161836	FH
19RP28182	FH
3SP145590	FH
22SP205408	FH
1RP803627	FH
111NPW552	NP[12]
454CG2136	NP[13]
1RP209705	FH
177SP197756	FH
3CG1466	RE
17RP26509	FH
2RP911740	FH
419CG1740	FH
543CG3620	FH
5RP802616	FH
1RP193239	FH
3SP115725	FH
36SP159377	FH
1RP28091	FH
9RP811418	FH
0BUP12479	FH
3RP911740	FH
2RP845294	FH
2RP204815	FH
751CG3940	RE

Lot Plan	Tenure[10]
1CG1466	SL
368CP893394	SL
178SP197756	FH
1RP147086	FH
4SP115741	FH
2RP231014	FH
10RP28182	FH
7SP134323	FH
3RP231014	FH
3RP204815	FH
21RP881327	FH
68RP45367	FH
42RP26509	FH
3BUP12479	FH
2BUP12479	FH
2RP8474	FH
11RP28182	FH
8SP141477	FH
1RP48601	FH
3RP62838	FH
2RP49230	FH
3RP849374	FH
2SP173065	FH
2RP81009	FH
1RP149059	FH
4RP224789	FH
1SP119729	FH
0BUP12479	FH
26USL31180	SL
437CG1973	LL
3RP802185	FH
10SP110903	FH
9SP110903	FH
30SP181277	FH
40SP181278	FH
340CG1481	RY
194SP110902	RY
8RP28182	FH
193SP141559	LL

10 *LL: Lands Leased; NP: National Park; FH: Freehold; RY: railway-land vested for railway purposes in the Department of Transport and Main Roads or QR.; SL: State Land; RE: Reserve*

11 *Dularcha National Park*
12 *Eudlo Creek National Park*
13 *Dularcha National Park*

Identification and securing of vegetation offsets

As the project involves clearing of 21.7 ha of protected vegetation under the *Vegetation Management Act*, offsets will be required to replace areas of remnant regional ecosystems removed by the proposed railway development, as discussed in **Chapter 11, Terrestrial flora (Section 11.6).** Offsets will be in line with the *Policy for Vegetation Management Offsets* of the Department of Environment and Resource Management, which is triggered under the *Vegetation Management Act 1999*. The final extent of offsets required and offset areas will be defined during the detailed design phase once the amount of clearing required has been finalised.

As the clearing of vegetation is not anticipated for many years, the opportunity to identify and secure offsets in advance of the construction is a significant opportunity to mitigate impacts before they occur.

2.5.3 Elements of construction

Site preparation and vegetation clearance

The clearance of vegetation from the project area would be undertaken as part of the site preparation works. To accurately represent the ultimate impact of the project on vegetation and biodiversity, the area of vegetation cleared for the whole project area (i.e. the land requirements for the four track corridor) has been assessed in **Chapter 11, Terrestrial flora.** As previously mentioned, the four track corridor would require clearing of 21.7 ha of vegetation within remnant regional ecosystems. However, vegetation clearance shall only occur for the areas required to construct and operate the two track project. Therefore, clearance of vegetation shall only be undertaken for those areas required for construction, construction access and earthworks for the two track requirements. In areas of significant cut and embankment, with access constraints, or where bridges are required, it may not be feasible to clear only the area required for the two track arrangements, and therefore clearance of a wider area may be required.

Vegetation to be retained shall be protected with fencing and an experienced spotter catcher shall be engaged to check vegetation for the presence of fauna immediately prior to its clearing. Measures to mitigate the impact of vegetation clearance are detailed in **Chapter 11, Terrestrial flora and Chapter 12, Terrestrial fauna, and Chapter 22, Environmental management plans.**

Mitigation measures for erosion prevention and water quality control during vegetation clearing and construction will be developed in an Environmental Management Plan (EMP).

Relocation of infrastructure

It is assumed that the relocation of telecommunication services and other public utility plant impacted by the project will be undertaken in the initial stages of construction. Opportunities to relocate telecommunication infrastructure impacted by the project in the new rail corridor will be investigated during detailed design. Approvals from the relevant utility and service authorities will be sought during future design phases, closer to construction.

Construction waste

The construction of the project and the decommissioning of the existing railway are likely to generate the following waste:

- building waste from vegetation clearance
- waste from railway sleepers and train tracks
- general waste from staff
- soil waste
- hydrocarbon waste from end-use
- wash down waste water
- stormwater
- sewage.

The waste impacts of the project are assessed in **Chapter 18, Waste** and measures are proposed to mitigate these impacts.

Three existing sewage-pumping stations are located in the area, two at Palmwoods and one in Nambour. A medium-sized sewerage pressure main runs along the existing rail corridor connecting Palmwoods to Woombye. Sewage waste will be treated by an approved septic or anaerobic treatment system where possible or via connection with the municipal waste sewage infrastructure, depending on location of the site. It is likely that construction sites will use mobile toilet systems (port-a-loos) and shower systems and hence, sewage and sink water will be managed through the mobile system contractor. Where possible, the use of self composting toilets and /or waterless urinals will be introduced. After mitigation and management, sewage is expected to result in a negligible impact.

Stormwater has the potential to spread contamination to surface water and groundwater and increase erosion from exposed soil and stockpiles. Contamination due to stormwater can be reduced by minimising the number of waterway crossings, site preparation and a stormwater management plan, this is discussed in detail in **Chapter 22.**

Transport logistics, storage and handling

In accordance with restrictions on the movement of oversized vehicles, the transport of some oversized equipment may occur infrequently at night time at the start of construction, in which case affected residents will be notified. As discussed in **Chapter 7, Transport**, the mitigation measures to reduce the impacts of construction on road traffic include:

- Temporary roads and alternative routes will be provided as road closures will occur on some roads during construction of the preferred route.
- Construction of new road connections will also commence to provide new permanent access for affected properties on

Mooloolah Connection Road, Toby Court, Leeons Road and Palmwoods Mooloolah Road.

- Temporary access on the side of the road will be provided on roads with wide road reserves (using safety barriers, appropriate signage and traffic control).
- Temporary lane closures will allow one lane to remain open for traffic during construction.
- Alternative routes will be provided for roads with limited road reserve during the construction of road-over-rail crossings.
- Machinery, vehicles and equipment used during construction should be kept as close to the preferred route as possible.
- Road pavements will be evaluated prior to construction, to determine suitability for construction access and to act as a baseline for monitoring for acceleration of rehabilitation and maintenance.

Traffic management objectives are also outlined in **Chapter 22, Environmental management plans**, and will require further planning and assessment during detailed design.

It may be possible to transport some construction materials via rail but only where the dimensions of the material can be safely carried. However, this will require scheduling of services to fit within the existing passenger and freight movements. Existing sidings/passing loops at Palmwoods and Woombye have been identified as possible sites for such activities. This concept will need to be reassessed during detailed design.

Local roads will be used for construction traffic where possible. The use of the area identified for the project (i.e. the proposed rail corridor) to access sections of the project shall also be considered. The roads listed below are considered likely to be utilised for the supply of construction materials, such as ballast and fill, equipment and personnel involved in the construction process:

- Bruce Highway
- Glass House Mountains Road
- Mooloolah Connection Road
- Palmwoods - Mooloolah Road
- Chevallum Road
- Woombye - Palmwoods Road
- Nambour Connection Road.

Worksites and storage

Multiple construction work sites may be established along the corridor. Work sites will preferably be limited to land acquired for the project. Worksite locations would be determined in the detailed design stage. Based on an assessment of properties acquired under hardship to date, potentially suitable work sites have been identified. Generally, indicative worksites are in locations central to a substantial portion of the works, easily accessible, on relatively level ground, with low significance for flora and fauna and appropriate distances from sensitive land-uses and environmentally sensitive areas.

Storage of minor quantities of hazardous materials will occur at most sites. Small quantities of petrol and diesel fuel will be stored separately at work sites. Fuel storage areas are to be bunded to contain spilt fuel and prevent spreading of a pool of fire. Construction methods for tunnels will need to be determined during detailed design, as detailed geotechnical ground condition surveys will need to be carried out prior to determining construction methods. Therefore, there is a potential for some work sites to be used for storage of explosives. Assessment of the type (i.e. environmental toxicity and biodegradability) of hazardous materials and requirements for transport and storage will be documented in construction environmental management plans. **Chapter 22, Environmental management plans** outlines the framework for the development of the construction environmental management plan.

Earthworks and tunnel construction

The extent of the earthworks required for the construction of the tracks is shown in **Drawings C101 to C128**.

Where possible and suitable, fill material shall be won from the project area. **Chapter 5, Soils and geology** identifies the extent of material likely to be useable for fill on the project. According to preliminary estimates, approximately 900,000m^3 of material will be cut and filled within the project, and 200,000m^3 of fill will removed to spoil. Assuming a significant proportion of the material won from the site can be reused, it is likely that there will be a net export of spoil as noted.

Stockpiling of topsoil for re-use on site for embankments and landscaping will occur in accordance with the Environmental Management Plans (EMPs) in **Chapter 22**. Measures outlined in these EMPs will be taken to minimise erosion and dust impacts such as temporary seeding or mulching. Embankments and cuts will be stabilised with native vegetation and retaining walls will be used on the steepest slopes, in particular, adjacent to sensitive uses to reduce the visual and physical impact of the earthworks.

Drawings C005, C010, C011, C014 and **C015** show the location of tunnels for the four track layout (C105, C110, C114 and C115 show tunnel locations for the two track layout). Further detailed geotechnical investigations (drilling and boreholes) will be required to more accurately determine the most appropriate construction methods and tunnel design. The information presented in this EIS is based on the best available information at the time of writing.

Considering the relatively short length of the tunnels, the nature of the ground conditions and depth to the water table, construction of the tunnels may be best undertaken using a face shield with rock excavation achieved using a rock breaker or by drill and blast. Temporary tunnel stabilisation measures are likely to be required and may comprise the installation of rock bolts, straps and mesh. Steel arches and/or shotcrete may also be required if bands of shale/mudstones are encountered.

A permanent lining may not be required due to the fact that groundwater is expected to be permanently deeper than invert level; however, for ensuring long term stability, a permanent lining may be favourable.

Condition surveys of buildings and structures above and adjacent to the route alignment must be undertaken prior to the commencement and following the completion of tunnelling and excavation activities to assess if any damage has occurred and conduct appropriate repairs.

Construction of bridges and structures

The design of bridges and rail structures will be finalised during the detailed design of the project, closer to construction. However, it is expected that the rail bridges and structures would be built of precast concrete. Compared to steel or composite structures, the use of concrete for bridges and structures would result in lower levels of re-radiated noise and is recommended in **Chapter 15, Noise and vibration**.

The road bridges are anticipated to be built of precast concrete.

Where bridges and structures are proposed for areas identified as environmentally sensitive, the requirements outlined in **Chapter 21, Special management areas** will apply.

Tracklaying

Ballast will be sourced from local quarries where available. The Parklands Blue Metal resource area north of Nambour has been identified as the closest source of known ballast material. Other sources may be required subject to the quantities available and reserves left at the time of the construction of the project.

The types of sleepers and tracks to be used for the construction of the railway cannot be finalised at this early stage of the project, as it is a field subject to constant research and improvements. The current standard at the time of writing is concrete sleepers, with continuously welded steel track.

Construction of new stations

New stations are proposed for Mooloolah, Eudlo, Palmwoods and Woombye. Upgrades to Nambour Station are proposed. Construction of the new Mooloolah station and upgrading of Nambour station would require careful construction planning, as these would need to remain operational throughout construction. Temporary platforms may be required to maintain services at Mooloolah.

Construction elements at stations include:

- platforms
- station buildings (toilets and ticket office for major stations, ticket vending machine, go-card swiping machine, concourse area, sheltered waiting areas, seating)
- lifts and pedestrian overbridges and underpasses
- access paths
- carparks (see **Chapter 7, Transport** for car parking requirements)
- bus turnaround/ interchange
- park and ride facility
- CCTV
- emergency phones.

The scale and design of these stations shall be sensitive to the character of the surrounding townships. **Chapter 6, Landscape and visual amenity** and **Chapter 21, Special management areas** provide guidance on design objectives.

Typical platform arrangements are shown in **Drawing C036**. Station locations are also shown on **Drawings C101 to C128**.

Road realignments and temporary sidetracking

The project necessitates the realignment of a number of existing roads.

As discussed in **Chapter 7, Transport**, the project will ultimately result in the construction of new rail over road, and road over rail bridges between Landsborough and Nambour, including:

- Gympie Street North (grade separation option, requiring closure of Way Street, diversion of traffic on Hatten Street, and Jones Street) shown on **SK001**
- Mooloolah Connection Road/ Bray Road (grade separation option, Way Street to Jones Street) shown on **SK003a** and **SK003b**
- Neill Road (rail over realigned road) shown on **C007**
- Neill Road (road over rail) shown on **C009**
- Logwoods Road (rail over road) shown on **C012**
- Highlands Road (rail over road) shown on **C013**
- Eudlo School Road (road over rail, rail in cut and cover tunnel or similar) shown on **SK004**
- Paskins Road property accesses (rail over road) shown on **SK005**
- Leeons Road (road over rail) shown on **SK006** and **SK007**
- Chevallum Road/ Nicklin Road (rail over road) shown on **SK009**
- Woombye-Palmwoods Road (rail over road) shown on **Drawing C019**
- Spackman Lane (rail over road) shown on **SK010**
- Back Woombye Road (road over rail, existing and future) shown on **SK011**
- Blackall Range Road (road over rail, replacing existing single lane bridge with two lane bridge) shown on **SK012**
- Arundell Avenue (rail over road) shown on **C027**.

In addition to these rail/road crossings, the following road realignments are proposed:

- Neill Road, from the intersection with Bray Road (also slight realignment of the Lornal Court intersection on Neill Road) shown on **C0007**
- Paskins Road- minor realignment within the existing rail corridor, shown on **Drawing C015**

- Eudlo Road- realigned to the east of the project, shown on **Drawing SK008, C018** and **C019)**
- Chevallum Road, shown on **Drawing C019** and **SK009**
- Spackman Lane, shown on **Drawing C020** and **SK010**
- Back Woombye Road, shown on **Drawing C023** and **SK011.**

These are shown in **Drawings C001 to C028, and SK001 to SK012.**

Where feasible, road realignments shall be constructed early as part of the construction traffic management plan. In particular, this would be beneficial at:

- Neill Road (south) shown on **Drawings SK003a** and **SK003b**
- Back Woombye Road bridge shown on **Drawing SK011**
- Eudlo Road, shown on **Drawing SK008.**

Where the project requires existing road bridges over rail to be replaced, or new road bridges replacing an existing section of road, temporary side tracks may be required. In particular, this includes:

- Neill Road (north) shown on **Drawing C109**
- Eudlo School Road shown on **Drawing C014** and **SK004** This will be dependent on the type of tunnel used for the rail under Eudlo School Road.
- Leeons Road (and Toby Court and the southern section of Paskins Road) shown on **Drawing SK006 and SK007)**
- Blackall Range Road shown on **Drawing C024.**

Temporary road closures, detours or sidetracks may be required for:

- Gympie Street North[14]
- Mooloolah Connection Road/ Brays Road[15]
- Logwoods Road (during rail bridge construction)
- Highlands Road (during rail bridge construction)
- Chevalllum Road/ Nicklin Road
- Arundell Avenue (during rail bridge construction).

Chapter 7, Transport discusses the traffic management measures that could be utilised to reduce the impacts of construction on road traffic.

2.5.4 Commissioning activities

The following activities would need to occur for the project to be operational:

- installation or relocation of catenary support structures, wires and signalling
- testing of track, signals, and power infrastructure prior to the commencement of rail service
- development of new timetable schedules for both freight and passenger services to optimise the use of the increased rail capacity
- installation of noise barriers (except for areas where it is determined beneficial and feasible prior to construction activities).

14 If the proposed grade separation option is not part of the initial construction

15 If the proposed grade separation option is not part of the initial construction

Progressive revegetation and landscaping

Following the completion of the construction works, the construction sites and storage areas will be cleaned up and rehabilitated. Areas that have been cleared or disturbed will be landscaped.

Where feasible, batter slopes shall be revegetated to aid in stabilisation, to mitigate visual impacts and to prevent the incursion of weeds.

This is further discussed in **Chapter 11, Terrestrial flora** and **Chapter 6, Landscape character and visual amenity**. Where possible, revegetation would be carried out using native species.

A landscaping and rehabilitation plan will need to be developed as part of the construction environmental management plans to be developed at the detailed design stage.

Decommissioning of the existing railway

Decommissioning of the existing railway is included as part of the project. This will include the removal of the existing railway tracks and the demolition or relocation of existing station buildings and infrastructure. Decommissioning can only occur following the commissioning of the proposed two tracks and new stations, and therefore is not anticipated to occur in most places prior to 2026. In some locations, where construction is online (e.g. Mooloolah Station, approach to Palmwoods station and the approach to Nambour Station), it may be necessary to decommission parts of the existing track to facilitate construction. However, if the project is staged, it may be possible to decommission sections and recycle or reuse elements of the existing rail infrastructure.

All materials suitable for reuse from the decommissioning process shall be taken to a licensed resource recovery facility, or reused on the project subject to their suitability. Some catenary support structures and signalling could possibly be relocated to the new route. However, it is unlikely that the existing structures would be adequate for a two track railway and the requirements for signalling and power supply are likely to evolve within the timeframe of the project. Opportunities for relocation of signalling and power infrastructure are thus likely to be limited.

Possible future use of the decommissioned railway as a recreational trail is discussed in **Chapter 3, Land use and infrastructure**.

A significant proportion of the existing rail corridor within the project area is listed in the Environmental Management Register of the Environmental Protection Agency, now Department of Environment and Resource Management (but not the Contaminated Land Register). According to previous consultation with QR Limited, the potential contamination of the existing rail corridor is a result of the majority of the rail corridor being historically (1940s and 1950s) treated with the herbicide sodium

arsenite, which was sprayed via boom arrangement onto the track. The resulting sodium arsenite has a low mobility and thus has a continued presence in the substrate. As a consequence, QR has adopted a policy whereby all soils excavated for track work are treated as contaminated. Due to the mechanics of the spraying method used, most of the contamination occurs within 5 m of the track formation, and to a depth of 0.5 m. Beyond this, the levels are expected to be much lower. Subject to the proposed future use of the corridor, excavated material can generally be kept in the corridor either in the location of origin or within the near vicinity. Should the existing railway be used for recreational trails, treatment and management measures will need to be developed in accordance with the level of contamination risk associated with the proposed future use. The Department of Environment and Resource Management permit QR Limited to move excavated material by road, provided it is returned to the rail corridor (near the place of origin). Excavated material is to be kept away from watercourses and boundary fences, due to the potential for erosion to mobilise the contaminants in the soils. Contaminated land issues are discussed in **Chapter 3, Land use and infrastructure** and **Chapter 5, Geology and soils**.

2.5.5 Workforce accommodation

At this early stage of the project, it is only possible to estimate the numbers and requirements of the workforce required for construction of the project. The economic assessment in **Chapter 8, Economic environment** estimated that the project would generate 659 jobs directly in the SEQ economy on average over the construction period.

It is expected that rail project workers will come from the local area where possible. However the sourcing of workers will be dependant on the economy and labour market conditions at the time of construction. A significant workforce, from outside of the area is likely to require short to medium term accommodation. While some of this may be taken up in the local rental market, it is important to avoid adverse impacts on rental housing and short term accommodation. This should be managed through an Accommodation Strategy.

Given that the project is not in a remote area, it is considered unlikely that construction camps will be required. Most of the workforce is anticipated to be based locally, on the Sunshine Coast or in Brisbane, and are therefore not expected to require onsite accommodation. When required, the workforce is expected to be accommodated in the local towns.

Construction camps, workers accommodation and site offices outside the rail corridor will be subject to the normal IDAS approvals process.

Chapter 8, Economic environment discusses the workforce requirements of the project, both direct and indirect, as well as accommodation availability.

Occupational groupings for the construction of the project comprise construction workers such as equipment and plant operators, formsetters, steel fixers, concreters, signalling communications and electrical engineers, labourers, tradespersons and truck drivers and other specialist consultants for geotechnical investigations, detailed design and environmental monitoring.

The Local Industry Policy aims to make sure Queensland and Australian suppliers have full, fair and equal opportunity to tender for major infrastructure and resource projects. Infrastructure and resource projects worth more than $5 million that are publicly funded are required, under the Local Industry Policy, to prepare Local Industry Participation Plans and implement the use of local content as one of the broad tender evaluation criteria. Local labour and sub-contractors will be used where possible during construction.

The Queensland Government Building and Construction Contracts Structured Training Policy requires that, on any Queensland Government building or civil construction project (with a value more than $250,000 for a building project or more than $500,000 for a civil construction project), a minimum of 10 percent of the total labour hours be carried out by apprentices, trainees or cadets or used to increase the skill levels of current employees (up to a maximum of 25 percent of the deemed hours).

A Local Industry Participation Plan and a Skills Development Plan will need to be developed in consultation with the Department of Tourism, Regional Development and Industry, during construction planning and management. This should be carried out by the constructing authority.

2.6 Operation activities

Once commissioned, the project will facilitate the following:

- passenger services (CityTrain, TravelTrain, Tilt Train)
- freight services (Intermodal and bulk freight).

Projected service levels for passenger and freight services are discussed in **Chapter 7, Transport.** The introduction of the double track railway allows for a significant increase in train paths, enabling up to four times more passenger services and twice as many freight services to operate within this section of the north coast line.

It is expected that, during the operation phase of the project, extra passenger load may have an additional demand on toilets at stations. This is anticipated to have a minimal impact of the municipal sewage system. Where possible, the use of self composting toilets and /or waterless urinals will be introduced.

Regular maintenance will be necessary on the tracks and require track possessions. Track possessions are normally limited to times such as Sunday mornings or weekends when the impact on users is minimal. The proposed two tracks will allow for the maintenance of one track to occur while the other track can be used, subject to QR Limited safety standards and procedures. This will deliver significant benefits, as the current single track requires full track closures for maintenance to be carried out.

The alignment for the project will reduce the need for maintenance created by the loads imparted on the rail on tight curves and steep grades. Appropriate clearances and provision of access roads, which have been included as part of the preliminary design, will allow people to carry out maintenance works safely.

QR Limited safety standards and procedures will guide the emergency management and evacuation procedures once the railway is operational[16]. The emergency management plan will be developed prior to as part of the construction planning and will be implemented during pre-construction and construction. It will include emergency response procedures to be followed in an accident situation, allocation of tasks and responsibilities and training requirements. A Bushfire Management Plan will be developed for the operation of the project, specifying appropriate clearance distances, and emergency service access requirements during construction. More information is provided in **Chapter 19, Hazard and risk.**

2.6.1 Decommissioning of the project

Typically, rail infrastructure has a design and service life of over 100 years, subject to maintenance, surrounding land use patterns and advances in rail technology. Provision for a third and fourth track would ensure that the longevity of this corridor is maximised.

However, to account for the full life cycle of the project, its decommissioning must be considered.

Activities likely to be associated with the decommissioning of the project include:

- removal of the existing railway tracks
- demolition or relocation of station buildings
- recycling of ballast, steel, power infrastructure where suitable
- revegetation of the project area
- removal of bridges and rehabilitation of bridge pier locations.

16 QR Limited has a safety policy of 'ZeroHarm' which applies to all rail activities across the QR network