20 Cumulative Impacts

20.1 Introduction

Morris and Therival (1995) define cumulative impacts as 'the sum of the project's impacts when added to those of other past, present or future projects'. Cumulative impacts may result from a number of activities with similar impacts interacting with the environment in a region. Cumulative Impact Assessment (CIA) has been a common practice in Europe and America for a number of years. Guidelines are set in place in the UK to integrate cumulative impact assessments into the Environmental Impact Assessment Process that is set in place by the Environment Agency (UK). There is no defined process for Cumulative Impact Assessment (CIA) in Australia.

In order to understand cumulative impacts, it is necessary to appreciate the interrelationships between impacts. Interactive effects arise where effects from one environmental element bring about changes in another environmental element. A working knowledge of the residual impacts caused by an activity is also necessary for CIA. The previous chapters in the EIS have described the likely impacts of the project.

This chapter explores the interrelationships between the residual environmental impacts described in the EIS that remain significant after mitigation methods have been put in place. These types of impacts relate to a variety of issues including social, economic, ecological issues etc. The likely cumulative effects that could occur as a consequence of the project in conjunction with the development of other projects that are currently in the project area are also discussed.

20.1.1 Aims

The aim of this chapter is to provide information on the overall impacts of the project in relation to other projects that are occurring within the area. These projects may be under construction or in planning. The aims of this assessment are to:

- consider the interrelationships between the impacts of the Landsborough to Nambour Rail Project (i.e. water, fauna, vegetation, air etc)
- identify other projects occurring within the area
- understand the potential impacts of these projects
- consider the combined effect of these impacts with the impacts identified for the Landsborough to Nambour Rail Project
- consider the opportunities that exist for efficiency gains and mitigation of environmental and property impacts through the co-location of the rail with other linear infrastructure.

20.2 Methodology

20.2.1 Review of existing information

The following environmental reports for other projects in the region were reviewed to identify cumulative impacts:

- Southern Regional Water Pipeline Alliance (2007) Northern Pipeline Interconnector Project EIS
- Energex (2008) SunCoast power project EIS
- former Queensland Transport now Department of Transport and Main Roads (2007) Caboolture to Landsborough Rail Upgrade Study, Beerburrum to Landsborough corridor.

20.2.2 Limitations of study

The residual impacts of other projects were identified through the review of existing environmental reports, which could result in three main limitations:

- Differences in methodologies and assessment criteria may exist between this report and environmental reports prepared for other projects, which may compromise the validity of the impact comparison.
- Few of the projects considered for this assessment have been built, so the real impact is unknown at this point.
- In some cases, the environmental investigations are currently being or have not yet been undertaken and the findings are not yet available. For the Gatton to Gympie gas pipeline, the findings were no longer available. For these projects, possible cumulative impacts were identified based on the proposed alignment and not on environmental investigations.

20.2.3 Assessment of impacts

The assessment of cumulative impacts is essentially a subjective process. Therefore, the cumulative impacts have only been identified as beneficial or adverse and not assessed on a significance scale from negligible to high.

20.3 Assessment of impact inter-relationships

The impacts of the project have been identified for each discipline. However, the accumulation of different impacts on the same receptor may result in a significant cumulative impact, even if each impact is considered negligible when assessed separately.

Table 20.6 lists the impacts identified in each chapter and their relationships with impacts identified in other chapters.

During the construction phase of the project, local residents will be affected by a slight deterioration of air quality and an increase in noise levels. Cumulatively, this will result in a significant adverse impact on sensitive land-uses surrounding the rail project.

The most significant cuts in the topography have the potential to cumulatively impact on the environment, through vegetation clearance, severance of fauna movement, as well as increased risk of landslides and flooding. Cuts have been minimised and the cumulative impact is unlikely to be significant. Embankments can also cumulatively impact on the topography, on surface water by disturbing natural drainage patterns and on fauna movement. Structures have been proposed in areas subject to flooding to mitigate these impacts.

The project is likely to cumulatively affect Kolora Park in Palmwoods in terms of land-use, visual impact and cultural heritage. In Kolora Park, a structure is proposed to avoid significant changes to the topography and minimise impact on flooding, although it will result in a high adverse visual impact on **Viewpoint 17 in Figure 6.5**. However, the structure is not likely to be as visually intrusive as an embankment and will reduce the impact on the open space land-use. In fact, the structure will allow the continuation of the use of this section of the park as open space, mitigating the project's impact on the existing land-use. It is also less likely to impact on the registered site of Aboriginal significance located in close proximity to the corridor than an embankment.

The project crosses six waterways, which could impact on terrestrial flora and fauna, aquatic biology and flooding. Risks are also associated with waterway crossings and these could be aggravated as a result of climate change.

Vegetation clearing not only affects terrestrial flora and fauna but it could also have a cumulative adverse impact on aquatic biology, soil stability, water quality and visual amenity. The removal of riparian vegetation is particularly likely to result in significant cumulative adverse impacts. Indeed, it could potentially affect fish habitat and bank stability, increase erosion, sedimentation and pollutants from stormwater runoff reaching the streams.

The improvements to the rail services are likely to have a long-term beneficial cumulative impact on transport and on the socio-economic environment.

The introduction of grade separated road/rail crossings in place of the existing open level crossings will improve road traffic and safety, although it may also result in a significant adverse visual impact.

The re-use of parts of the existing railway corridor for alternative uses, in particular for a recreational rail trail, could result in a beneficial impact on pedestrian and cycle movements, recreational land use and the social environment. However, the inclusion of a rail trail in more ecologically sensitive areas of the existing railway corridor, such as areas within Dularcha National Park, The Pinch Lane and various river and creek crossings, may be downscaled to a narrow working trail to minimise disturbance in these areas. In the long-term, rehabilitation adjacent to the rail trail will increase the attractiveness of the trail, while enhancing its biodiversity value.

20.4 Description of related projects

The project will cumulatively with other public transport projects improve public transport provision in SEQ and the Sunshine Coast, which is likely to result in a significant cumulative beneficial impact on the social and economic environments. Due to the increased choice of travel destinations, improved regional public transport connections will create much greater potential for residents to benefit than improvements to the services provided by the project alone. Other public transport projects for the sunshine coast are discussed in Chapter 1 and include:

- CoastConnect: bus system between Caloundra and Maroochydore
- CAMCOS (Caloundra to Maroochydore Corridor Study): rail service between Beerwah and Maroochydore
- NCL duplication and straightening between Caboolture and Landsborough in two phases.

Other infrastructure projects in the region are shown on **Drawings C029 to C034 and Figure 20.4** in relation to the existing and proposed rail corridors and other existing infrastructure. The rail project has been designed to minimise costly relocation of existing infrastructure.

20.4.1 Gatton to Gympie gas pipeline

A future gas pipeline is planned between Gatton and Gympie. The proposed pipeline alignment runs predominately east of the rail project, from the south west to north east into Mooloolah, crossing the rail project to continue on the eastern side of Eudlo, Palmwoods, Woombye and Nambour. The proposed pipeline is currently in the planning stage.

The proposed pipeline alignment crosses the rail project on structure at chainage 87000 (Mooloolah River). Although the rail project is proposed to be on structure in this location to reduce the impacts on the Mooloolah River, cumulatively, the gas pipeline and the rail structure could have an adverse impact on the Mooloolah River, the riparian vegetation and threatened species.

20.4.2 Northern Pipeline Interconnector

The proposed Northern Pipeline Interconnector (NPI) is a drought emergency pipeline. The pipeline easement runs on the eastern side of the rail project from Landsborough to Nambour. A corridor of up to 30 metres is required to allow construction of the pipeline. The NPI runs into the project area just south of Mooloolah for approximately 2.5 km before running north east out of the project area at Palmwoods. Phase 1 connecting Lander's Shute Water Treatment Plant near Eudlo to the Morayfield reservoirs was completed in December 2008. The EIS for phase 2 of the NPI project (from Lander's Shute Water Treatment Plant near Eudlo to the Noosa Water Treatment Plant) has recently been released for public comment (Jan-Mar 09) and the Coordinator-General is currently assessing submissions to determine whether a supplementary report to the EIS is required.

Although, the NPI and the rail project do not cross, they both affect a number of adjoining properties to the south of Mooloolah. The construction phases of the two projects are separated by over 10 years and, as the construction impacts will be short-term, there should be no cumulative construction impacts on the affected properties.

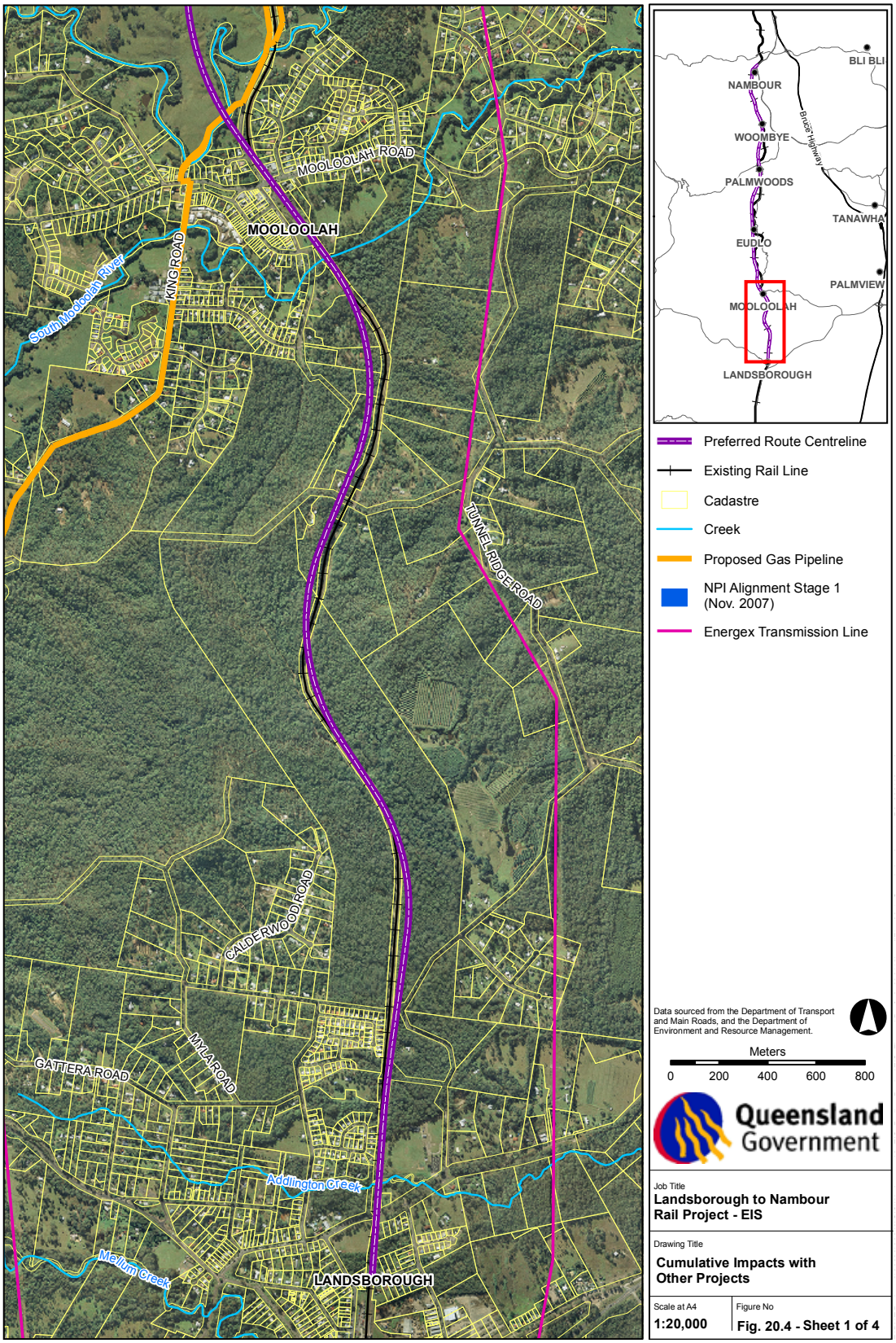
20.4.3 Palmwoods – West Maroochydore – Pacific Paradise power corridor (SunCoast power project)

The new high voltage power line runs from Powerlink's Palmwoods Substation to Energex's existing West Maroochydore Substation. It is proposed to locate the new transmission line within the existing easement, therefore the operational impacts of the SunCoast power project will not be significantly different to the existing impacts as the land affected by the easement is already cleared. The power line will cross the rail project to the north of Eudlo at chainage 92300. However, the rail project is proposed to run in a cut and cover structure at that location and will not impact on the proposed additional transmission line. The SunCoast power project and the rail project are unlikely to result in any cumulative impacts.

Other projects such as the Landsborough Community Precinct and Nambour Structure Plan will contribute to reinforce the attractiveness of Landsborough and Nambour. For instance, the development of an art, community and heritage precinct in Landsborough, identified in the Landsborough and District Local Area Plan (2001), is proposed to the south west of Landsborough rail station. Cumulatively with the rail project, these projects are likely to result in a beneficial cumulative impact on the social and economic environment.

Opportunities also exist to link a recreational trail on the decommissioned railway with recreational trails proposed in '*Caloundra City Recreational Links and Trails'* in the long-term. This will enhance the benefits of the rail project on the social environment.

Figure 20.4: Cumulative impacts with other projects



Whilst every care has been taken to ensure the accuracy of this data, the Department of Transport and Main Roads makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) and costs which might be incurred as a result of the plan being inaccurate or incomplete in any way and for any reason.

Figure 20.4: Cumulative impacts with other projects

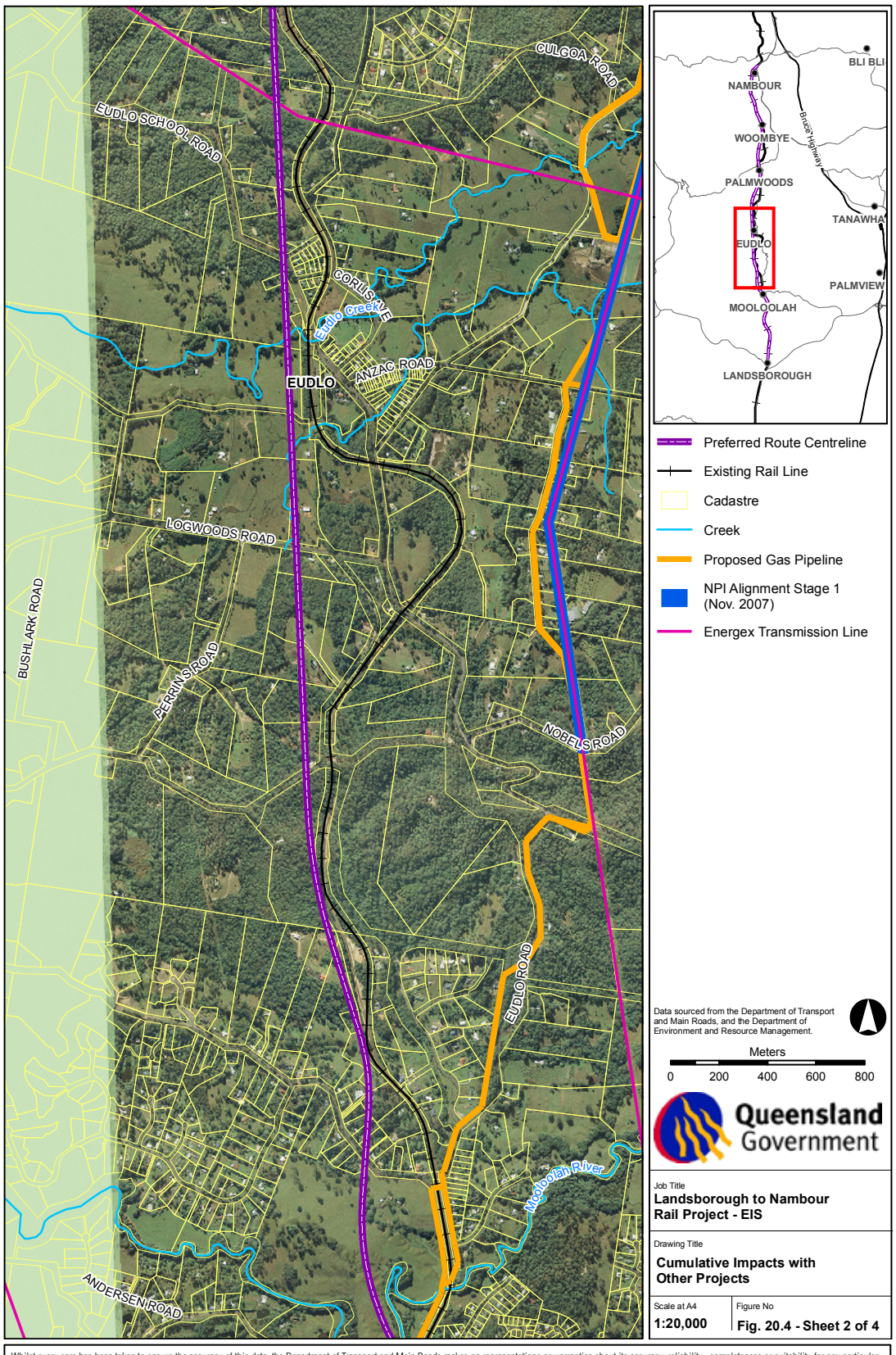


Figure 20.4: Cumulative impacts with other projects

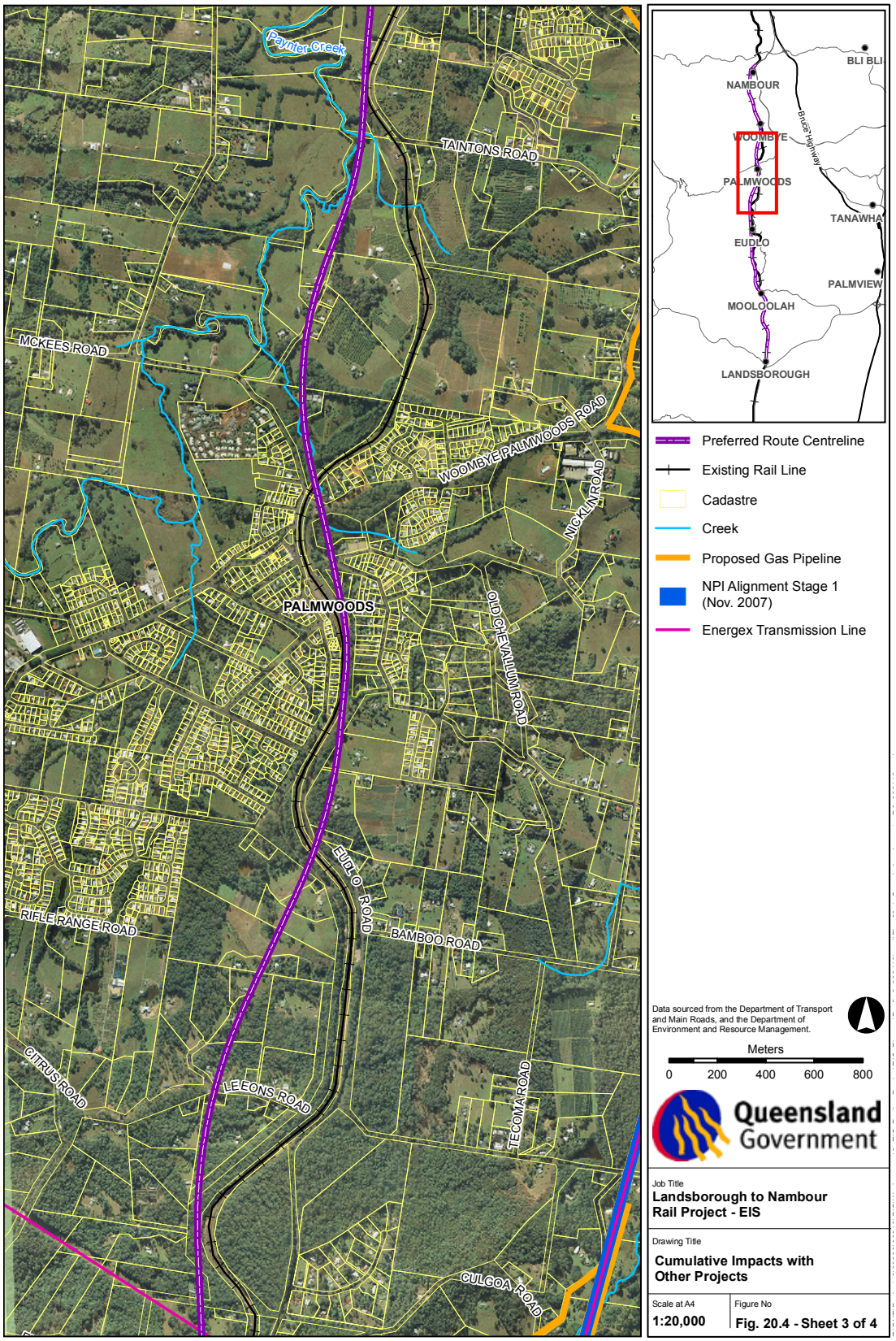
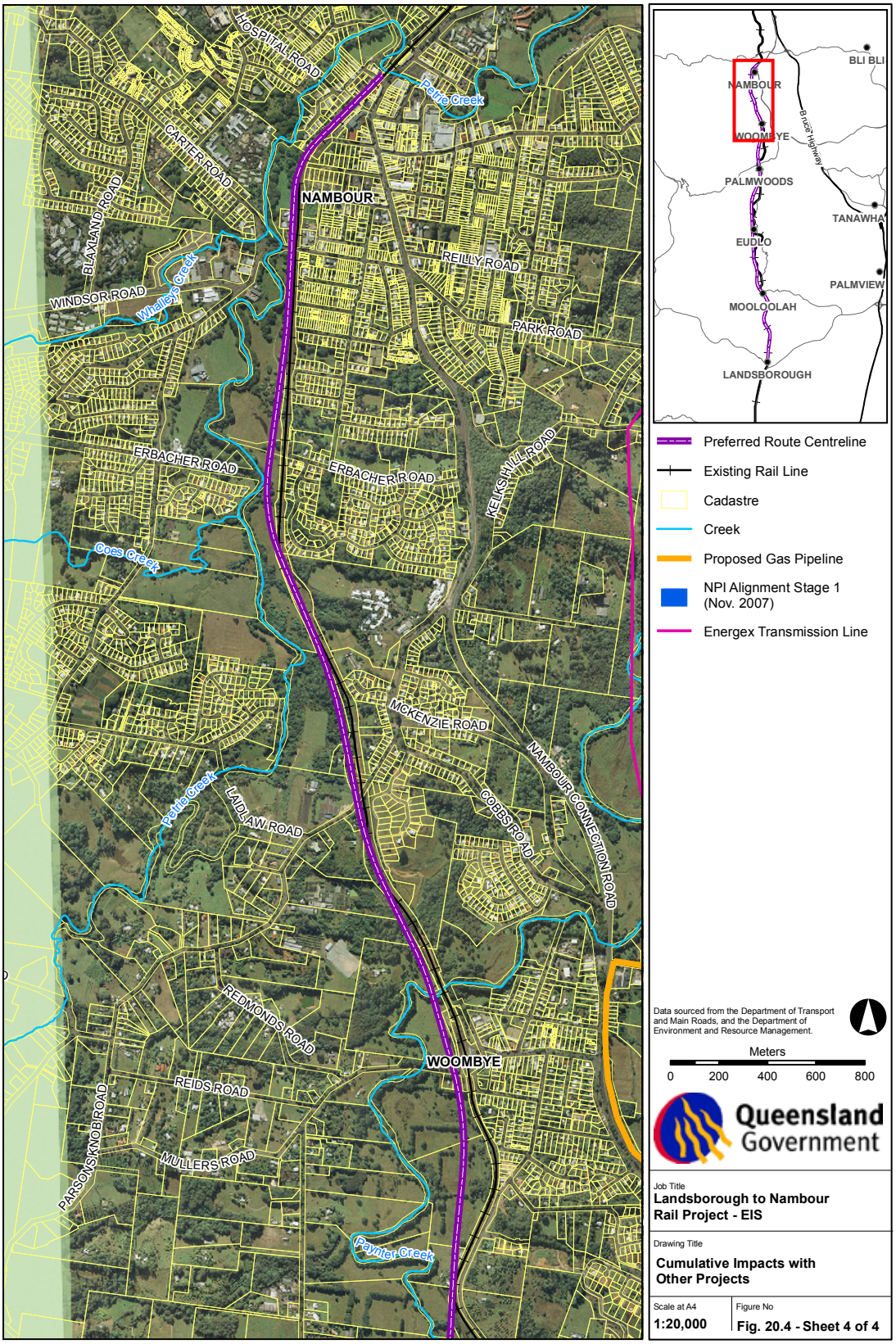


Figure 20.4: Cumulative impacts with other projects



20.5 Assessment of cumulative impacts

Cumulative impacts in or in close proximity to the project are considered in **Section 20.4**. **Table 20.6** provides a summary of the impacts identified and assessed for the rail project with impacts identified in environmental reports for other projects. Although the impacts occur in different locations, they are likely to cumulatively affect regional receptors such as regional ecosystems or the regional economy. These cumulative impacts at a regional level are identified in the table.

20.6 Summary and conclusions

Some impacts of the project will have a cumulative effect on the environment. In particular, important cuts in the topography will have a significant adverse cumulative impact, as they will affect fauna movement, soil stability and increase risk of landslide and flooding. Riparian vegetation clearance will also result in cumulative adverse effects on terrestrial and aquatic biodiversity, soil stability and water quality. However, the rail project will also have long-term cumulative beneficial impacts on transport, safety and the socio-economic environment.

Cumulatively with other infrastructure projects on the Sunshine Coast, the project will improve accessibility and service provision in the region, resulting in a cumulative beneficial impact on transport and the socio-economic environment. Temporary construction impacts are not expected to result in any cumulative effects as the projects will be spread geographically and in time, thus not affecting the same receptors. However, the accumulation of low adverse impacts on the biodiversity in different locations in the region could significantly affect the regional biodiversity.

Table 20.6: Impacts of the project

Landsborough to Nambour				Other Projects (information sourced from the findings of environmental investigations when available)				
Value	Impacts	Residual Impact	Interrelationships	CAMCOS	NCL	NPI	SunCoast power project	Cumulative Impact
Land use and Infrastructure	Land resumption impacts on land tenure	Moderate adverse	Chapter 11Terrestrial Flora, Chapter 12 Terrestrial Fauna					
	Construction impacts on existing land uses and infrastructure	Moderate adverse	Chapter 11Terrestrial Flora, Chapter 12, Terrestrial Fauna, Chapter 7 Transport and Infrastructure and Chapter 21 Special Management Areas			√		√
	Decommissioning impacts	Minor negligible to beneficial	Chapter 3 Land use and Infrastructure					
Topography and Geomorphology	Cuts, embankments and structures	Locally moderate adverse Regionally negligible	Chapter 5 Geology and Soils, , Chapter 11 Terrestrial Flora, Chapter 12 Terrestrial Fauna, Chapter 14 Water resources and Chapter 17 Climate and Natural disaster, Chapter 19 Hazard and Risk					
Geology and soils (including land contamination)	Erosion, acid Sulphate soils and rocks, etc.	Negligible		√		√		√
	Material from cuts	Beneficial						
Landscape character and visual amenity	Reduction in or improvement to scenic amenity and scenic value	High adverse to beneficial (depending on the viewpoint)	Chapter 4 Topography and Geomorphology, Chapter 14 Water resources, Chapter 19 Hazard and Risk		√		√	√
Transport and Infrastructure	Impacts on road traffic, pedestrians, cyclists and riders during construction	Low adverse			√	√	√	√

Table 20.6: continued

Landsborough to Nambour				Other Projects (information sourced from the findings of environmental investigations when available)				
Value	Impacts	Residual Impact	Interrelationships	CAMCOS	NCL	NPI	SunCoast power project	Cumulative Impact
Transport and Infrastructure cont.	Impacts to rail services	Moderate adverse in the short term and beneficial in the long-term.	Chapter 8 Economic, Chapter 9 Social, Chapter 4 Land use and infrastructure		√			
	Impacts to other public transport	Long-term residual impact would be beneficial			√			
	Traffic benefits							
	Road network impacts	Beneficial to negligible	Chapter 16 Air Quality, Chapter 21 Special Management Areas, Chapter 9 Social, Chapter 3 Land use and Infrastructure					
	Impacts on Open Level Crossings (OLCs)	Beneficial	Chapter 19 Hazard and Risk, Chapter 6 Landscape character and Visual Amenity, Chapter 15 Noise and Vibration					
	Upgrade/closure of bridges	Low adverse residual impact in the short-term and negligible in the long-term.	Chapter 13 Aquatic Biology, Chapter 14 Water resources, Chapter 17 Climate and Natural Disasters					
	Impacts on State-Controlled Roads (SRCs)		Chapter 8 Economic, Chapter 9 Social, Chapter 16 Air quality					
	Transport-related environmental issues	Low adverse residual impact in the short-term and negligible in the long-term.	Chapter 11, Terrestrial Flora, Chapter 12 Terrestrial Flora					
Economic Environment								
Social Environment	Loss of public facilities	Moderate adverse	Chapter 3 land use and infrastructure		√			√
	Impact on housing and affordability	Beneficial -long term	Chapter 3 land use and infrastructure, Chapter 8 Economic		√			√
	Impact on open space provision	Beneficial -long term	Chapter 3 land use and infrastructure					

Table 20.6: continued

Landsborough to Nambour				Other Projects (information sourced from the findings of environmental investigations when available)				
Value	Impacts	Residual Impact	Interrelationships	CAMCOS	NCL	NPI	SunCoast power project	Cumulative Impact
Social Environment cont.	Impact on townships	Moderate adverse - short term, beneficial - long term	Chapter 22 Special Management Areas, Chapter 3 Land use and Infrastructure.					
Cultural Heritage	Impacts on cultural heritage values of heritage sites, places and precincts	Beneficial to moderate adverse	Chapter 6 Landscape character and Visual Amenity Chapter 21: Special Management Areas		√			
Terrestrial Flora	Clearing of remnant vegetation	Moderate adverse (short-term) andl low adverse (long-term)	Chapter 21: Special Management Areas, Chapter 12 Terrestrial Fauna, Chapter 13 Aquatic Biology, Chapter 5 Geology and Soils, Chapter 6 Landscape character and Visual Amenity	√	√	√	√	√
	Reduction of flora habitat and diversity	Low adverse		√				√
	Removal of individual species of significance	Negligible to low adverse	Chapter 12: Terrestrial Fauna	√				√
	Reduction of corridor functionality	Low to moderate adverse	Chapter 12 Terrestrial Fauna, Chapter 13 Aquatic Biology,	√		√		√
	Remnant vegetation edge effects	Moderate adverse	Chapter 12 Terrestrial Fauna	√	√			√
	Riparian vegetation disturbance	Low to moderate adverse	Chapter 12: Terrestrial Fauna, Chapter 12 Terrestrial Fauna, Chapter 13 Aquatic Biology	√				√
	Removal of horticultural crops and vegetation of cultural significance.	Low adverse impact	Chapter 8 Economic, Chapter 9 Social, Chapter 10 Cultural Heritage					

Table 20.6: continued

Landsborough to Nambour				Other Projects (information sourced from the findings of environmental investigations when available)				
Value	Impacts	Residual Impact	Interrelationships	CAMCOS	NCL	NPI	SunCoast power project	Cumulative Impact
Terrestrial Fauna	Clearing of remnant vegetation	Moderate adverse (short-term) and low adverse (long term)	Chapter 11 Terrestrial Flora, Chapter 13 Aquatic Biology, Chapter 14, Water resources, Chapter 5 Geology and Soils, Chapter6 Landscape character and Visual Amenity	√	√	√		√
	Habitat fragmentation and reduction in corridor functionality	Low – moderate adverse	Chapter 11 Terrestrial Flora, Chapter 13 Aquatic Biology,	√		√		√
	Decreasing condition of habitat	Moderate adverse	Chapter 11 Terrestrial Flora	√		√		√
	Introduction of feral animals	Low adverse		√				√
	Fauna mortality and animal welfare	Low adverse	Chapter 19 Hazard and Risk	√				√
	Removal of significant species	Low Adverse (most species) and Moderate Adverse (for *M. iteratus*)		√				√
Aquatic Biology	Vegetation clearing and physical disturbance of aquatic habitats and surrounds	Low adverse	Chapter 11 Terrestrial Flora, Chapter 14, Water resources, Chapter 5 Geology and Soils	√	√	√		√
	Water quality modifications, especially increased turbidity and the introduction of contaminants	Low adverse	Chapter 14 Water Resources, Chapter 5 Geology and soils, Chapter 19 Hazard and risk	√	√	√		√

Table 20.6: continued

Landsborough to Nambour				Other Projects (information sourced from the findings of environmental investigations when available)				
Value	Impacts	Residual Impact	Interrelationships	CAMCOS	NCL	NPI	SunCoast power project	Cumulative Impact
Aquatic Biology cont.	Creation of in-stream barriers to fauna passage	Negligible to low adverse	Chapter 12 Terrestrial Fauna	√				√
	Increased occurrence of exotic flora and fauna species	Negligible to low adverse	Chapter 12 Terrestrial Fauna, Chapter 14 Water Resources					
	Creation of new mosquito or biting midge breeding habitats	Negligible	Chapter 12 Terrestrial Fauna, Chapter 14 Water Resources					
Water resources	Riparian vegetation	Low Adverse	Chapter 11, Terrestrial Flora , Chapter 13 Aquatic Biology	√	√	√		√
	Alterations to surface water quality	Negligible to low adverse	Chapter 13 Aquatic Biology	√		√		
	Alterations to groundwater quality	Negligible to low adverse	Chapter 8 Economic, Chapter 9 Social, Chapter 11 Terrestrial Flora, Chapter 12 Terrestrial Fauna, Chapter 13 Aquatic Biology	√				
	Alterations of groundwater levels	Negligible to low adverse	Chapter 8 Economic, Chapter 9 Social, Chapter 11 Terrestrial Flora, Chapter 12 Terrestrial Fauna, Chapter 13 Aquatic Biology					
Noise and Vibration	Construction noise	Negligible to Moderate Adverse			√	√	√	
	Excessive noise at nearby residences	Low Adverse	Chapter 3 Land use and Infrastructure	√	√			