CHAPTER

23

Cumulative Impacts

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Inland Rail is a subsidiary of
Australian Rail Track Corporation

INLAND RAIL

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23. Cumulative impacts

This chapter addresses the 'General approach', 'Mandatory requirements of an EIS' and 'Further requirements of an EIS' of the Terms of Reference (ToR) inclusive of ToR items 5.3, 6.6 and 7.3. ToR item 7.3 states:

'Cumulative impacts should be assessed over time and in combination with impacts created by the activities of other local, upstream and downstream land uses, major projects under construction, and proposed significant development progressing through the statutory assessment processes for which information is publicly available. The EIS should also propose means to suitably address predicted cumulative impacts. Outline ways in which the cumulative impact assessment and management could subsequently be progressed on a further collective basis.'

This chapter was publicly notified between 23 January 2021 and 4 May 2021 following the submission of the draft Environmental Impact Statement (EIS) to the Office of the Coordinator General. Following notification of the draft EIS, the Coordinator-General issued additional information requests to Australian Rail Track Corporation (ARTC). This chapter has been updated in accordance with the additional information requested from the Coordinator-General.

Appendix A2: Terms of Reference Cross-reference Table provides a cross reference for each ToR against relevant sections in the revised draft EIS.

23.1 Overview

The purpose of this chapter is to provide an assessment of the cumulative impacts on specific matters that could occur as a result of the New South Wales (NSW)/Queensland (QLD) Border to Gowrie project (the Project) in conjunction with other assessable projects.

As defined in the ToR, cumulative impacts are defined as the '*combined impacts from all relevant sources (developments and other activities in the area)*'. Therefore, projects with a spatial and/or temporal overlap can result in cumulative impacts. Cumulative impacts may:

- Differ in magnitude from those of an individual project when considered in isolation
- Be positive or negative
- Differ in severity and duration depending on the spatial and temporal overlap of projects occurring in an area
- Occur at a local, regional or national level
- Accumulate over time
- Exacerbate the intensity, scale, frequency or duration of impacts in either isolation or combination with other known existing or planned projects.

The construction period of most projects typically results in the greatest impact as the project is new to the location and the amount of disturbance and activity is at a peak. It is for this reason that this Cumulative Impacts Assessment (CIA) has generally focused on the construction works stage of the Project. Exceptions to this, such as where the operations stage has been included, are noted where they occur.

In addition to meeting the ToR, the CIA has also been prepared in response to:

- Submissions received from stakeholders during public consultation of the draft EIS
- Changes that have been made to the reference design (now referred to as the revised reference design) and construction methodologies in the time since the draft EIS was completed and released for public consultation
- Further refinement of the Project footprint
- The additional information requests received from the Coordinator-General on the draft EIS.

This CIA draws on the findings of the revised draft EIS, Chapter 8 to Chapter 22, which include impact assessments of assessable projects within each area of influence (AOI) for each specific matter. Specific matters are the components of the natural, built and social environment that have been assessed for the Project.

The CIA was carried out for each specific matter using the methodology outlined in Section 23.2. The potential cumulative impacts for each specific matter, and proposed mitigation measures, are summarised in Section 23.3.

23.2 Methodology

23.2.1 Scope and assessment approach

The scope of the CIA is to present information on the cumulative impacts that could occur as a result of the Project's development in conjunction with other identified existing or proposed projects. Specific matters include:

- Land use and tenure
- Land resources
- Landscape and visual amenity
- Flora and fauna
- Air quality
- Surface water
- Flooding and geomorphology
- Groundwater
- Noise and vibration
- Social
- Economics
- Cultural heritage (non-Indigenous)
- Traffic, transport and access
- Hazard and risk
- Waste and resource management.

An assessment method for the CIA was not prescribed within the ToR, nor is there a recognised industry standard for the assessment of cumulative impacts for linear infrastructure. In the absence of a recognised industry standard, ARTC has developed an assessment approach for implementation across EISs for all Inland Rail projects. The approach used to identify and assess potential cumulative impacts is outlined within Chapter 4: Assessment Methodology, and is summarised as follows:

- A review of the potential impacts has been identified through the assessment of specific matters, as presented in Chapter 8 to Chapter 22 of the revised draft EIS. The status of the natural, built and social environment at the time of the revised draft EIS preparation is considered to be the baseline.
- A register of assessable projects has been collated with estimated timelines to identify the temporal relationship between projects. The assessable projects are relevant at the time of receiving the request for additional information from the Coordinator-General on the draft EIS. These comprise projects that meet either one or more of the selection criteria outlined in Section 23.2.3.
- Identification and mapping of the assessable projects and the AOI of each specific matter being considered to determine the spatial or temporal overlaps.
- Where there is a potential overlap in impacts (either spatially or temporally), a CIA has been undertaken to determine the nature of the cumulative impact. This includes:
  - where possible, the assessment method has been quantitative in nature; however, qualitative assessment has also been undertaken for some specific matters
  - the probability, duration, and magnitude/intensity of the impacts have been considered, as well as the sensitivity of the receiving environmental conditions.
- An assessment matrix method (further detailed in Section 23.2.3) has been used to determine the significance of cumulative impacts with respect to beneficial or detrimental effects. An exception to this is the social impacts which used the matrix outlined in Section 23.2.5.
- Where cumulative impacts were deemed to be of 'medium' or 'high' significance, additional mitigation measures were proposed, beyond those already proposed by the relevant specific matter assessments.

23.2.2 Specific matter approach to cumulative impact assessment

A summary of the assessment approach adopted for each specific matter in assessing cumulative impacts for the Project is presented in Table 23-1.

TABLE 23-1 SPECIFIC MATTER APPROACH TO CUMULATIVE IMPACT ASSESSMENT

Specific matter	Location of assessment	Assessment approach	Assessment matrix
Land use and tenure	Section 23.3.1	Qualitative	Inland Rail (Section 23.2.4)
Land resources	Section 23.3.2	Qualitative	Inland Rail (Section 23.2.4)
Landscape and visual amenity	Section 23.3.3	Qualitative	Inland Rail (Section 23.2.4)
Flora and fauna	Section23.3.4	Quantitative	Inland Rail (Section 23.2.4)
Air quality (construction only)[1]	Section 23.3.5	Qualitative, but supported by quantitative baseline assessment	Inland Rail (Section 23.2.4)
Surface water	Section 23.3.6	Qualitative, but supported by quantitative baseline assessment	Inland Rail (Section 23.2.4)
Flooding and geomorphology	Sections 23.3.7.1 and 23.3.7.2	Quantitative	N/A – included in assessment of Project impacts of Chapter 14: Flooding and Geomorphology
Groundwater	Section 23.3.8	Qualitative, but supported by quantitative baseline assessment	Inland Rail (Section 23.2.4)
Noise and vibration	Section 23.3.9	Qualitative, but supported by quantitative baseline assessment	Inland Rail (Section 23.2.4)
Social	Section 23.3.10	Qualitative	*Social Impact Assessment Guideline for State significant mining, petroleum production and extractive industry development and SIA Scoping Tool* (NSW Department of Planning and Environment (DPE, 2017) (Section 23.2.5)
Economics	Section 23.3.11	Qualitative, but supported by quantitative baseline assessment	N/A – assessed via qualitative discussion due to the potential fluidity of future economic scenarios
Indigenous heritage	N/A	Qualitative	N/A – identified and managed under a relevant approved Indigenous Cultural Heritage Management Plan developed with the relevant Aboriginal Party in accordance with the Indigenous cultural heritage duty care requirements under the *Aboriginal Cultural Heritage Act 2003* (Qld) for the Project
Non-Indigenous heritage	Section 23.3.12	Qualitative	Inland Rail (Section 23.2.4)
Traffic, transport and access	Section 23.3.13	Qualitative	Inland Rail (Section 23.2.4)
Hazard and risk	Section 23.3.14	Qualitative	Inland Rail (Section 23.2.4)
Waste and resource management	Section 23.3.15	Qualitative	Inland Rail (Section 23.2.4)

Table note:
1. Operational air quality cumulative impacts included in assessment of Project impacts (Chapter 12: Air Quality)

23.2.3 Selection criteria

Projects identified as assessable, and therefore included within the CIA, meet either one or more of the following selection criteria at the time of receiving the request for additional information from the Coordinator-General on the draft EIS:

- 'State significant' or 'strategic' projects (i.e. coordinated projects under the *State Development and Public Works Organisation Act 1971* (Qld)) that are in the public domain as being planned, constructed or operated at the time of the assessment
- Additional projects that have been deemed to be of local significance, as occurring through consultation with community groups and stakeholders including:
  - projects subject to approval under the *Planning Act 2016* (Qld) and listed in the Goondiwindi Regional Council (GRC) and Toowoomba Regional Council (TRC) development application databases
  - development projects undertaken by Economic Development Queensland
  - development within Priority Development Areas in accordance with the *Economic Development Act 2012* (Qld)
  - development within declared State Development Areas in accordance with the *State Development and Public Works Organisation Act 1971* (Qld)
  - infrastructure designation projects under the *Planning Act 2016* (Qld)
  - projects within the public register of environmental authorities under the *Environmental Protection Act 1994* (Qld) (EP Act)
  - Department of Transport and Main Roads (DTMR) infrastructure projects
  - private infrastructure facilities
  - development in accordance with the *Regional Planning Interests Act 2014* (Qld)
- Other Inland Rail projects immediately adjacent to the Project.

The following sections provide a description of the assessment matrices that have been adopted by the various specific matters when undertaking the CIA for the revised draft EIS.

23.2.4 Inland Rail assessment matrix

For each specific matter, aspects such as the probability, duration, and magnitude/intensity of the impacts have been considered, as well as the sensitivity of the receiving environment. For each of these aspects, a relevance factor score of 'low', 'medium' or 'high' has been determined in accordance with the assessment matrix shown in Table 23-2.

The relevance factors have been determined by using professional judgement applied by specific matter teams. The sum of the relevance factors determines the impact significance and likely management and/or monitoring requirement, which are summarised in Table 23-3.

This two-step approach is intended to provide structure to an otherwise subjective assessment, enabling the significance of potential cumulative impacts to be categorised, thus guiding the management and/or monitoring requirements for that specific matter. The intent is not to replicate or replace the compliance, risk or significance assessment that is conducted for each specific matter, as identified in Chapter 8 to Chapter 22 of the revised draft EIS.

For example, if a specific matter such as groundwater is considered to have a probability of impact of 2, duration of impact of 3, magnitude/intensity of impact of 1 and a sensitivity of receiving environment of 1, the significance of impact would be classified as 'medium' (2+3+1+1 = 7), for which mitigation measures and specific management practices will likely be required.

TABLE 23-2 INLAND RAIL ASSESSMENT MATRIX

Aspect	Relevance factor		
	Low	Medium	High
Probability of impact	1	2	3
Duration of impact	1	2	3
Magnitude/Intensity of impact	1	2	3
Sensitivity of receiving environment	1	2	3

TABLE 23-3 IMPACT SIGNIFICANCE

Impact significance	Sum of relevance factors	Management or monitoring requirement
Low	1 to 6	Negative impacts need to be managed by standard environmental management practices. Monitoring to be part of general Project monitoring program.
Medium	7 to 9	Mitigation measures likely to be necessary and specific management practices to be applied. Targeted monitoring program required, where appropriate.
High	10 to 12	Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Targeted monitoring program required, where appropriate.

The key mitigation measures to reduce the potential cumulative impacts of the Project that are identified in this chapter are presented in the mitigation measures sections of Chapter 8 to Chapter 22 and in Chapter 24: Draft Outline Environmental Management Plan (draft Outline EMP). When assessing potential impacts from other projects, it is reasonably assumed that these projects will comply with their respective conditions of approval from the relevant regulators and so have an acceptable and similar level of impact mitigation to the Project.

23.2.5 Social impact assessment matrix

The Queensland *Social Impact Assessment Guideline* (Department of State Development, Infrastructure, Local Government and Planning, 2018), which the social impact assessment uses as a guideline for the assessment of social impacts, does not include a significance or risk-assessment matrix. Therefore, the social risk matrix from the NSW *Social Impact Assessment Guideline for State significant mining, petroleum production and extractive industry development* (NSW DPE, 2017), as shown in Table 23-4, has been applied in the assessment of the cumulative impacts for social. Having been adopted for the assessment of Project risks, this same social risk matrix has then been adopted for the assessment of cumulative social impacts that are presented in Section 23.3.10.

The likelihood of social impacts and opportunities occurring has been assessed with reference to the social baseline (e.g. findings regarding community vulnerabilities), stakeholder inputs and technical findings of the revised draft EIS.

'Consequence', as defined in Table 23-5, has been assessed based on how the social impact may be experienced by the relevant stakeholders, considering the:

- Duration of impacts and benefits, being either short-term (during construction) or long-term (during operation)
- Sensitivity, including specific vulnerabilities and resilience to impacts
- Severity of potential effects on stakeholders and magnitude of potential benefits.

TABLE 23-4 SOCIAL RISK MATRIX

Likelihood	Consequence level				
	1 Minimal	2 Minor	3 Moderate	4 Major	5 Catastrophic
A Almost certain	A1 (High)	A2 (High)	A3 (Extreme)	A4 (Extreme)	A5 (Extreme)
B Likely	B1 (Moderate)	B2 (High)	B3 (High)	B4 (Extreme)	B5 (Extreme)
C Possible	C1 (Low)	C2 (Moderate)	C3 (High)	C4 (Extreme)	C5 (Extreme)
D Unlikely	D1 (Low)	D2 (Low)	D3 (Moderate)	D4 (High)	D5 (High)
E Rare	E1 (Low)	E2 (Low)	E3 (Moderate)	E4 (High)	E5 (High)
	Project benefits and opportunities				

Source: Social Impact Assessment Guideline for State significant mining, petroleum production and extractive industry development and SIA Scoping Tool (NSW DPE, 2017)

TABLE 23-5 CONSEQUENCE DEFINITIONS

Rating	Impact (-)	Benefit (+)
Minimal	Local, small-scale, easily reversible change on social characteristics, or the values of the community, or communities, of interest can easily adapt or cope with change	Local small-scale opportunities emanating from the Project that the community can readily pursue and capitalise on
Minor	Short-term recoverable changes to social characteristics and values of the communities of interest, or the community has substantial capacity to adapt and cope with change	Short-term opportunities emanating from the Project
Moderate	Medium-term recoverable changes to social characteristics and values of the communities of interest, or the community has some capacity to adapt and cope with change	Medium-term opportunities emanating from the Project
Major	Long-term recoverable changes to social characteristics and values of the community, or communities, of interest, has limited capacity to adapt and cope with change	Long-term opportunities emanating from the Project
Catastrophic	Irreversible changes to social characteristics and values of the communities of interest, or the community has no capacity to adapt and cope with change	N/A

Source: Adapted from the Queensland Social Impact Assessment Guideline (Department of State Development, Infrastructure, Local Government and Planning, 2018).

23.2.6 Assessable projects

A number of projects have been identified for consideration for their potential to contribute to cumulative impacts, in combination with the Project. These assessable projects have been included based on the selection criteria listed in Section 23.2.3.

One project, the Regional quarantine facility was determined to not contribute to cumulative impacts of the Project and is not listed in Table 23-6.

The remaining twenty-seven assessable projects have the potential to contribute to cumulative impacts and are summarised in Table 23-6. These assessable projects are current as of receiving the request for additional information from the Coordinator-General on the draft EIS.

Projects that are already operational are not traditionally considered in a CIA, as their operation is included in the baseline assessments for an impact assessment (i.e. included in the existing environment). Some operational projects, however, have been included in the assessable projects due to known proposed or planned expansion or maintenance works or legacy construction impacts.

The location of each assessable project is shown in Figure 23-1 to illustrate the potential spatial overlap, while Table 23-7 presents the anticipated construction timing of each of the assessable projects in relation to the Project to gain an appreciation of the potential temporal overlap.

TABLE 23-6 ASSESSABLE PROJECTS

Projects	Location	Description	Status[1]	CIA assumed construction dates and jobs[1]	Operation years and jobs[1]
North Star to NSW/QLD Border (Inland Rail)	Rail alignment from North Star, NSW to the NSW/QLD border Adjoins the Project alignment at the southern end, located at the NSW/QLD border	New 37 kilometre (km) rail corridor to connect North Star (NSW) to the Queensland Rail (QR) South West Rail Line just north of the NSW/QLD border.	Reference design and draft EIS	2021 to 2024 300 peak full-time equivalent (FTE)	>100 years 15 FTE
Kagaru to Acacia Ridge and Bromelton (K2ARB) (Inland Rail)[4]	Rail alignment from Kagaru to Acacia Ridge, Queensland 113 km to the southeast of chainage (Ch) 210.48 km of the Project	Enhancements to, as well as commissioning of, dual-gauge operations along the existing interstate track between Kagaru and Acacia Ridge. The project involves 49 km of existing track to be enhanced, enabling double-stacking capability along the existing interstate route both south from Kagaru to Bromelton and north from Kagaru to Brisbane's major intermodal terminal at Acacia Ridge. It extends across three local government areas (LGAs)—Scenic Rim, Logan and Brisbane.	Reference design	2026 to 2028 Unknown	>100 years 15 FTE
Calvert to Kagaru (Inland Rail)[2]	Rail alignment from Calvert to Kagaru, Queensland 70 km to the southeast of Ch 210.48 km of the Project	New 53 km dual-gauge track from Calvert to Kagaru to provide convenient access for freight to major proposed industrial developments at Ebenezer in the City of Ipswich, and at Bromelton near Beaudesert in the Scenic Rim Region. The project includes a 1.1 km long tunnel through the Teviot Range.	Reference design and draft EIS	2024 to 2028 660 peak FTE	>100 years 20 FTE
Helidon to Calvert (Inland Rail)[2]	Rail alignment from Helidon to Calvert, Queensland 26 km to the east of Ch 210.48 km of the Project	New 47 km dual-gauge rail line connecting Helidon (east of Toowoomba) with Calvert (near Ipswich), via Placid Hills, Gatton, Forest Hill, Laidley and Grandchester, extending through the LGAs of Lockyer Valley and Ipswich. The project includes a 1.1 km long tunnel to create an efficient route through the steep terrain of the Little Liverpool Range.	Reference design and draft EIS	2024 to 2028 410 peak FTE	>100 years 15 FTE
Gowrie to Helidon (Inland Rail)[2]	Rail alignment from Gowrie to Helidon, Queensland Adjoins at the northern point of the Project alignment at Ch 210.48 km	New 26 km dual-gauge track between Gowrie (north-west of Toowoomba) and Helidon (east of Toowoomba), extending through the LGAs of Toowoomba and Lockyer Valley. The project includes a 6.38 km long tunnel to create an efficient route through the steep terrain of the Toowoomba Range.	Reference design and draft EIS	2024 to 2028 596 peak FTE	>100 years 15 FTE

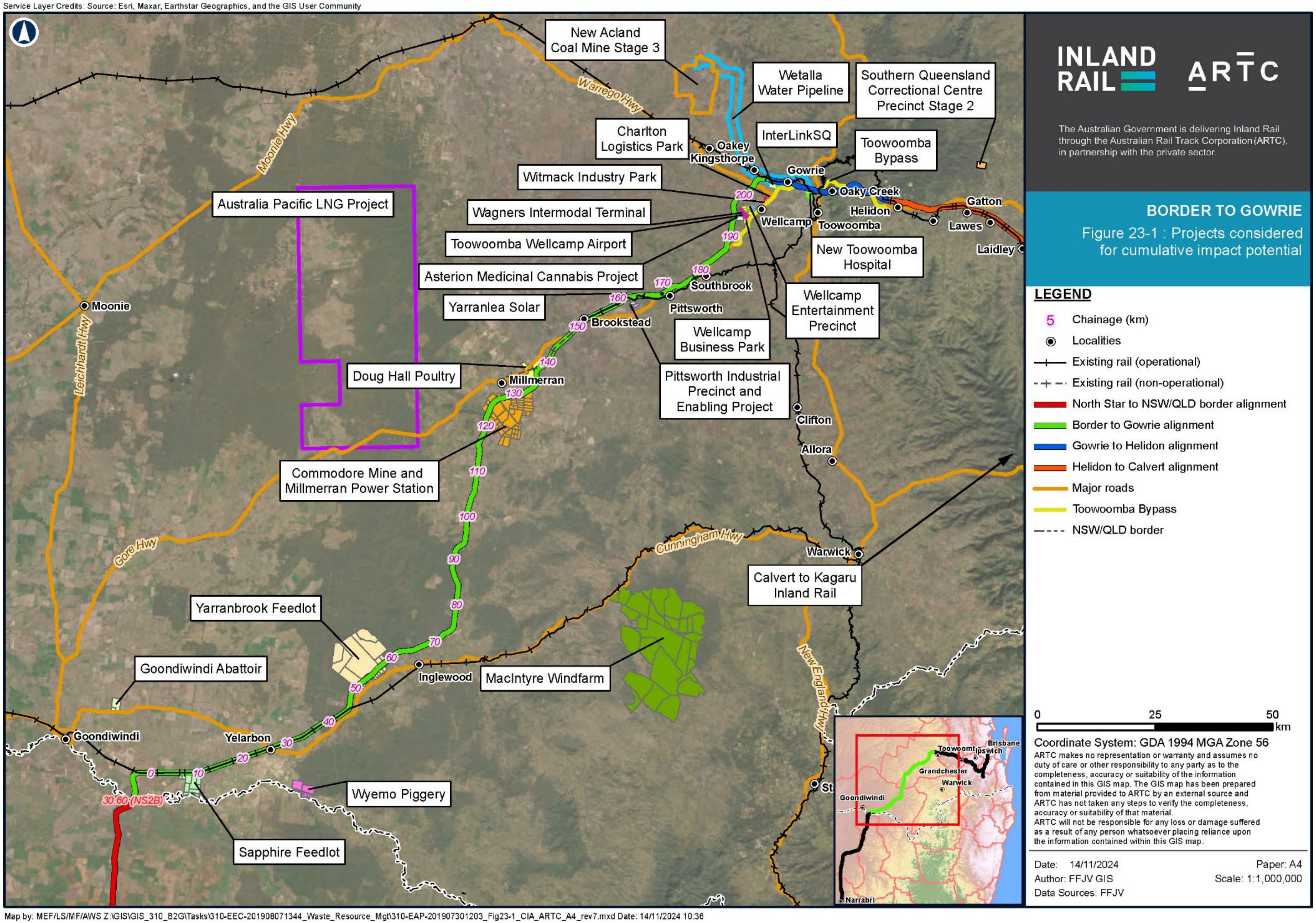
Projects	Location	Description	Status[1]	CIA assumed construction dates and jobs[1]	Operation years and jobs[1]
MacIntyre Windfarm	Karara, Queensland 40 km east of Ch 80.00 km of the Project, 10 km south of Karara	The Wind Farm Precinct will span approximately 40,000 hectares (ha), predominantly built on sheep farming land. The MacIntyre Wind Farm is expected to generate 1,026 megawatts (MW), using up to 120 turbines.	Construction	2022 to 2024 640 FTE	>30 years 14 FTE
InterLinkSQ	13 km west of Toowoomba Adjacent to Ch 210.48 km of the Project.	A 200 ha transport, logistics and business hub. Located on the narrow-gauge regional rail network and interstate network. Located at the junction of the Gore, Warrego and New England Highways.	Construction	Commenced May 2022 and will continue development until Inland Rail is operational in 2028. n/a	Ongoing 1,500 FTE Up to 4,000 FTE including indirect jobs
Wagners Intermodal Terminal	Wellcamp Airport, Queensland East of Ch 196.00 km of the Project	Major freight terminal, designed to benefit the freight network and future Inland Rail. The terminal will be 24/7 facility, designed to operate 78,000 containers for almost 400 freight customers. Utilising approximately 150 locomotives and 1,500 wagons. Unique features of Wagners Intermodal terminal are a 2.7 km frontage for 1,800 m freight trains, a daily-use fully licensed and bonded international air cargo terminal and reach up to 500,000 containers capacity by 2040.	Construction	Unknown 240 FTE	Ongoing 400 FTE
New Acland Coal Mine Stage[3]	35 km northwest of Toowoomba 18 km north of Ch 210.48 km of the Project	Expansion of the existing New Acland open-cut coal mine to up to 7.5 million tonnes per annum.	EIS approval with conditions. Q4 2021, Queensland Court recommends environmental conditions be reassessed.	The mine is operational. Potential for Stage 3 expansion works 600 peak FTE	Sequential development of resource areas expected to extend coal production until 2042. 400 FTE
Australia Pacific LNG Project	Walloons gas fields (approximately 20 km west of Millmerran) 13 km west of the Project footprint	Integrated liquified natural gas (LNG) project. The Walloons gas fields, located to the west of the Project, supplies coal seam gas to support the LNG facility on Curtis Island.	EIS approved, with conditions, in 2011 Operational, but subject to continued expansion	Project started operation in 2015, but subject to continual gas field development 2,100 peak FTE	Expected project life of 30 years 700 peak FTE (in field) 200 peak FTE (across hubs in Brisbane, Miles and Roma)

Projects	Location	Description	Status[1]	CIA assumed construction dates and jobs[1]	Operation years and jobs[1]
Toowoomba Bypass	The 41 km long bypass route extends from the Warrego Highway at Helidon Spa in the east to the Gore Highway at Athol in the west, via Charlton 1 km to south and east of Ch 126.00 km of the Project	This bypass takes heavy vehicle through-traffic around the north of Toowoomba.	Operational	2015 to 2019 1,800 FTE	Ongoing n/a
New Toowoomba Hospital	Baillie Henderson Hospital campus, Toowoomba	A new $1.3 billion hospital announced as part of the 2022/23 State Budget. The re-developed 75 ha campus will include multidisciplinary health services, research, education, commercial and community recreation spaces.	Construction	2022 to 2027 3,100 FTE	Ongoing from second half of 2027 Unknown
Toowoomba Wellcamp Airport	Wellcamp, Queensland 1 km east of the Project footprint	Airport servicing Toowoomba, promoting interstate, intrastate and international connection for the Darling Downs, Granite Belt, Surat Basin and Southern Downs regions.	Operational	2013 to 2014 n/a	Ongoing n/a
Wellcamp Business Park	Wellcamp, Queensland 1.5 km east of Ch 196.00 km of the Project	A 500 ha industrial and commercial park that forms part of the Toowoomba Enterprise Hub. The business park is located in close proximity to the Toowoomba Wellcamp Airport and other major transportation infrastructure.	Operational	2016 to 2018 30 FTE	Ongoing 30 FTE
Witmack Industry Park and Charlton Logistics Park	Wellcamp, Queensland 3 km southeast of Ch 200.00 km of the Project (Witmack Industry Park) Charlton, Queensland 3 km south of Ch 200.00 km of the Project (Charlton Logistics Park)	The Witmack Industry Park is a large industrial land development that offers large industrial land parcels. Business situated within the Witmack Industrial Park include the Toowoomba Pulse Data Centre. The Charlton Logistics Park is part of the Toowoomba Enterprise Hub and provides fully serviced 2 ha sites and is well situated for potential transport and logistics operators due to its proximity to transport infrastructure.	Operational	2016 to 2018 30 FTE	Ongoing 30 FTE

Projects	Location	Description	Status[1]	CIA assumed construction dates and jobs[1]	Operation years and jobs[1]
Asterion Medicinal Cannabis Facility	Wellcamp, Queensland Adjoins the Project footprint 1 km south of Toowoomba–Cecil Plains Road, east of Ch 196.00 km of the Project	A high-tech medicinal cannabis cultivation, research and manufacturing facility. The project involves infrastructure construction spanning approximately 71.0 ha to produce 20,000 plants per day at full capacity. Medicinal-grade cannabis grown at the facility will be manufactured into a range of medicinal products, including single patient packs, cannabis oils, gels, salts and related products, destined solely for the medicinal market. This facility is anticipated to be the largest facility of its kind in the world. Major Project status granted 14 July 2020.	Approved	Unknown 800 FTE	Ongoing 300 FTE
Commodore Mine and Millmerran Power Station–expansion	Domville, Queensland Intersects the Project, located at approximately Ch 122.00 km, primarily to the east.	The Commodore Mine is an open-cut coal mine that provides coal for the 850 MW Millmerran Power Station. The Millmerran Power Station is a coal-fired power station that supplies enough electricity to power approximately 1.1 million homes (Power Technology, 2018).	Operational	Ongoing to 2056 n/a	Ongoing 50 FTE
Doug Hall Poultry	Millmerran, Queensland Intersects the Project footprint, located primarily to northwest of Ch 138.00 km of the Project.	Poultry farming operation with capacity of approximately 20,000 chickens. Operations include egg grading, a feedmill with output of 1,500 tonnes per week, piggery, cropping and solar farm.	Operational	n/a	Ongoing ~200 FTE
Yarranbrook Feedlot	Whetstone, Queensland Intersects the Project footprint, located predominantly to the north	Cattle feedlot licenced for 25,000 heads	Operational	n/a	Ongoing n/a
Wyemo Piggery	Glenarbon, Queensland 8 km south of Ch 30.00 km of the Project footprint	Piggery with approval for 55,000 pig units.	Approved, with conditions, by GRC	Unknown	Ongoing once complete Unknown
Goondiwindi Abattoir	Goondiwindi, Queensland 19 km north-west of Ch 1 km of the Project footprint	A new beef abattoir located on the outskirts of Goondiwindi with beef processing of up to 72,000 tonnes per year.	Approved, with conditions, by GRC	Unknown	Unknown 380 FTE

Projects	Location	Description	Status[1]	CIA assumed construction dates and jobs[1]	Operation years and jobs[1]
Wetalla Water Pipeline[3]	From the Wetalla Wastewater Reclamation Facility in Toowoomba to the New Acland coal mine, 35 km northwest of Toowoomba Adjacent to Ch 210.48 km of the Project	A 45 km underground water pipeline to supply up to 5,500 megalitres of treated wastewater to the New Acland coal mine.	EIS approved, with conditions, in 2008 The Wetalla Water Pipeline is completed and operational	2010 to 2013 n/a	Ongoing n/a
Pittsworth Industrial Precinct and Enabling Project[3]	Pittsworth, Queensland 500 m to the south of the Project footprint, west of Ch 160.00 km of the Project.	Road and sewerage upgrades at the Pittsworth Industrial Precinct to allow for industrial land for industries servicing agriculture and the wider region.	Operational	2017 to 2019 Unknown	Ongoing ~30 FTE
Sapphire Feedlot[3]	Kildonan, Queensland Adjacent to the south of the Project at Ch 10.00 km.	Cattle feedlot that had a 6,000 head capacity, which expanded to 20,000 head in 2020.	Operational	2018 to 2020 n/a	Ongoing n/a
Yarranlea Solar[3]	500 m north of Project Yarranlea, Queensland Intersects the Project footprint, located Ch 163.5 km at Yarranlea Road, Yarranlea	Solar Farm Stage 1 will span over 250 ha area consisting of 360,000 solar panels. Projected to have a generation capacity of up to 100 MW once completed. Estimated to power 32,000 homes.	Operational	2018 to 2019 200 FTE	Ongoing 5 FTE
Southern Queensland Correctional Centre Precinct Stage Two[5]	12 km north east of Gatton, Queensland 50 km west of Project	Construction of a new 1,004-cell, high security facility for mail prisoners.	Construction	2021-2023	Ongoing 500 FTE
Wellcamp Entertainment Precinct[5]	Wellcamp, Queensland 2.4 km east of the Project	Planned to be Queensland's largest entertainment precinct, designed to hold 40,000 people for major events and house 5,000 in on site accommodation.	Proposed	2022 to 2032 130 FTE	Ongoing 2,500 FTE

Table notes:
1. Information sourced and accurate at the time of receiving the request for additional information from the Coordinator-General on the draft EIS (December 2021).
2. ARTC acknowledge that details and construction dates are subject to change for these projects in response to recommendations made in *The Delivery of Inland Rail: An Independent Review* (Schott, 2023). These projects have been retained in this CIA to ensure an appropriate level of conservatism for the purposes of cumulative impacts.
3. Project only assessed for the specific matter of flora and fauna due to the ongoing cumulative impacts to ecological values and processes during operation.
4. K2ARB is only subject to Section 23.3.13 Traffic, Transport and Access CIA.
5. Project only assessed for the specific matters of social and economics due to potential cumulative impacts associated with construction workforce requirements and potential for significant labour draws on South East Queensland's construction workforce.



Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
New Acland Coal Mine Stage 3
Wetalla Water Pipeline
Southern Queensland Correctional Centre Precinct Stage 2
Charlton Logistics Park
InterLinkSQ
Toowoomba Bypass
Witmack Industry Park
Australia Pacific LNG Project
Wagners Intermodal Terminal
Toowoomba Wellcamp Airport
Asterion Medicinal Cannabis Project
New Toowoomba Hospital
Yarranlea Solar
Wellcamp Entertainment Precinct
Wellcamp Business Park
Doug Hall Poultry
Pittsworth Industrial Precinct and Enabling Project
Commodore Mine and Millmerran Power Station
Calvert to Kagaru Inland Rail
Yarranbrook Feedlot
Goondiwindi Abattoir
MacIntyre Windfarm
Wyemo Piggery
Sapphire Feedlot
Oakey
Kingsthorpe
Gowrie
Oaky Creek
Helidon
Gatton
Lawes
Laidley
Wellcamp
Toowoomba
Southbrook
Pittsworth
Brookstead
Millmerran
Moonie
Clifton
Allora
Warwick
Inglewood
Yelarbon
Goondiwindi
Warrego Hwy
Moonie Hwy
Leichhardt Hwy
Gore Hwy
Cunningham Hwy
New England Hwy
30.60 (NS2B)
INLAND RAIL
ARTC
The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.
BORDER TO GOWRIE
Figure 23-1 : Projects considered for cumulative impact potential
LEGEND
Chainage (km)
Localities
Existing rail (operational)
Existing rail (non-operational)
North Star to NSW/QLD border alignment
Border to Gowrie alignment
Gowrie to Helidon alignment
Helidon to Calvert alignment
Major roads
Toowoomba Bypass
NSW/QLD border
0 25 50 km
Coordinate System: GDA 1994 MGA Zone 56
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Date: 14/11/2024
Paper: A4
Author: FFJV GIS
Scale: 1:1,000,000
Data Sources: FFJV
Brisbane
Ipswich
Toowoomba
Grandchester
Warwick
Goondiwindi
Narrabri
Map by: MEF/LS/MF/AWS Z:\GIS\GIS_310_B2G\Tasks\310-EEC-201908071344_Waste_Resource_Mgt\310-EAP-201907301203_Fig23-1_CIA_ARTC_A4_rev7.mxd Date: 14/11/2024 10:36

TABLE 23-7 ASSESSABLE PROJECT TIMING

Project	Estimated construction timeframe	Project construction Year				
		2024	2025	2026	2027	2028
NSW/QLD Border to Gowrie (the Project)	2024 to 2028					
North Star to NSW/QLD Border	2024 to 2028					
Kagaru to Acacia Ridge and Bromelton[3]	2024 to 2028					
Calvert to Kagaru[1]	2024 to 2028					
Helidon to Calvert[1]	2024 to 2028					
Gowrie to Helidon[1]	2024 to 2028					
MacIntyre Wind Farm	2022 to 2024					
InterLinkSQ	Continuing to 2028					
New Toowoomba Hospital	2022 to 2027					
Other projects[2]	**Project status**					
Wagners Intermodal terminal	Construction					
New Acland Coal Mine Stage 3	Operational – potential for expansion					
Australia Pacific LNG Project	Operational – potential for continual gas field development					
Toowoomba Bypass	Operational					
Toowoomba Wellcamp Airport	Operational					
Wellcamp Business Park	Operational					
Witmack Industry Park and Charlton Logistics Park	Operational					
Asterion Medicinal Cannabis Facility	Unknown					
Commodore Mine and Millmerran Power Station expansion	Operational – potential for annual maintenance shutdown and continual pit expansion ongoing to 2056					
Doug Hall Poultry	Operational					
Yarranbrook Feedlot	Operational					
Wyemo Piggery	Unknown					
Goondiwindi Abattoir	Unknown					
Wetalla Water Pipeline	Operational					
Pittsworth Industrial Precinct and Enabling Project	Operational					
Sapphire Feedlot	Operational					
Yarranlea Solar	Operational					
Southern Queensland Correctional Centre Precinct Stage 2	2021 to 2023					
Wellcamp Entertainment Precinct	2022 to 2032					

Table notes:
1. ARTC acknowledge that details and construction dates are subject to change for these projects in response to recommendations made in *The Delivery of Inland Rail: An Independent Review* (Schott, 2023). These projects have been retained in this CIA to ensure an appropriate level of conservatism for the purposes of cumulative impacts.
2. Projects that were considered in CIA, but do not have an overlap in construction timing, or the construction timing is unknown.
3. K2ARB is only subject to section 23.3.13 Traffic, Transport and Access cumulative impact assessment.

23.3 Cumulative impacts and mitigation measures

The following sections present the CIA undertaken for each specific matter, along with the recommended mitigation measures. The detailed assessment of each specific matter is provided in the revised draft EIS Chapter 8 to Chapter 22 and, where applicable, the supporting technical reports.

Each of the specific matters discussed in this section present the logic for which of the 27 projects have been considered relevant for their CIA.

Where the potential for cumulative impacts with other projects have been identified, mitigations that are within the control of ARTC have been proposed in the applicable mitigation tables. Where the identified potential cumulative impact is associated with another project in the Inland Rail Program, it is proposed that these potential impacts are managed through a combination of mitigation measures proposed for the Project, in isolation, and in addition to the implementation of Program-wide mitigation measures.

The projects that have been assessed for each specific matter through Section 23.3 are summarised in Table 23-8. Also presented in this table is the maximum cumulative impact significance for each project and the maximum cumulative impact significance, for each specific matter. The maximum impact significance is the highest impact significance rating across all potential impacts for that project.

TABLE 23-8 MAXIMUM CUMULATIVE IMPACT SIGNIFICANCE OF EACH PROJECT FOR EACH SPECIFIC MATTER

Project	Land use and tenure	Land resources	Landscape and visual amenity	Flora and fauna[1]	Air quality	Surface water	Flooding and Geomorphology[2]	Groundwater	Noise and vibration	Social[3]	Economics[2]	Non-Indigenous heritage	Traffic, transport and access	Hazard and risk	Waste management
Kagaru to Acacia Ridge and Bromelton (Inland Rail)													✓		
Calvert to Kagaru (Inland Rail)										✓	✓		✓		
Helidon to Calvert (Inland Rail)			✓	✓						✓	✓		✓		
Gowrie to Helidon Project (Inland Rail)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wetalla Water Pipeline				✓											
Wagners Intermodal Terminal			✓	✓		✓		✓	✓	✓	✓				
New Acland Coal Mine Stage 3			✓	✓		✓				✓	✓		✓		
Australia Pacific LNG Project			✓	✓							✓		✓		
Toowoomba Bypass				✓			✓								
InterLinkSQ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		
New Toowoomba Hospital				✓						✓	✓				
Toowoomba Wellcamp Airport				✓			✓								
Wellcamp Business Park				✓							✓				
Witmack Industry Park and Charlton Logistics Park				✓						✓	✓				
Asterion Medicinal Cannabis Facility		✓	✓	✓		✓	✓	✓	✓		✓		✓		
Commodore Mine and Millmerran Power Station - expansion	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		
Pittsworth Industrial Precinct and Enabling Project				✓											
Doug Hall Poultry				✓			✓								
Yarranbrook Feedlot				✓			✓								
Sapphire Feedlot				✓							✓				
Wyemo Piggery				✓						✓	✓		✓		
Yarranlea Solar				✓											

Project	Land use and tenure	Land resources	Landscape and visual amenity	Flora and fauna[1]	Air quality	Surface water	Flooding and Geomorphology[2]	Groundwater	Noise and vibration	Social[3]	Economics[2]	Non-Indigenous heritage	Traffic, transport and access	Hazard and risk	Waste management
MacIntyre Wind Farm				✓						✓	✓		✓		
Goondiwindi Abattoir			✓	✓		✓	✓			✓	✓		✓		
North Star to NSW/QLD Border (Inland Rail)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Southern Queensland Correctional Centre Precinct Stage 2										✓	✓				
Wellcamp Entertainment Precinct										✓	✓				
Maximum cumulative impact significance rating[4]	L	M	M	M	L	M	N/A	L	M	N/A	N/A	M	M	M	L

Table notes:

1. Cumulative impact significance scored in the aggregate only, not per project.
2. Cumulative impact significance has not been scored for individual projects or in the aggregate.
3. Social impacts identified using *Social Impact Assessment Guideline for State significant mining, petroleum production and extractive industry development and SIA Scoping Tool* (DPE, 2017) whereby the maximum cumulative impacts cannot be scored the same as other specific matters.
4. Highest cumulative impact category per specific matter from the listed projects.

L = Low (green highlighted cell), M = Medium/Moderate (yellow highlighted cell), H = High (orange highlighted cell). Shading is as per the relevant assessment matrix in Section 23.2.3 or Section 23.2.5 (social only).

23.3.1 Land use and tenure

For the purposes of land use and tenure, projects that directly interface with the Project and that will have temporal overlap in construction and/or expansion activities are considered to have the potential to result in cumulative impacts. Four of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to land use and tenure. The four identified projects are assessed in Table 23-9.

The combined land requirements of these projects have the potential to result in cumulative impacts associated with:

- Impacts on agricultural land (Agricultural Land Classification Class A, Class B and land within an important agricultural area (IAA))
- Impacts to Strategic Cropping Land (regional interest)
- Disruption to agricultural operations
- Impacts on accessibility within the wider road network and to private properties
- Temporary disruption to services and utilities.

It is recognised that the Project may contribute to cumulative impacts to land use and tenure, as the development of agricultural land cannot be fully mitigated or replaced in a like-for-like manner; however, the Project is consistent with the State land-use planning expectations for the area, having endeavoured to minimise potential land-use impacts through a rigorous route and alignment selection process.

The Project's potential impact on Class A and Class B land, along with the cumulative and flow-on effects of proposed non-agricultural development on agricultural activities, has been assessed. The Project's overall impact on agricultural land remains minimal, with less than 0.1 per cent of Class A agricultural land and land within an IAA in the Goondiwindi LGA are impacted, with the permanent footprint affecting less than 0.1 per cent of Class B agricultural land, and no temporary footprint traversing in Class B agricultural land. Similarly, in the Toowoomba LGA, the permanent footprint impacts 0.17 per cent of Class A agricultural land, 0.22 per cent of Class B agricultural land, and 0.19 per cent of land within an IAA. The potential flow-on effects include land fragmentation, impacts on animal husbandry and apiary sites, rural homesteads, stock routes, barrier fences, and other indirect impacts.

The potential cumulative impacts on individual property owners, affecting multiple properties during construction and operation, was assessed. The examination considered various factors, including property values, land use changes, disruptions to daily activities, and associated socio-economic effects. ARTC will consult with affected landowners to develop measures aimed at minimising impacts, such as changes in land tenure and use. With approximately 46 landowners facing multiple property impacts, detailed analysis of cumulative impacts will be conducted prior to construction works stage of the Project, focusing on property acquisition impacts and considering factors like property values, noise, and economic effects on agriculture and local businesses.

Overall, the significance of potential cumulative impacts is considered to be low and with identified mitigation measures applied, the residual land use and tenure impacts of the Project are expected to remain low both at a regional and State level.

TABLE 23-9 CUMULATIVE IMPACT ASSESSMENT FOR LAND USE AND TENURE

Project	Cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Loss of Strategic Cropping Land, Class A and Class B agricultural land within an IAA	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ Refining the Project footprint during detailed design to minimise the land required for the construction works and safe operation of the Project in proximity to the InterLinkSQ site ▸ Rehabilitation of land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) at the end of its use for construction, unless otherwise agreed with the relevant landowner ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan, as a component of the Construction Environmental Management Plan (CEMP) for the Project, to be cognisant of InterLinkSQ's adjoining activities and address cumulative impacts to agricultural land.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Disruption to agricultural operations	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through the development of individual property treatments in consultation with landowners/occupants, with respect to the management of cumulative construction activities on, or immediately adjacent to, private properties. These will detail any required adjustments to fencing, access, farm infrastructure or relocation of impacted structures, as required. Measures, where agreed, will be documented in individual property agreements.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Impacts on accessibility to the road network and to private properties	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Legal access to properties will be maintained. Alternative access to and from a public road will be provided to an equivalent standard where feasible and practicable. Alternative access arrangements will be developed in consideration of cumulative accessibility impacts, in combination with InterLinkSQ activities. ▸ ARTC will consult with the operators of InterLinkSQ to establish a shared understanding of construction, operation and maintenance schedules for both projects. This information sharing will be used to inform property owners, occupants and businesses in advance of the timing and scope of activities in their area; and potential impacts or interruptions to access or property operational arrangements.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Temporary disruptions to services and utilities	Probability of the impact	Low (1)	4	Low	Potential cumulative impacts will be managed through consultation with the operators of InterLinkSQ to establish a shared understanding for the utility and service requirements for each of the two projects during construction, operation and maintenance. This information sharing will be used to inform the optimal timing of temporary service disruptions and realignment/relocation of services, if either is required. This information sharing will also be used to inform property owners, occupants and businesses in advance of the timing and scope of disruptions to services and utilities in their area.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
Commodore Mine and Millmerran Power Station - expansion	Loss of Strategic Cropping Land, Class A and Class B agricultural land within an IAA	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ Refinement of the Project footprint during detailed design to minimise the land required for construction and safe operation of the Project in proximity to the Commodore Mine and Millmerran Power Station ▸ Rehabilitation of land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) at the end of its use for construction, unless otherwise agreed with the relevant landowner ▸ A Rehabilitation and Landscaping Management Plan will be developed and implemented for the Project, as a component of the CEMP, to be cognisant of plans for the adjoining Commodore Mine and Millmerran Power Station and addresses cumulative impacts to agricultural land.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Disruption to agricultural operations	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through the development of individual property treatments in consultation with landowners/occupants, with respect to the management of cumulative construction activities on or immediately adjacent to private properties. These will detail any required adjustments to fencing, access, farm infrastructure or relocation of impacted structures, as required. Measures, where agreed, will be documented in individual property agreements (or similar). It is noted that a large number of properties surrounding the Commodore Mine and Millmerran Power Station are owned and leased for private occupancy by entities that also have an ownership interest in the mine and power station.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Impacts on accessibility to the road network and to private properties	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ The detailed design process to maintain legal access to properties. Alternative access to and from a public road will be provided to an equivalent standard, where feasible and practicable. Alternative access arrangements will be developed in consideration of cumulative accessibility impacts, in combination with plans for the adjoining Commodore Mine and Millmerran Power Station. ▸ ARTC will consult with the tenure holders of the Commodore Mine and Millmerran Power Station to establish a shared understanding of construction, expansion, operation and maintenance schedules for both projects. This information sharing will be used to inform property owners, occupants and businesses in advance of the timing and scope of activities in their area; and potential impacts or interruptions to access or property operational arrangements.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Temporary disruptions to services and utilities	Probability of the impact	Low (1)	4	Low	Potential cumulative impacts will be managed through consultation with the tenure holders of the Commodore Mine and Millmerran Power Station to establish a shared understanding for the utility and service requirements foreach of the two projects during construction, operation and maintenance. This information sharing will be used to inform the optimal timing of temporary service disruptions and realignment/relocation of services, if either is required. This information sharing will also be used to inform property owners, occupants and businesses in advance of the timing and scope of disruptions to services and utilities in their area.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
North Star to NSW/QLD Border (Inland Rail)	Loss of Strategic Cropping Land, Class A and Class B agricultural land within an IAA	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ Refining both projects during detailed design to minimise the footprint to the extent required for the construction works and safe operation of the Project ▸ Rehabilitation of land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) at the end of its use for construction, unless otherwise agreed with the relevant landowner ▸ Rehabilitation and Landscaping Management Plans (or equivalent) will be prepared for both adjoining Inland Rail projects, and that these plans are complementary and are consistent with the Inland Rail Landscape and Rehabilitation Strategy ▸ Construction contract documentation for the adjoining Inland Rail projects will have clauses regarding the monitoring and defect correction for revegetated and rehabilitated areas, particularly in areas designated as Class A and Class B agricultural land or within an IAA, or equivalent land classifications.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Disruption to agricultural operations	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ The development of individual property treatments in consultation with landowners/occupants, with respect to the management of cumulative construction activities on, or immediately adjacent to, private properties. These will detail any required adjustments to fencing, access, farm infrastructure or relocation of impacted structures, as required. Measures, where agreed, will be documented in individual property arrangements. ▸ Requiring all site personnel to adhere to ARTC land access protocols and procedures and property agreements when entering private properties adjacent to the Project footprint.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Impacts on accessibility to the road network and to private properties	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Maintaining legal access to properties through the detailed design process. Alternative access to and from a public road will be provided to an equivalent standard where feasible and practicable. Alternative access arrangements will be developed in consideration of cumulative accessibility impacts associated with the adjoining Inland Rail projects. ▸ Disruptions to access during construction will be addressed through temporary diversions and onsite traffic management in consultation with the local community. Roads will only be closed permanently where the impact of diversions or consolidations is considered acceptable, or where the existing location is not considered safe and cannot reasonably be made safe. In consultation with landowners, an appropriate level of access will be maintained for agricultural businesses across and between properties affected by the Project. ▸ During construction, regular Project updates will be provided to stakeholders, including affected landowners, which forecast road works, road realignments and closures, and explain alternative routes to enable agricultural and other business operators to plan their travel with minimal disruptions. ▸ Depending on the compartmentalisation of contracts for the adjoining Inland Rail projects, ARTC will facilitate an open channel of communication between contractors to establish a shared understanding of construction, expansion, operation and maintenance schedules for both projects. This information sharing will be used to inform property owners, occupants and businesses in advance of the timing and scope of activities in their area and potential impacts or interruptions to access or property operational arrangements.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Temporary disruptions to services and utilities	Probability of the impact	Medium (2)	6	Low	Depending on the compartmentalisation of contracts for the adjoining Inland Rail projects, ARTC will facilitate an open channel of communication between contractors to establish a shared understanding of the utility and service requirements for each of the two projects during construction, operation and maintenance. This information sharing will be used to inform the optimal timing of temporary service disruptions and realignment/relocation of services, if either is required. This information sharing will also be used to inform property owners, occupants and businesses in advance of the timing and scope of disruptions to services and utilities in their area.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
Gowrie to Helidon (Inland Rail)	Loss of Strategic Cropping Areas, Class A and Class B agricultural land within an IAA	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ The design for both projects will be refined during detailed design to minimise the footprint to the extent required for the construction works and safe operation of the Project ▸ Land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) will be rehabilitated at the end of its use for construction, unless otherwise agreed with the relevant landowner ▸ Rehabilitation and Landscaping Management Plans (or equivalent) will be prepared for both adjoining Inland Rail projects, and that these plans are consistent with the Inland Rail Landscaping and Rehabilitation Strategy ▸ Construction contract documentation for the adjoining Inland Rail projects will have clauses regarding the monitoring and defect correction for revegetated and rehabilitated areas, particularly in areas designated as Class A and Class B agricultural or within an IAA, or equivalent land classifications.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Disruption to agricultural operations	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ The development of individual property treatments in consultation with landowners/occupants, with respect to the management of cumulative construction activities on or immediately adjacent to private properties. These will detail any required adjustments to fencing, access, farm infrastructure or relocation of impacted structures, as required. Measures, where agreed, will be documented in individual property agreements (or similar). ▸ All site personnel will be required to adhere to ARTC land access protocols and procedures, and property agreements, when entering private properties.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Impacts on accessibility to the road network and to private properties	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Maintaining legal access to properties through the detailed design process. Alternative access to and from a public road will be provided to an equivalent standard where feasible and practicable. Alternative access arrangements will be developed in consideration of cumulative accessibility impacts associated with the adjoining Inland Rail projects. ▸ Disruptions to access during construction will be addressed through temporary diversions and onsite traffic management in consultation with the local community. Roads will only be closed permanently where the impact of diversions or consolidations is considered acceptable, or where the existing location is not considered safe and cannot reasonably be made safe. In consultation with landowners, an appropriate level of access will be maintained for agricultural businesses across and between properties affected by the Project. ▸ During construction, regular Project updates will be provided to stakeholders, including affected landowners, which forecast road works, road realignments and closures, and explain alternative routes to enable agricultural and other business operators to plan their travel with minimal disruptions. ▸ Depending on the compartmentalisation of contracts for the adjoining Inland Rail projects, ARTC will facilitate an open channel of communication between contractors to establish a shared understanding of construction, expansion, operation and maintenance schedules for both projects. This information sharing will be used to inform property owners, occupants and businesses in advance of the timing and scope of activities in their area; and potential impacts or interruptions to access or property operational arrangements.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Temporary disruptions to services and utilities	Probability of the impact	Medium (2)	6	Low	Depending on the compartmentalisation of contracts for the adjoining Inland Rail projects, ARTC will facilitate an open channel of communication between contractors to establish a shared understanding of the utility and service requirements for each of the two projects during construction, operation and maintenance. This information sharing will be used to inform the optimal timing of temporary service disruptions and realignment/relocation of services, if either is required. This information sharing will also be used to inform property owners, occupants and businesses in advance of the timing and scope of disruptions to services and utilities in their area.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

23.3.2 Land resources

For the purposes of land resources, projects that directly interface the Project and that will have a temporal overlap in construction and/or expansion activities are considered to have the potential to result in cumulative impacts. Five of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to land resources. The five identified projects are assessed in Table 23-10.

Although the identified projects may have different land-resource impacts to the Project, the following impacts are likely to be common to each project if not managed appropriately:

- Land contamination
- Loss of soil resources
- Change to landform and topography
- Secondary salinity
- Erosion of soils.

Cumulative impacts on land resources are considered to be of low-to-medium significance (Section 23.2.3 for significance rating). Where cumulative impacts have been assessed as low significance there are unlikely to be long-term cumulative impacts, providing that all assessable projects apply mitigation measures that are consistent with those proposed for this Project (Chapter 9: Land Resources).

Matters including loss of soil resources, changes to landform and topography, erosion and weed management have been assessed as 'medium' significance. Initial controls for the management of these potential cumulative impacts are based on the implementation of the measures prescribed in Chapter 9: Land Resources. Consultation with potentially affected landowners and other stakeholders, including proponents of non-Inland Rail projects that interface with this Project, may result in additional mitigation measures of relevance being identified during the detailed design process. In such instances, additional mitigation measures will be incorporated into relevant components of the CEMP, if appropriate to do so (Table 23-10).

Overall, the significance of potential cumulative impacts is considered to be medium.

TABLE 23-10 CUMULATIVE IMPACT ASSESSMENT FOR LAND RESOURCES

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Leaks or spills leading to migration of contaminants through surface water/soil/ groundwater or increased human health risk through ingestion/ dermal contact	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through: ▸ Emergency response procedures, to be cognisant of InterLinkSQ's adjoining activities, will be developed and implemented ▸ Consulting with InterLinkSQ regarding scheduling of construction activities to minimise the potential for overlapping of high-risk activities.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Permanent loss of soil resources within the permanent footprint	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, to be cognisant of InterLinkSQ's adjoining activities and addresses cumulative impacts to agricultural land. ▸ Refining the Project footprint during detailed design to minimise the land required for the construction works and safe operation of the Project in proximity to the InterLinkSQ site. ▸ Land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) will be rehabilitated at the end of its use for construction, unless otherwise agreed with the relevant landowner.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Change to landform and topography	Probability of the impact	Medium (2)	7	Medium	The design levels of the Project will be assessed for compatibility with landform modifications and land management practices within the InterLinkSQ site. Cross-drainage and longitudinal drainage provided as part of the Project will need to be developed to accommodate for overland flows that move into the Project footprint from the adjoining InterLinkSQ site.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Secondary salinity	Probability of the impact	Medium (2)	6	Low	▸ The potential for the Project to contribute to secondary salinity will be managed through the development and implementation a Soil Management Plan. ▸ Site levels within the Project footprint will be established to prevent the inadvertent ponding of water.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Erosion	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a Certified Practitioner in Erosion and Sediment Control (CPESC) in accordance with the *Best Practice Erosion and Sediment Control* (International Erosion Control Association (IECA), 2008). ▸ Consultation with InterLinkSQ regarding the scheduling of construction activities and the identification of proposed erosion control measures with activities and land management measures on the adjoining site. ▸ Monitoring the effectiveness of erosion controls that are within the Project footprint during construction. ▸ Monitoring the ongoing effectiveness of permanent erosion control measures as part of ARTC's rail corridor maintenance program.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
Commodore Mine and Millmerran Power Station - expansion	Leaks or spills leading to migration of contaminants through surface water/soil/ groundwater or increased human health risk through ingestion/ dermal contact	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through: ▸ Emergency response procedures, to be cognisant of Intergen's adjoining activities, will be developed and implemented. ▸ Consulting with Intergen regarding scheduling of construction activities to minimise the potential for overlapping of high-risk activities.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Permanent loss of soil resources within the permanent footprint	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, to be cognisant of with Intergen's adjoining activities and addresses cumulative impacts to agricultural land. ▸ Refining the Project footprint during detailed design to minimise the land required for the construction works and safe operation of the Project in proximity to the Commodore Mine site. ▸ Land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) will be rehabilitated at the end of its use for construction, unless otherwise agreed with the relevant landowner.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Change to landform and topography	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through assessment of design levels for compatibility with landform modifications and land management practices within the Commodore Mine site. Cross-drainage and longitudinal drainage provided as part of the Project will need to be developed to accommodate for overland flows that move into the Project footprint from the adjoining Commodore Mine site or vice versa
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Secondary salinity	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through the development and implementation of a Soil Management Plan. Site levels within the Project footprint will be established to prevent the inadvertent ponding of water.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Erosion	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with IECA (2008). ▸ Consultation with Intergen regarding the scheduling of construction activities and the identification of proposed erosion control measures with activities and land management measures on the adjoining site. ▸ Monitoring the effectiveness of erosion controls that are within the Project footprint will be monitored by the contractor during construction. ▸ Monitoring the ongoing effectiveness of permanent erosion control measures as part of ARTC's rail corridor maintenance program.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
North Star to NSW/QLD Border (Inland Rail)	Leaks or spills leading to migration of contaminants through surface water/soil/ groundwater or increased human health risk through ingestion/ dermal contact	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through facilitation of discussions between contractors for adjoining Inland Rail projects regarding the scheduling of construction activities and the development and implementation of compatible emergency response procedures.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Permanent loss of soil resources within the permanent footprint	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, that addresses cumulative impacts to agricultural land. ▸ Refining the Project footprint during detailed design to minimise the land required for the construction works and safe operation of the Project. ▸ Land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas and storage areas) will be rehabilitated at the end of its use for construction, unless otherwise agreed with the relevant landowner.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Change to landform and topography	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through assessment of design levels for identification with landform modifications and land management practices on surrounding land. Cross-drainage and longitudinal drainage provided as part of the Project will need to be developed to accommodate for overland flows that move into the Project footprint. ARTC will continue to liaise with the adjoining projects to minimise and where practicable, optimise any impacts to landforms and topography.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Secondary salinity	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through the development and implementation of a Soil Management Plan. Site levels within the Project footprint will be established to prevent the inadvertent ponding of water.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Erosion	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the IECA (2008). ▸ Facilitating discussions between contractors for the adjoining packages regarding the scheduling of construction activities and the identification of proposed erosion control measures. ▸ Monitoring the effectiveness of erosion controls that are within the Project footprint during construction. ▸ Monitoring the ongoing effectiveness of permanent erosion control measures as part of ARTC's rail corridor maintenance program.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Gowrie to Helidon (Inland Rail)	Leaks or spills leading to migration of contaminants through surface water/soil/ groundwater or increased human health risk through ingestion/ dermal contact	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through facilitation of discussions between contractors for adjoining Inland Rail projects regarding the scheduling of construction activities and the development and implementation of compatible emergency response procedures.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Permanent loss of soil resources within the permanent footprint	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, that addresses cumulative impacts to agricultural land. ▸ Refining the Project footprint during detailed design to minimise the land required for the construction works and safe operation of the Project. ▸ Land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) will be rehabilitated at the end of its use for construction, unless otherwise agreed with the relevant landowner.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Change to landform and topography	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through assessment of design levels for compatibility with landform modifications and land management practices on surrounding land. Cross-drainage and longitudinal drainage provided as part of the Project will need to be developed to accommodate for overland flows that move into the Project footprint. ARTC will continue to liaise with the adjoining projects to minimise and where practicable, optimise any impacts to landforms and topography.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Secondary salinity	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through the development and implementation of a Soil Management Plan. Site levels within the Project footprint will be established to prevent the inadvertent ponding of water.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Erosion	Probability of the impact	Medium (2)	7	Medium	▸ ARTC will develop and implement location-specific erosion and sediment control measures, developed by a CPESC in accordance with IECA (2008). ▸ ARTC will facilitate discussions between contractors for the adjoining packages regarding the scheduling of construction activities and the identification of proposed erosion control measures. ▸ The effectiveness of erosion controls that are within the Project footprint will be monitored by the contractor during construction. ▸ Permanent erosion control measures will be monitored for ongoing effectiveness as part of ARTC's rail corridor maintenance program.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
Asterion Medicinal Cannabis Project	Leaks or spills leading to migration of contaminants through surface water/soil/ groundwater or increased human health risk through ingestion/ dermal contact	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through: ▸ Emergency response procedures, to be cognisant of Asterion's adjoining activities will be developed and implemented ▸ Consulting with Asterion regarding scheduling of construction activities to minimise the potential for overlapping of high-risk activities.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Permanent loss of soil resources within the permanent footprint	Probability of the impact	Low (1)	6	Low	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, to be cognisant of Asterion's adjoining activities and addresses cumulative impacts to agricultural land. ▸ Refining the Project footprint during detailed design to minimise the land required for the construction works and safe operation of the Project in proximity to the Asterion site. ▸ Land that is temporarily disturbed in support of construction activities (e.g. for access tracks, laydown areas) will be rehabilitated at the end of its use for construction, unless otherwise agreed with the relevant landowner.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Change to landform and topography	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through assessment of design levels for compatibility with landform modifications and land management practices within the Asterion site. Cross-drainage and longitudinal drainage provided as part of the Project will need to be developed to accommodate for overland flows that move into the Project footprint from the adjoining Asterion site.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Secondary salinity	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through the development and implementation of a Soil Management Plan. Site levels within the Project footprint will be established to prevent the inadvertent ponding of water.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Erosion	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through: ▸ Location-specific erosion and sediment control measures will be developed by a CPESC in accordance with IECA (2008). ▸ Consultation with Asterion regarding the scheduling of construction activities and the identification of proposed erosion control measures with activities and land management measures on the adjoining site. ▸ Monitoring the effectiveness of erosion controls that are within the Project footprint during construction. ▸ Monitoring the ongoing effectiveness of permanent erosion control measures as part of ARTC's rail corridor maintenance program.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

23.3.3 Landscape and visual amenity

An area of 50 km (approximately 30 minutes' drive) beyond the Project footprint was established for the assessment of landscape and visual amenity cumulative impacts. Beyond this distance, it is considered that there would be no reasonable expectation of cumulative landscape or visual amenity impact being registered by a receptor.

For the purposes of landscape and visual amenity, projects that are within the assessment area and that will have temporal overlap in construction or expansion activities or spatial impacts in operations are considered to have potential to result in cumulative impacts. Ten of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to landscape and visual amenity. The ten projects are assessed in Table 23-11.

For each of these projects, the potential for the following cumulative impacts has been considered:

- Temporal construction impacts–presence of construction traffic, workforce and machinery operating on adjoining projects at the same time
- Spatial operational impacts–the residual impact of the visibility of infrastructure of identified projects to sensitive receptors, including increases in the visibility of infrastructure as a result of the introduction of additional visual receptors (including residential receptors) into an area and with potential to view the Project.

It is noted that due to the low level of lighting proposed for the Project, there are not anticipated to be any significant cumulative lighting impacts, and therefore, this has not been considered further.

The following factors contributed to this determination:

- In terms of temporal (construction) impact, it is likely that the other sections of Inland Rail (i.e. North Star to NSW/QLD Border, Gowrie to Helidon and Helidon to Calvert), the Goondiwindi abattoir and InterLinkSQ may have some overlap in construction periods. In addition, ongoing growth and expansion of Commodore Mine and Millmerran Power Station, Australia Pacific LNG, New Acland Coal Mine, Wagners Intermodal terminal and the Asterion Medicinal Cannabis Facility may result in some temporal overlap. Collectively, these projects have the potential to result in the perception of relatively high amounts of construction activity and views of the movement of heavy vehicles and plant within the AOI.
- The areas within the AOI likely to be most affected by this cumulative activity are the Cunningham Highway, Millmerran–Inglewood Road, Gore Highway, Toowoomba Bypass and Warrego Highway, with the greatest activity in the north-eastern part of the alignment, to the west of Toowoomba. As large vehicles on the highway and main road would not be unexpected from a visual perspective and the construction impacts are temporary, the significance of this cumulative impact during construction in the AOI is considered to be low.
- In terms of the spatial (operational) impacts of other linear transport infrastructure projects, the North Star to NSW/QLD Border and the Gowrie to Helidon sections of Inland Rail immediately adjoin the Project. Some receptors will experience views of both the Project and the North Star to NSW/QLD Border section of Inland Rail or both the Project and the Gowrie to Helidon section of Inland Rail. However, these developments will be viewed as part of the same integrated Inland Rail Program. This is considered to be an impact of medium cumulative impact significance.
- With regards to InterLinkSQ, there would be potential for the perception of development intensification in the northern part of the corridor, with potential cumulative impacts of up to medium cumulative impact significance. Similar effects of medium significance are likely associated with views from the Toowoomba–Cecil Plains Road for the Asterion Medicinal Cannabis Facility and ongoing development of the Wagners Intermodal terminal which are part of the broader Charlton Wellcamp Enterprise Area that is to be developed on the western side of the Toowoomba Wellcamp Airport. Combined or successive impacts with Australia Pacific LNG and New Acland Mine are less likely due to the separation distances from the Project and is considered to be of low cumulative impact significance.
- The Goondiwindi abattoir is unlikely to result in meaningful operational cumulative impact on landscape or visual values. This is because it is a discrete rural development project that is in keeping with the rural and agricultural character of the landscape. Therefore, although combined, successive and/or sequential views may be obtained it is not considered that the Project will intensify this. This is considered to be of low cumulative impact significance.
- The Commodore Mine and Millmerran Power Station are existing facilities. In the context of the expansion of this development, the cumulative landscape and visual impact of the Project is considered to be generally very modest and of low cumulative impact significance.
- The significance of the contribution of Helidon to Calvert section of Inland Rail to cumulative impacts is considered to be low for both landscape and visual values due to the separation distance from the Project.

This assessment has concluded that the cumulative landscape and visual amenity impacts of the Project are expected to be of low to medium significance. Overall, the significance of the potential cumulative impacts is considered to be medium.

TABLE 23-11 CUMULATIVE IMPACT ASSESSMENT FOR LANDSCAPE AND VISUAL AMENITY

Project	Impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas	Probability of the impact	Medium (2)	7	Medium	Activities associated with the Project and InterLinkSQ have the potential to combine to result in cumulative visual impact of residents of Kingsthorpe and Gowrie Junction. Such impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, that is compatible with InterLinkSQ's adjoining activities and addresses cumulative landscape and visual impacts. ▸ Consultation with InterLinkSQ regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects.	Probability of the impact	Medium (2)	9	Medium	Activities associated with the Project and InterLinkSQ have potential to combine to result in cumulative visual impacts for residents of Kingsthorpe and Gowrie Junction. Such impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to InterLinkSQ.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
Asterion Medicinal Cannabis Facility	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan, as a component of the CEMP, that is compatible with Asterion's adjoining activities and addresses cumulative landscape and visual impacts. Consultation with Asterion regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	8	Medium	The Asterion Medicinal Cannabis Facility is the first facility as part of the broader Charlton Wellcamp Enterprise Area that is to be developed on the western side of the Toowoomba Wellcamp Airport, adjacent to the Project footprint. In combination with the Project, the Asterion Medicinal Cannabis Facility may result in cumulative impacts to views from Toowoomba-Cecil Plains Road. Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to the Asterion Medicinal Cannabis Facility.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Commodore Mine and Millmerran Power Station - expansion	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, that is compatible with Intergen's adjoining activities and addresses cumulative landscape and visual impacts ▸ Consultation with Intergen regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	7	Medium	Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to Commodore Mine and Millmerran Power Station.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
North Star to NSW/QLD Border (Inland Rail)	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas	Probability of the impact	High (3)	7	Medium	The Project interfaces with the North Star to NSW/QLD Border project at the NSW/QLD border on the Macintyre River. Potential cumulative impacts will be managed through: ▸ ARTC to ensure that Rehabilitation and Landscaping Management Plans (or equivalent) are prepared for both adjoining Inland Rail projects, and that these Plans are complimentary and are consistent with the Inland Rail Landscaping and Rehabilitation Strategy ▸ ARTC to ensure that construction contract documentation for adjoining projects have consistent clauses regarding landscape design and planting. This will extend to the development and implementation of plans, and the monitoring and defect correction for revegetated and rehabilitated areas.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	9	Medium	Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC, across adjoining project of the Inland Rail Program.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Gowrie to Helidon (Inland Rail)	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas	Probability of the impact	High (3)	8	Medium	The Project interfaces with the Gowrie to Helidon project adjacent to the InterLinkSQ site, before Inland Rail connects into the QR West Moreton System. Potential cumulative impacts will be managed through: ▸ ARTC to ensure that Rehabilitation and Landscaping Management Plans (or equivalent) are prepared for both adjoining Inland Rail projects, and that these Plans are complimentary and are consistent with the Inland Rail Landscaping and Rehabilitation Strategy ▸ AARTC to ensure that construction contract documentation for adjoining projects will have consistent clauses regarding landscape design and planting. This will extend to the development and implementation of plans, and the monitoring and defect correction for revegetated and rehabilitated areas.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	9	Medium	Potential cumulative impacts will be managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC, across adjoining projects of the Inland Rail Program.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
Wagners Intermodal Terminal	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas	Probability of the impact	Medium (2)	6	Low	Activities associated with the Project and Wagners Intermodal terminal have potential to combine to result in cumulative visual impacts. Potential cumulative impacts will be managed through: ▸ Development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP, that is compatible with Wagner's adjoining activities and addresses cumulative landscape and visual impacts. ▸ Consultation with Wagners regarding scheduling of construction activities to avoid, where possible, the undertaking of concurrent activities that are to the detriment of local landscape and visual values, including night works.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Medium (2)	8	Medium	The Wagners Intermodal terminal is part of the broader Charlton Wellcamp Enterprise Area that is to be developed on the western side of the Toowoomba Wellcamp Airport, adjacent to the Project footprint. In combination with the Project, the Wagners Intermodal terminal may result in cumulative impacts to views from Toowoomba-Cecil Plains Road. Potential impacts will be managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC in proximity to the Wagners Intermodal terminal.
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
New Acland Coal Mine Stage 3	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas.	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 18 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts will be appropriately managed through the maintenance of landscaping and rehabilitation treatments that are the responsibility of ARTC. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
Australia Pacific LNG Project	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas.	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km west of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km west of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
Helidon to Calvert (Inland Rail)	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas.	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 26 km to the east of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of Rehabilitation and Landscaping Management Plans (or equivalent) for both Inland Rail projects that are consistent with the Inland Rail Landscaping and Rehabilitation Strategy.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 26 km to the east of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance of landscaping and rehabilitation treatments, that are the responsibility of ARTC, across the Inland Rail Program.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Goondiwindi Abattoir	Construction impacts associated with views of increases in: ▸ Construction traffic ▸ Construction areas.	Probability of the impact	Medium (2)	5	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the development and implementation of a Rehabilitation and Landscaping Management Plan for the Project, as a component of the CEMP. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Operation impacts associated with combined, successive and sequential views of adjoining projects	Probability of the impact	Low (1)	4	Low	The potential for cumulative impacts are considered low due to the separation distance between the projects (located 13 km north of the Project footprint). The potential for cumulative impacts will be appropriately managed through the maintenance landscaping and rehabilitation treatments, that are the responsibility of ARTC. By doing so, ARTC will have managed landscape and visual impacts within its control.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

23.3.4 Flora and fauna

Ecological cumulative impacts are most appropriately considered at a biologically relevant spatial scale. A distance of 50 km from the Project was selected as the AOI for flora and fauna, as many of the matters of State environmental significance (MSES) of relevance to the Project (incorporating all habitat categories) do not occur beyond this area and, if they do occur, any cumulative impacts associated with the Project are not considered to be relevant beyond this extent. The 50 km AOI buffer allows for consideration of projects across the region that would be overlooked with a smaller buffer. To allow for the relatively large buffer area, low thresholds for magnitude of impact have been adopted as shown in Table 23-12.

A total of 23 of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to flora and fauna.

Operational projects have been included in the assessment of ecological cumulative impacts due to the potential for such developments to continue to have an ongoing impact on ecological values and processes, for example, through the degradation of adjoining habitats or disturbance of species through noise, operational emissions, light and weed incursion.

The total impact area of MSES habitat contained within the combined footprint of the 23 projects occurring within the AOI has been quantified and is provided in Table 23-12. It must be noted that the areas of assessment have varied between matters of national environmental significance (MNES) and MSES. For MNES, assessment included areas contained within NSW as well as Queensland, considering projects within both States. For MSES, the cumulative impact assessment only considered projects and areas within Queensland as MSES are bound by State borders.

The quantitative method of assessment that has been applied establishes a percentage of impact to each significant environmental value as a combined consequence of all projects identified for the cumulative impact assessment. The results of the significance assessment of these cumulative impacts are presented in aggregated form in Table 23-13 (i.e. a level of cumulative impact significance is not attributed for each project).

Unmitigated, the cumulative impacts resulting from existing and proposed developments within the impact assessment area include some that can be considered irreversible and permanent. Without targeted mitigation measures, the potential cumulative impacts upon protected matters within the impact assessment area have been assessed to be of low to moderate significance.

The potential for cumulative impacts to protected matters from the Project will be managed through the implementation of mitigation measures specified in Appendix L: Terrestrial and Aquatic Ecology Technical Report.

TABLE 23-12 CUMULATIVE IMPACTS AS CALCULATED WITHIN THE FLORA AND FAUNA AREA OF INFLUENCE

Ecological Value	Occurrence in cumulative study area (50 km) (ha)	Occurrence in cumulative impact project area (excluding Project footprint) (ha)	Occurrence in Project footprint (ha)	Occurrence in the footprint of all projects, including the Project (ha)	Disturbance in AOI of all projects, including the Project (%)	Disturbance in AOI as a result of the Project (%)	Magnitude of disturbance[1]
TECs (*Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act))							
Brigalow (*Acacia harpophylla* dominant and co-dominant)	21,457.68	729.23	103.69	832.92	3.88	0.48	Low
Natural grassland on basalt and fine-textured alluvial plains of northern NSW and southern Queensland	2,721.27	308.45	66.07	374.52	13.76	2.43	Low
Semi-evergreen vine thicket within the Brigalow Belt (north and south) and Nandewar bioregions (SEVT)	2,073.39	73.08	0.00	73.08	3.52	0.00	Low
White box-yellow box-Blakely's red gum grassy woodland and derived native grassland	115,393.38	26.66	2.54	29.20	0.03	0.00	Low
Threatened flora habitat (EPBC Act)							
King bluegrass (*Dichanthium queenslandicum*)	40,161.13	908.71	50.31	959.02	2.39	0.13	Low
Belson's panic (*Homopholis belsonii*)	76,372.56	7,593.34	260.52	7,853.86	10.28	0.34	Low
Winged peppercress (*Lepidium monoplocoides*)	224,744.96	59,510.29	79.86	59,590.15	26.51	0.04	Low
Hawkweed (*Picris evae*)	231,977.32	35,564.49	110.67	35,675.16	15.38	0.05	Low
Austral cornflower (*Rhaponticum australe*)	51,370.32	2,244.33	83.49	2,327.82	4.53	0.16	Low
Austral toadflax (*Thesium australe*)	49,881.87	1,091.90	46.44	1,138.34	2.28	0.09	Low
Small-flowered westringia (*Westringia parvifolia*)	960.91	0.00	27.19	27.19	2.83	2.83	Low
Xerothamnella herbacea	17,272.17	654.69	11.99	666.68	3.86	0.07	Low
Threatened fauna habitat (EPBC Act)							
Birds							
Australasian bittern (*Botaurus poiciloptilus*)	47,239.09	547.46	7.91	555.37	1.18	0.02	Low
Squatter pigeon (southern) (*Geophaps scripta scripta*)	19,832.41	1,026.00	421.42	1,447.42	7.30	2.12	Low
Painted honeyeater (*Grantiella picta*)	30,624.83	178.93	330.66	509.59	1.66	1.08	Low
Australian painted snipe (*Rostratula australis*)	47,386.54	547.46	7.91	555.37	1.17	0.02	Low
Fish							
Murray cod (*Maccullochella peelii*)	20,899.39	101.47	60.50	161.97	0.77	0.29	Low

Ecological Value	Occurrence in cumulative study area (50 km) (ha)	Occurrence in cumulative impact project area (excluding Project footprint) (ha)	Occurrence in Project footprint (ha)	Occurrence in the footprint of all projects, including the Project (ha)	Disturbance in AOI of all projects, including the Project (%)	Disturbance in AOI as a result of the Project (%)	Magnitude of disturbance[1]
Mammals							
South-eastern long-eared bat (*Nyctophilus corbeni*)	386,856.92	88,063.03	696.25	88,759.28	22.94	0.18	Low
Koala (*Phascolarctos cinereus*)	284,426.65	33,849.54	1,362.53	35,210.07	12.38	0.48	Low
Grey-headed flying-fox (*Pteropus poliocephalus*)	804,185.50	17,672.78	788.39	18,461.17	2.30	0.10	Low
Reptiles							
Five-clawed worm-skink (*Anomalopus mackayi*)	40,247.30	2048.44	241.61	2,290.05	5.69	0.60	Low
Collared delma (*Delma torquata*)	273,942.02	8,243.10	36.83	8,279.93	3.02	0.01	Low
Dunmall's snake (*Furina dunmalli*)	57,552.21	7,921.64	262.69	8,184.33	14.22	0.46	Low
Condamine earless dragon (*Tympanocryptis condaminensis*)	58,139.65	2,419.50	51.20	2,470.70	4.25	0.09	Low
Invertebrates							
Brigalow woodland snail (*Adclarkia cameroni*)	150,415.22	2,218.55	146.72	2,365.27	1.57	0.10	Low
State significant ecological constraints							
Protected nature areas: ▸ Alice Creek Nature Refuge ▸ Berlin Scrub Nature Refuge ▸ Dilladerri Nature Refuge ▸ Ellangowan Nature Refuge ▸ Fair Hills Nature Refuge ▸ Gattonview Nature Refuge ▸ JAL Nature Refuge ▸ Kalisha Nature Refuge ▸ Long Grass Nature Refuge ▸ Myall Park Nature Refuge ▸ Pine Cliffs Nature Refuge ▸ Ravensbourne Nature Refuge ▸ The Gullies Nature Refuge ▸ Thompson's Nature refuge ▸ Walker's Wilderness Nature Refuge ▸ Whilalloo Nature Refuge ▸ Wilga Park Nature Refuge ▸ Xanthorrhoea Nature Refuge	7,946.28	0.00	0.00	0.00	0.00	0.00	N/A

Ecological Value	Occurrence in cumulative study area (50 km) (ha)	Occurrence in cumulative impact project area (excluding Project footprint) (ha)	Occurrence in Project footprint (ha)	Occurrence in the footprint of all projects, including the Project (ha)	Disturbance in AOI of all projects, including the Project (%)	Disturbance in AOI as a result of the Project (%)	Magnitude of disturbance[1]
Protected area estates (*excluding State forests*): ▸ Bendidee National Park ▸ Coolmunda Conservation Park ▸ Crow's Nest National Park ▸ Dwyers Scrub Conservation Park ▸ Esk National Park ▸ Flagstone Creek Conservation Park ▸ Gatton National Park ▸ Geham National Park ▸ Hampton National Park ▸ Irongate Conservation Park ▸ Lockyer National Park ▸ Lockyer Resources Reserve ▸ Mount Binga National Park ▸ Ravensbourne National Park ▸ Tenthill Conservation Park ▸ Wondul Range National Park *Note: State forests are not an MSES*	295,306.56	4,450.10	0.00	4,450.10	1.51	0.00	Low
Regulated vegetation (*Vegetation Management Act 1999* (Qld) (VM Act))							
Category B – 'Endangered' regional ecosystems (REs):	46,668.45	201.32	49.39	250.71	0.5	0.11	Low
Category B – 'Of Concern' REs:	202,417.66	3,530.07	85.06	3,615.13	1.79	0.04	Low
Essential habitat (EH)	84,262.99	1,263.97	113.19	1377.16	1.63	0.13	Low
State significant wetlands (HES Wetlands)	7,476.06	22.02	0.00	22.02	0.29	0.00	Low
MSES protected wildlife habitat (flora) (*Nature Conservation Act 1992* (Qld) (NC Act)):							
Cyperus clarus	41,397.45	936.65	166.07	1,102.72	2.66	0.40	Low
Picris barbarorum	452,656.34	70,447.80	174.98	70,622.78	15.60	0.04	Low
MSES protected wildlife habitat (fauna) (NC Act):							
Common death adder (*Acanthophis antarcticus*)	775,562.91	98,486.02	277.27	98,763.29	12.73	0.04	Low
Glossy black-cockatoo (*Calyptorhynchus lathami lathami*)	362,917.60	72,079.64	120.01	72,199.65	19.89	0.03	Low
Grey snake (*Hemiaspis damelii*)	61,039.51	2,136.76	259.80	2,396.56	3.93	0.43	Low
White-throated needletail (*Hirundapus caudacutus*)	2,395,033.14	156,019.14	2,853.24	158,872.38	6.63	0.12	Low

Ecological Value	Occurrence in cumulative study area (50 km) (ha)	Occurrence in cumulative impact project area (excluding Project footprint) (ha)	Occurrence in Project footprint (ha)	Occurrence in the footprint of all projects, including the Project (ha)	Disturbance in AOI of all projects, including the Project (%)	Disturbance in AOI as a result of the Project (%)	Magnitude of disturbance[1]
MSES Special least concern fauna (NC Act)							
Platypus (*Ornithorhynchus anatinus*)	135,748.44	7,266.51	24.81	7,291.32	5.37	0.02	Low
Short-beaked echidna (*Tachyglossus aculeatus*)	45,563.01	2,804.14	1,397.48	4,201.62	9.22	3.07	Low
MSES connectivity (Biodiversity Planning Assessment (BPA))							
Corridor (Regional Terrestrial)	122,194.40	1,723.52	220.39	1,943.91	1.59	0.18	Low
Corridor (State Riparian)	58,074.21	305.42	31.82	337.24	0.58	0.05	Low
Corridor (State Terrestrial)	415,966.65	7,268.32	305.04	7,573.36	1.82	0.07	Low

Table notes:

1. Magnitude is calculated based on the proportional disturbance from the Project to each receptor within the cumulative impact assessment area and the percentage contribution of the Project to the overall disturbance of that receptor. Low magnitude = project contribution of less than 2 per cent OR an overall cumulative impact of <10 per cent.

TABLE 23-13 SIGNIFICANCE ASSESSMENT OF CUMULATIVE IMPACTS WITHIN THE AREA OF INFLUENCE

Ecological value(s)	Potential cumulative impact	Relevance factor of aspects				Sum of relevance factors	Impact significance
		Probability	Duration	Magnitude	Sensitivity		
MNES							
Australian Government significant ecological constraint (community listed under the EPBC Act) ▸ Brigalow (*Acacia harpophylla* dominant and co-dominant) ▸ Natural grassland on basalt and fine-textured alluvial plains of northern NSW and southern Queensland ▸ Semi-evergreen vine thicket within the Brigalow Belt (north and south) and Nandewar bioregions ▸ White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	▸ Habitat loss from vegetation clearing/removal	1	3	1	3	8	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	3	7	Medium
	▸ Fauna species injury or mortality	1	1	1	3	6	Low
	▸ Dust and light and contaminant disturbance	1	1	1	3	6	Low
	▸ Increase in litter (waste)	1	1	1	3	6	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	3	7	Medium
	▸ Displacement of species from invasion of weed and pest species	1	1	1	3	6	Low
Australian Government significant ecological constraint (species listed under the EPBC Act): **Flora** ▸ King bluegrass (*Dichanthium queenslandicum*) ▸ Belson's panic (*Homopholis belsonii*) ▸ Winged peppercress (*Lepidium monoplocoides*) ▸ Hawkweed (*Picris evae*) ▸ Austral cornflower (*Rhaponticum australe*) ▸ Austral toadflax (*Thesium australe*) ▸ Small-flowered westringia (*Westringia parvifolia*) ▸ *Xerothamnella herbacea* **Fauna** ▸ Australasian bittern (*Botaurus poiciloptilus*) ▸ Squatter pigeon (southern) (*Geophaps scripta scripta*) ▸ Painted honeyeater (*Grantiella picta*) ▸ Australian painted snipe (*Rostratula australis*)	▸ Habitat loss from vegetation clearing/removal	2	3	1	3	9	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	2	2	1	3	8	Medium
	▸ Fauna species injury or mortality	1	1	1	3	6	Low
	▸ Dust and light and contaminant disturbance	1	1	1	3	6	Low
	▸ Increase in litter (waste)	1	1	1	3	6	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	3	7	Medium
	▸ Displacement of species from invasion of weed and pest species	1	1	1	3	6	Low

Ecological value(s)	Potential cumulative impact					Sum of relevance factors	Impact significance
▸ Murray cod (*Maccullochella peelii*) ▸ South-eastern long-eared bat (*Nyctophilus corbeni*) ▸ Koala (*Phascolarctos cinereus*) ▸ Grey-headed flying-fox (*Pteropus poliocephalus*) ▸ Five-clawed worm-skink (*Anomalopus mackayi*) ▸ Collared delma (*Delma torquata*) ▸ Dunmall's snake (*Furina dunmalli*) ▸ Condamine earless dragon (*Tympanocryptis condaminensis*) ▸ Brigalow woodland snail (*Adclarkia cameroni*)							
MSES							
State significant ecological constraint (VM Act): ▸ Category B – 'Endangered' remnant vegetation (REs)	▸ Habitat loss from vegetation clearing/removal	2	3	1	3	9	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	3	7	Medium
	▸ Fauna species injury or mortality	1	1	1	3	6	Low
	▸ Dust and light and contaminant disturbance	1	1	1	3	6	Low
	▸ Increase in litter (waste)	1	1	1	3	6	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	3	7	Medium
	▸ Displacement of species from invasion of weed and pest species	1	1	1	3	6	Low

Ecological value(s)	Potential cumulative impact	Relevance factor of aspects				Sum of relevance factors	Impact significance
State significant ecological constraint (VM Act): ▸ Regulated Vegetation—Category B—'Of concern' remnant vegetation (REs)	▸ Habitat loss from vegetation clearing/removal	2	3	1	2	8	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	2	6	Low
	▸ Fauna species injury or mortality	1	1	1	2	5	Low
	▸ Dust and light and contaminant disturbance	1	1	1	2	5	Low
	▸ Increase in litter (waste)	1	1	1	2	5	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	2	6	Low
	▸ Displacement of species from invasion of weed and pest species	1	1	1	2	5	Low
State significant ecological constraint (VM Act): ▸ Regulated Vegetation—Category B—'Least concern' remnant vegetation (REs)	▸ Habitat loss from vegetation clearing/removal	2	3	1	1	7	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	1	5	Low
	▸ Fauna species injury or mortality	1	1	1	1	4	Low
	▸ Dust and light and contaminant disturbance	1	1	1	1	4	Low
	▸ Increase in litter (waste)	1	1	1	1	4	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	1	5	Low
	▸ Displacement of species from invasion of weed and pest species	1	1	1	1	4	Low

Ecological value(s)	Potential cumulative impact	Relevance factor of aspects				Sum of relevance factors	Impact significance
State significant ecological constraint (VM Act): ▸ Regulated vegetation (Category C—HVR)	▸ Habitat loss from vegetation clearing/removal	2	3	1	2	8	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	2	6	Low
	▸ Fauna species injury or mortality	1	1	1	2	5	Low
	▸ Dust and light and contaminant disturbance	1	1	1	2	5	Low
	▸ Increase in litter (waste)	1	1	1	2	5	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	2	6	Low
	▸ Displacement of species from invasion of weed and pest species	1	1	1	2	5	Low
State significant ecological constraint: ▸ State significant wetlands (HES)	▸ Habitat loss from vegetation clearing/removal	1	3	1	3	8	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	3	7	Medium
	▸ Fauna species injury or mortality	1	1	1	3	6	Low
	▸ Dust and light and contaminant disturbance	1	1	1	3	6	Low
	▸ Increase in litter (waste)	1	1	1	3	6	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	3	7	Medium
	▸ Displacement of species from invasion of weed and pest species	1	1	1	3	6	Low

Ecological value(s)	Potential cumulative impact	Relevance factor of aspects				Sum of relevance factors	Impact significance
State significant ecological constraint (species listed as threatened under the NC Act): **Flora** ▸ *Cyperus clarus* ▸ *Picris barbarorum* (tall hawkweed) **Fauna** ▸ Common death adder (*Acanthophis antarcticus*) ▸ Southern whiteface (*Aphelocephala leucopsis*) ▸ Glossy black-cockatoo (*Calyptorhynchus lathami lathami*) ▸ Brown treecreeper (south-eastern) (*Climacteris picumnus victoriae*) ▸ Grey snake (*Hemiaspis damelii*) ▸ Hooded robin (south-eastern) (*Melanodryas cucullata cucullata*) ▸ Diamond firetail (*Stagonopleura guttata*) ▸ White-throated needletail (*Hirundapus caudacutus*)	▸ Habitat loss from vegetation clearing/removal	2	3	1	3	9	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	3	7	Medium
	▸ Fauna species injury or mortality	1	1	1	3	6	Low
	▸ Dust and light and contaminant disturbance	1	1	1	3	6	Low
	▸ Increase in litter (waste)	1	1	1	3	6	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	3	7	Medium
	▸ Displacement of species from invasion of weed and pest species	1	2	1	3	6	Medium
State Significant Ecological Constraint (SLC fauna species): ▸ Fork-tailed swift (*Apus pacificus*) ▸ Latham's snipe (*Gallinago hardwickii*) ▸ Satin flycatcher (*Myiagra cyanoleuca*) ▸ Glossy ibis (*Plegadis falcinellus*) ▸ Common greenshank (*Tringa nebularia*) ▸ Rufous fantail (*Rhipidura rufifrons*) ▸ Platypus (*Ornithorhynchus anatinus*) ▸ Short-beaked echidna (*Tachyglossus aculeatus*)	▸ Habitat loss from clearing riparian vegetation and associated aquatic microhabitat features	1	3	1	2	7	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	2	6	Low
	▸ Fauna species injury or mortality	1	1	1	2	5	Low
	▸ Dust and light and contaminant disturbance	1	1	1	2	5	Low
	▸ Increase in litter (waste)	1	1	1	2	5	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	2	6	Low
	▸ Displacement of species from invasion of weed and pest species	1	1	1	2	5	Low

Ecological value(s)	Potential cumulative impact	Relevance factor of aspects				Sum of relevance factors	Impact significance
State significant ecological constraint (BPA): ▸ BPA habitat values (State) ▸ Corridor (State terrestrial) ▸ Corridor (State riparian)	▸ Habitat loss from vegetation clearing/removal	1	3	1	3	8	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	3	7	Medium
	▸ Fauna species injury or mortality	1	1	1	3	6	Low
	▸ Dust and light and contaminant disturbance	1	1	1	3	6	Low
	▸ Increase in litter (waste)	1	1	1	3	6	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	3	7	Medium
	▸ Displacement of species from invasion of weed and pest species	1	1	1	3	6	Low
State significant ecological constraint (BPA): ▸ BPA habitat values (regional) ▸ Corridor (regional terrestrial)	▸ Habitat loss from vegetation clearing/removal	1	3	1	2	7	Medium
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	2	6	Low
	▸ Fauna species injury or mortality	1	1	1	2	5	Low
	▸ Dust and light and contaminant disturbance	1	1	1	2	5	Low
	▸ Increase in litter (waste)	1	1	1	2	5	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	2	6	Low
	▸ Displacement of species from invasion of weed and pest species	1	1	1	2	5	Low

Ecological value(s)	Potential cumulative impact	Relevance factor of aspects				Sum of relevance factors	Impact significance
State significant ecological constraint (BPA): ▸ BPA habitat values (local or other) (MLES)	▸ Habitat loss from vegetation clearing/removal	1	3	1	1	6	Low
	▸ Edge effects ▸ Habitat fragmentation ▸ Barrier effects ▸ Reduction in connectivity of biodiversity corridors	1	2	1	1	5	Low
	▸ Fauna species injury or mortality	1	1	1	1	4	Low
	▸ Dust and light and contaminant disturbance	1	1	1	1	4	Low
	▸ Increase in litter (waste)	1	1	1	1	4	Low
	▸ Reduction in biological viability of soil to support growth due to soil compaction	1	2	1	1	5	Low
	▸ Displacement of species from invasion of weed and pest species	1	1	1	1	4	Low

Table notes:
Relevance factors between 1 and 3 were determined using professional judgement to select most appropriate relevance factor for each aspect and summing the relevance factors.
Sum of relevant factors definition:
- Low (1 - 6): Negative impacts need to be managed by standard environmental management practices. Monitoring to be part of general project monitoring program.
- Medium (7 - 9): Mitigation measure likely to be necessary and specific management practices to be applied. Targeted monitoring program required, where appropriate.
- High (10 - 12): Alternative actions should be considered and/or mitigation measures applied to demonstrate improvement. Targeted monitoring program necessary, where appropriate.

Following the cumulative impact assessment, all MNES and MNES were assessed as having a 'low' magnitude of disturbance (Table 23-13), with impacts to be managed by standard environmental management practices, and monitoring to be part of the general Project monitoring program. Impacts with the potential to cause a 'medium' significant impact, include:

- Habitat loss from vegetation clearing/removal
- Habitat fragmentation:
  - edge effects
  - barrier effects
  - reduction in connectivity of biodiversity corridors
- Reduction in the biological viability of soil to support growth due to soil compaction
- Displacement of species from invasion of weed and pest species.

23.3.5 Air quality

23.3.5.1 Construction cumulative air quality impacts

Dust is predicted to be the primary emission from the Project during construction. The *Guidance on the assessment of dust from demolition and construction* (United Kingdom Institute of Air Quality Management, 2014) specifies that receptors located 350 m or more from a dust-generation source are expected to have a sensitivity to human health impacts that is 'low'. Therefore, the AOI for the air quality assessment is 350 m from the boundary of the Temporary footprint.

For the purposes of construction air quality, projects that directly interface the Project, and that will have temporal overlap in construction or expansion activities, are considered to have the potential to result in cumulative impacts. Four of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to air quality during construction. The four identified projects are assessed in Table 23-14.

Due to the mostly isolated nature of construction works stage emissions from the Project, the significance of potential cumulative impacts is considered to be low. Where cumulative impacts have been assessed as low significance, there are unlikely to be long-term cumulative impacts providing that all assessable projects apply mitigation measures that are consistent with those proposed for this Project. Consultation with potentially affected landowners and other stakeholders, including proponents of non-Inland Rail projects that interface with the Project, may result in additional mitigation measures of relevance being identified during the detailed design process. In such instances, additional mitigation measures will be incorporated into the CEMP, if appropriate.

Operational cumulative air quality impacts are assessed in Section 23.3.5.2.

TABLE 23-14 CUMULATIVE IMPACT ASSESSMENT FOR AIR QUALITY (CONSTRUCTION)

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Emissions of air pollutants, specifically dust (construction)	Probability of the impact	Medium (2)	6	Low	The potential for cumulative impacts during construction to air quality is considered to be low, therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through the development and implementation of an Air Quality and Dust Management Plan, as a component of the CEMP for the Project ARTC will consult with InterLinkSQ regarding scheduling of construction activities to avoid the simultaneous undertaking of dust generating activities, where possible.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
Commodore Mine and Millmerran Power Station - expansion	Emissions of air pollutants, specifically dust (construction)	Probability of the impact	Medium (2)	6	Low	The potential for cumulative impacts during construction to air quality is considered to be low, therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ▸ Development and implementation of an Air Quality and Dust Management Plan, as a component of the CEMP for the Project ▸ Establishing a local baseline for particulate matter, using data collected from the Millmerran air quality monitoring station ▸ Undertaking dust deposition (total suspended particulate) monitoring, at locations where baseline data is collected, while construction activities occur in proximity to Commodore Mine (e.g. where dust-generating activities occur between Ch 120.0 km to Ch 128.0 km) ▸ Consultation with Intergen regarding scheduling of construction activities, to avoid the simultaneous undertaking of dust-generating activities, where possible.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
North Star to NSW/QLD Border (Inland Rail)	Emissions of air pollutants, specifically dust (construction)	Probability of the impact	Low (1)	6	Low	The potential for cumulative impacts during construction to air quality is considered to be low, therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through the development and implementation of an Air Quality and Dust Management Plan, as a component of the CEMP for the Project. A complaint hotline for the Project will be established and advertised to enable members of the public to notify ARTC of issues, including the generation of excessive dust or other air emissions during construction, either from a single project or a combination of adjoining Inland Rail projects.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Gowrie to Helidon (Inland Rail)	Emissions of air pollutants, specifically dust (construction)	Probability of the impact	Low (1)	6	Low	The potential for cumulative impacts during construction to air quality is considered to be low, therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through the development and implementation of an Air Quality and Dust Management Plan, as a component of the CEMP for the Project. A complaint hotline for the Project will be established and advertised to enable members of the public to notify ARTC of issues, including the generation of excessive dust or other air emissions during construction, either from a single project or a combination of adjoining Inland Rail projects.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

23.3.5.2 Operational cumulative air quality impacts

Assessment of operations stage air quality impacts has been incorporated into the emission contributions of existing or planned developments that are, or will be, a source of pollutants of interest that are also relevant to the Project.

The *National Pollutant Inventory* (NPI) (Department of Agriculture, Water and the Environment, 2021) is regulated by the Australian Government. The purpose of the NPI is to track pollution sources across Australia and ensure that the community has access to information about the emission and transfer of toxic substances that may affect them locally. Facilities that exceed NPI reporting thresholds are required by the Australian Government to submit annual reports of their emissions to air.

A search of the NPI identified eight operational facilities within the air quality impact assessment area that are required to report emissions annually. Of these eight facilities, only two (which are considered as one project for this CIA) —the Commodore Mine and the Millmerran Power Station expansion—are recognised as generating emissions that are also pollutants of concern for the operation of the Project (i.e. particulate matter, oxides of nitrogen and carbon monoxide). Consequently, NPI-reported emissions for pollutants of interest for the mine and power station were included in the dispersion model developed for the assessment.

In addition to these operational cumulative NPI-regulated sources, the following emission sources have been included in the dispersion model for the assessment due to their potential to contribute to cumulative air quality impacts at receptors in the air quality AOI:

- North Star to NSW/QLD Border Project—1 km of this project has been included in the dispersion modelling for the Project
- Gowrie to Helidon Project—1 km of this project has been included in the dispersion modelling for the Project
- West Moreton Line—this is the existing rail west of the junction between the Project and the Gowrie to Helidon section of Inland Rail—3.5 km of this rail line has been included in the dispersion modelling for the Project.

In addition to the NPI sources (Commodore Mine and Millmerran Power Station) and the adjoining rail lines, other local emission sources will include environmentally relevant activities, local commercial and industrial uses, and vehicle traffic. Local commercial uses near the Project will include InterLinkSQ, Wagners Intermodal Terminal and the Asterion Medicinal Cannabis Facility, which are approved but not currently operational. Operation of these facilities are not anticipated to generate significant emissions and do not require detailed assessment.

It is expected that emissions from environmentally relevant activities, local commercial and industrial uses and vehicle traffic will be adequately represented by the assumed background concentrations, and these activities emit significantly lower quantities of pollutants than the major polluters that report to the NPI.

Odour impacts can be cumulative if odour emitted by multiple sources is of the same character (the same type of odour). Although intermittent agricultural odour is expected to be common to the existing ambient air environment, the potential for significant cumulative odour impacts is considered to be low due to the short duration of a train pass-by event.

The primary pollutant of concern for the feedlots and poultry farms is ammonia. Ammonia is not a pollutant of concern for the Project and emissions from these facility types were not included in the cumulative model.

Commodore Mine and Millmerran Power Station operate under Environmental Authorities issued under the EP Act, which require that they must take all reasonable and feasible avoidance measures so that particulate matter emissions generated do not exceed the specified levels. Therefore, based on the assessment methodology applied, the contribution of the Project at a sensitive receptor 1.1 km from Commodore Mine is considered to be minor.

Based on the results of the modelling, the operation of the Project is not expected to significantly adversely impact environmental values of the air environment.

The assessment has considered background air quality in the prediction of cumulative concentration and deposition levels at sensitive receptors and has therefore considered the assimilative capacity of the air environment in determining the impact of the Project.

23.3.6 Surface water

For the purposes of surface water, projects that are within 3 km the Project and that will have temporal overlap in construction and/or expansion activities are considered to have the potential to result in cumulative impacts. Eight of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to surface water. The eight identified projects are assessed in Table 23-15.

These projects may result in the following impacts, to some extent:

- Riparian vegetation loss, reducing ecosystem services to water quality
- Impacts to aquatic fauna species through water quality and waterway barrier works
- Reduction in waterway connectivity
- Increase in erosion and sedimentation of waterways
- Increase in contamination of waterways
- Saline discharge into proximal waterway (intra-catchment)
- Increase in surface expression within alluvial waterways.

This assessment has concluded that the cumulative surface water impacts of the Project are expected to be of low to medium significance. The following factors contributed to this determination:

- Riparian vegetation loss from vegetation clearing/removal–loss of ecosystem service to water quality:
  - A potential exists for a cumulative impact from the loss of sensitive receptors (riparian vegetation communities) with works involving waterways and associated crossings across the projects. Impacts may be compounded with interface between the Project and other listed projects in regard to decreased resilience to biotic and abiotic factors. Potential consequences include loss of bank stability, loss of diversity and reduction in water quality values due to decreased performance of ecosystem services to water quality. The proximity of other projects to watercourses and inadequate rehabilitation on those projects and the Border to Gowrie Project would result in the highest risk of significant cumulative impact.
  - Interaction of impacts leading to a loss of ecosystem services or water quality are considered possible between the Project and the New Acland Coal Mine Stage 3 expansion, Asterion Medicinal Cannabis Facility, InterLinkSQ, Commodore Mine and Millmerran Power Station operations, and construction of the North Star to NSW/QLD Border and Gowrie to Helidon sections of Inland Rail.
- Potential impacts to aquatic fauna species both through impacts to water quality and barrier works:
  - There is potential for cumulative downstream impacts from water quality issues associated with overland works and waterway barrier works, if not appropriately managed. Cumulative impacts would be expected to occur in relatively short spatial distances (as cumulative point-source impacts) and would be expected to ‘dilute’ with increasing distance downstream from point source impact.
  - It is expected that cumulative impacts would be expected to occur between projects linked spatially and temporally during construction. As such, the current Project and North Star to NSW/QLD Border and Gowrie to Helidon sections of Inland Rail are expected to generate cumulative impacts, as well as Asterion Medicinal Cannabis Facility, Wellcamp Airport projects and InterLinkSQ.
- Permanent reduction in the connectivity of waterways:
  - There is potential for impact if not appropriately managed due to multiple permanent crossings, or temporary disturbances of waterways. If left unmanaged, these impacts would progressively accumulate between projects. Whole catchments may be impacted from separate projects on separate waterways. However, the greatest cumulative impacts would be expected where there is spatial interface between separate projects. Water quality degradation may arise from reduced waterway connectivity and the associated decrease in ecosystem resilience.
  - Cumulative impacts are most likely to arise due to projects in proximity to waterways that are crossed by the Project, being the New Acland Coal Mine Stage 3 expansion, Asterion Medicinal Cannabis Facility, InterLinkSQ, Wellcamp Airport projects, Commodore Mine and Millmerran Power Station operations and construction of the North Star to NSW/QLD Border and Gowrie to Helidon sections of Inland Rail. Note that the Goondiwindi Abattoir is removed from this potential cumulative impact due to sub-catchment separation from the Project.
- Increase in erosion and sedimentation in waterways during construction:
  - Cumulative impacts may arise due to increase in waterway sedimentation from simultaneous construction activities within catchments. Cumulative impacts in regard to erosion may arise from impaction of waterway structure/hydrological regimes and may be further impacted by cumulative riparian vegetation loss.

TABLE 23-15 CUMULATIVE IMPACT ASSESSMENT FOR SURFACE WATER

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
New Acland Coal Mine Stage 3	Riparian vegetation loss from vegetation clearing and/or removal	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (Department of Regional Development, Manufacturing and Water (DRDMW), 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (Department of Agriculture and Fisheries (DAF), 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply ▸ The success of riparian rehabilitation for the Project will be monitored to verify that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works.	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in erosion and sedimentation of waterways	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of water quality objective (WQO) exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Asterion Medicinal Cannabis Facility	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply. ▸ The success of riparian rehabilitation for the Project will be monitored to verify that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works.	Probability of the impact	Medium (2)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Reduction in waterway connectivity	Probability of the impact	Low (1)	4	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Increase in erosion and sedimentation of waterways	Probability of the impact	Low (1)	4	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Increase in waterway contamination	Probability of the impact	Low (1)	4	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply. ▸ The success of riparian rehabilitation for the Project will be monitored to verify that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works.	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in erosion and sedimentation of waterways	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Commodore Mine and Millmerran Power Station	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply The success of riparian rehabilitation for the Project will be monitored to ensure verify that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works.	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in erosion and sedimentation of waterways	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Increase in surface salinity around alluvial waterways	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Goondiwindi Abattoir	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Low (1)	6	Low	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan. The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply ▸ The success of riparian rehabilitation for the Project will be monitored to ensure verify that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Low (1)	4	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Increase in erosion and sedimentation of waterways	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Wagners Intermodal terminal	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Low (1)	6	Low	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works	Probability of the impact	Low (1)	5	Low	▸ Hazardous Materials Management Plan. The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply The success of riparian rehabilitation for the Project will be monitored to verify that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Low (1)	4	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
	Increase in erosion and sedimentation of waterways	Probability of the impact	Low (1)	5	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
North Star to NSW/QLD Border (Inland Rail)	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan. The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply. ▸ The success of riparian rehabilitation for the Project will be monitored to verify ensure that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in erosion and sedimentation of waterways	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Gowrie to Helidon (Inland Rail)	Riparian vegetation loss from vegetation clearing and /or removal	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts during construction will be managed through development and implementation of the following, as part of the CEMP: ▸ Rehabilitation and Landscaping Management Plan ▸ Surface Water Management Plan, including the establishment of baseline conditions and construction works stage monitoring ▸ Soil Management Plan, including erosion and sediment control measures ▸ Hazardous Materials Management Plan
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Potential impacts to aquatic fauna species both through impacts to water quality and barrier works.	Probability of the impact	Medium (2)	6	Low	The potential for cumulative impacts during construction will also be managed during detailed design and construction in accordance with the following: ▸ *Riverine Protection Permit Exemption Requirements* (DRDMW, 2023a) ▸ *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018a) ▸ Permit/approval conditions if either of the previous two listed requirements cannot be adhered to or do not apply. ▸ The success of riparian rehabilitation for the Project will be monitored to verify ensure that its contribution to riparian vegetation loss is appropriately rectified.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Reduction in waterway connectivity	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Increase in erosion and sedimentation of waterways	Probability of the impact	Medium (2)	6	Low	Potential cumulative impacts will be managed through: ▸ Development of location-specific erosion and sediment control measures, developed by a CPESC in accordance with the *Best Practice Erosion and Sediment Control* (IECA, 2008). ▸ Implementation of a surface water monitoring program for the duration of construction. Corrective action procedures for patterns of WQO exceedance that can be attributed to the Project will be agreed with the Environmental Monitor prior to commencement of construction and documented in the CEMP.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in waterway contamination	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Saline discharge into proximal waterways (intra-catchment scope)	Probability of the impact	Medium (2)	6	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increase in surface salinity around alluvial waterways	Probability of the impact	Low (1)	5	Low	
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

23.3.7 Flooding and geomorphology

For cumulative impacts to arise, another project will need to be located within a sub-catchment that elements of the Project are also located in and to be located close enough to the Project footprint for an overlap in any hydrological impacts.

For the purposes of flooding and geomorphology, the distance from the Project beyond which impacts are no longer expected to occur varies between floodplains; however, all modelled upstream and downstream hydrological impacts are confined to a distance of less than 1 km from the Project footprint. Based on these criteria, ten of the twenty-seven initial projects have potential to result in cumulative hydrological impacts. The projects identified for potential cumulative impacts are identified in Table 23-6.

Flood impact objectives, as presented in Chapter 14: Flooding and Geomorphology, have been established and used to guide the Project design, including mitigation of impacts through refinement of the hydraulic design, including adjustment of the numbers, dimensions and location of major drainage structures. The hydrologic and flooding assessment undertaken has demonstrated that the Project is predicted to result in impacts on the existing flooding regime. A comprehensive consultation exercise has been undertaken to provide the community with detailed information and certainty around the flood modelling and the Project design. In future stages, ARTC will continue to work with:

- Landowners concerned with hydrology and flooding throughout the detailed design, construction works and operations stages of the Project
- Directly impacted landowners affected by the alignment throughout the detailed design, construction works and operations stages of the Project
- Local councils, State government agencies and local flood specialists throughout the detailed design, construction works and operations stages of the Project.

23.3.7.1 Flooding

The hydrologic and hydraulic investigation has included existing infrastructure in the Existing Case, where information was available. The Existing Case has been used as the basis to compare the Developed Case against, to determine potential impacts and then derive appropriate mitigation measures. This process is followed for all infrastructure projects that have the potential to impact on this investigation, with projects required to mitigate and minimise impacts to acceptable levels; therefore, cumulative impacts have been included in the assessment of Existing Case versus Developed Case. Where information was readily available, future approved developments, external to Inland Rail (e.g. InterLinkSQ, Doug Hall Poultry, Commodore Mine and the Millmerran Power Station expansion) have been included in hydraulic models to ensure due consideration of cumulative impacts is completed. Continued consultation with stakeholders will be undertaken in subsequent stages of the Project to ensure future developments are considered within hydraulic modelling. The mitigations are included in the revised reference design and presented in Chapter 14: Flooding and Geomorphology and Chapter 24: Draft Outline Environmental Management Plan.

The exception is the North Star to NSW/QLD Border and the Gowrie to Helidon Inland Rail projects that are being concurrently developed. These projects have been included in the Developed Case for this Project to enable cumulative impacts to be considered and addressed. During the detailed design stage, a thorough review of new developments will be carried out to ensure that these are captured within the flood models.

23.3.7.2 Geomorphic catchment processes

Key catchment processes include sediment budget change, channel change, changing flood and flow regime, dam construction, land use change and flood control works including levees. Many of these impacts have historically occurred in the Project area catchments and will continue to occur outside of the Project influence area. Fluvial responses due to catchment impacts can have time lags of decades or more, meaning that catchment impacts occurring prior to and unrelated to the Project construction and operation may not be realised for some time after construction.

Sustainable approaches to catchment management minimise morphological changes that threaten water resource assets, but also include measures that accommodate the normal range of variability in channel form by allowing ‘room for the river’ (Downs and Pieguy, 2019). The mitigation measures in the revised reference design, namely preference of bridges over culverts, and oversized bridges provide more ‘room for the river’ than existing infrastructure. The mitigations are included in the revised reference design and presented in Chapter 14: Flooding and Geomorphology and Chapter 24: Draft Outline Environmental Management Plan.

Impacts of the Project on sediment budget change and channel change were included in the risk assessment for all potentially sensitive watercourses and floodplains, residual risk for the operations stage for all except two sites are low and as such cumulative catchment impacts are also assessed as low.

23.3.8 Groundwater

For the purposes of groundwater, projects that are within 1 km of the Project footprint with potential groundwater drawdown of contamination activities are considered to have the potential to result in cumulative impacts. Six of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to groundwater. The six identified projects are assessed in Table 23-16.

Projects and operations surrounding the groundwater impact assessment area were evaluated in terms of the potential of each to impact groundwater receptors of relevance to the Project. Cumulative impacts to groundwater are most likely to occur where multiple projects intersect and/or take groundwater from the same aquifer units and can be more significant when construction timing overlaps. The resultant impacts to groundwater may be:

- Changes in groundwater levels
- Reduction in groundwater quality, including from contamination.

Predictive impact modelling indicates that no bores located outside of the Project footprint are expected to experience groundwater drawdown as a result of Project activities. Therefore, due to the localised potential of groundwater impacts associated with the Project and the distance and nature of many of the surrounding projects considered, six of the initial 27 projects are considered to have potential to result in cumulative impacts to groundwater.

Overall, the significance of potential cumulative impacts on groundwater is considered to be low.

TABLE 23-16 CUMULATIVE IMPACT ASSESSMENT FOR GROUNDWATER

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
North Star to NSW/QLD Border Project	Change in groundwater levels	Probability of impact	Low (1)	5	Low	The potential for cumulative impacts to groundwater levels during construction is considered low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The development and implementation of the Groundwater Management and Monitoring Program (GMMP), including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts to groundwater quality during construction to is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ▸ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ▸ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Gowrie to Helidon Project	Change in groundwater levels	Probability of impact	Low (1)	5	Low	The potential for cumulative impacts to groundwater levels during construction is considered low as there are no deep cuts within 10 km of the Project interface and potential for groundwater drawdown will be isolated in the vicinity of deep cuts which intersect groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts to groundwater quality during construction to is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ▸ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ▸ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Asterion Medicinal Cannabis Facility	Change in groundwater levels	Probability of impact	Low (1)	6	Low	It is unclear where the Asterion Medicinal Cannabis Facility will source irrigation water however the possibility of extraction of groundwater for irrigation use should be considered. The Asterion project is proposed to be developed in three stages with peak production unlikely to occur during the B2G construction works stage. The facility is proposed adjacent to Cut C39 with the potential to intercept groundwater. However, modelling indicates that groundwater drawdown resulting from excavation of deep cut C39 will be localised and temporary. Further take of water is managed by DRDMW under the provisions of groundwater entitlements process and within the licensing limits for each hydrostratagraphic unit. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts during construction to groundwater quality is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ▸ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ▸ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Commodore Mine and Millmerran Power Station – expansion	Change in groundwater levels	Probability of impact	Low (1)	6	Low	There is potential for overlap of dewatering impacts on shallow aquifers intersected by Project cuttings and dewatering from the Commodore Mine open pit. Deep cut C25 is located adjacent to Commodore Mine but is considered unlikely to intercept groundwater and induce drawdown. Further, any potential drawdown due to the Project is anticipated to be localised and temporary during excavation works. The potential for cumulative impacts during construction to groundwater levels is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through the development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts during construction to groundwater quality is considered to be low due to the localised predicted impacts on groundwater. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ▸ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ▸ The development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
Wagners Intermodal Terminal	Change in groundwater levels	Probability of impact	Low (1)	5	Low	The potential for cumulative impacts to groundwater levels is considered low as no deep cuts are proposed along the section of the alignment adjacent to the proposed Intermodal Terminal Site. Further, excavations for the Intermodal Terminal are unlikely to reach the depth of groundwater. The development and implementation of the GMMP, including the establishment of baseline conditions will help identify potential cumulative impacts during the construction works and operations stages of the Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	The potential for cumulative impacts to groundwater quality during construction to is considered to be low as any minor spills/leaks that occur are anticipated to be isolated and low volume. Therefore, specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through: ▸ The development and implementation of the GMMP, including the establishment of baseline conditions and construction works stage monitoring. ▸ The development and implementation of a Hazardous Materials Management Plan, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
InterLinkSQ	Change in groundwater levels	Probability of impact	Low (1)	5	Low	Potential cumulative impacts will be managed through the development and implementation of the GMMP, including the establishment of baseline conditions and monitoring during construction and initial years of operation.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of receiving environment	Medium (2)			
	Groundwater quality and contamination	Probability of impact	Low (1)	6	Low	Potential cumulative impacts will be managed through the development and implementation of the GMMP, including the establishment of baseline conditions and monitoring during construction and initial years of operation. In addition, the development and implementation of a Hazardous Materials Management Plan for the Project, thereby ensuring the safe handling, storage and usage of hazardous materials and dangerous goods.
		Probability of impact	Medium (2)			
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			

23.3.9 Noise and vibration

For the purposes of noise and vibration, projects that directly interface the Project and that will have temporal overlap in construction, expansion activities or commencement of operation are considered to have the potential to result in cumulative impacts. Five of the identified projects in Table 23-6 meet these criteria and are assessed in Table 23-17.

The Project will, in places, intersect and be located alongside the existing road network and future new and upgraded roads proposed within the Project.

The construction noise assessment for the Project assumes all required plant could operate at the same time. The noise levels due to cumulative activities are not expected to significantly increase above the levels predicted for the construction of the Project, in isolation. As a result, quantitatively combining the predicted noise levels with impacts from other projects would overstate the impacts of the Project. The noise levels due to cumulative impacts that may arise from adjoining projects have been assessed qualitatively.

During operation, it is expected that receptors will perceive the operation of the Inland Rail network as a single project, acting as a single linear noise source. Therefore, cumulative impacts with adjoining Inland Rail projects are expected to not differ from those predicted for the Project in isolation. It is anticipated that operational noise arising from InterLinkSQ, Asterion Medicinal Cannabis Facility and an expanded Commodore Mine operation would differ from the noise generated from an operational railway, regarding tone, frequency, and volume. It is also anticipated that, in each instance, adjoining developments would be mitigating and managing noise in accordance with environmental and planning regulations. As a result, the contributing effect of noise from these adjoining operations is regarded as unlikely to result in significant cumulative impacts.

Overall, the significance of potential cumulative impacts on noise and vibration during construction is considered to be medium (Section 23.3.9.1) and during operation is considered to be low (Section 23.3.9.2).'

23.3.9.1 Noise and vibration–construction and road traffic

Based on the predicted construction noise levels, the following factors contribute to cumulative construction noise that is expected to be of medium significance:

- Simultaneous noise from construction works of adjoining projects has the potential to increase noise levels at nearby noise sensitive receivers also impacted by construction noise associated with the Project. However, the modelling approach adopted for the impact assessment methodology includes simulation of simultaneous construction works, by assuming that as a worst-case, all activities could occur at any time within a defined area, including up to the limit of the Project footprint. The noise levels due to cumulative impacts are not expected to significantly increase above the levels predicted for the Project in isolation.
- The construction methodology will be developed and refined with the aim of achieving compliance with construction noise and vibration performance criteria as specified in Chapter 24: Draft Outline Environmental Management Plan.

Based on the predicted existing road traffic noise levels and the assessed road traffic with the Project, the overview assessment determined:

- The majority of the new and upgraded roads within the Project are adjacent to or intersect with the rail alignment of the Project. Consequently, at the nearest sensitive receptors to the local road networks, the predicted road traffic and railway noise levels are typically within 10 dB(A) of each other. The future noise environment could therefore be influenced by the cumulative noise from both sources of transport noise.
- Any increase in the overall daily transport noise at sensitive receptors in proximity to both the local road traffic and the Project's rail alignment would be a marginal perceptible increase of not more than 3 dB(A). Because road traffic and railway noise are perceived differently, there may not be an increased potential for noise-related impacts where there is a cumulative increase in transport noise levels.
- The road and railway traffic will not be continuous and there will be periods throughout the daytime and night-time where there could be minimal or no transport noise
- Specific measures to manage or mitigate cumulative transport noise are not required in areas where the Project's rail alignment crosses, or is adjacent to, the future local road network. Any specific mitigations implemented to control railway noise at road–rail interfaces would be expected to also assist in reducing and controlling perceived cumulative noise impacts.

23.3.9.2 Noise and vibration– railway operation

The subjective response to the different noise levels and noise characteristics of the intermittent sources of road traffic and railway noise are such that individuals are less likely to perceive or determine impacts based on a cumulative exposure of the combined transport noise. Consequently, noise from road traffic and railway operations are assessed and, if necessary mitigated, separately.

While the policies and guidelines referenced by the ToR do not specify criteria or management objectives for combined road and railway transport noise, an overview assessment of potential cumulative transport noise has been undertaken to inform the revised draft EIS. Based on the railway noise modelling, no additional receptors were identified where combined noise levels from upgraded roads and new rail would result in noise levels increasing above $L_{Aeq,24h}$ 65 dBA, which were not already identified as triggering the Single Event Maximum rail noise criteria.This is since the relative contribution from the adjacent project sections are not anticipated to be sufficient to influence the overall noise predictions for receivers near both ends of the Project.

TABLE 23-17 CUMULATIVE IMPACT ASSESSMENT FOR CONSTRUCTION AND OPERATIONAL NOISE

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
InterLinkSQ	Increased noise and vibration levels at sensitive receptors—construction	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative impacts from noise and vibration during construction will be managed through: ▸ Implementation of the CEMP for the Project ▸ ARTC will facilitate discussions between respective contractors on adjoining Inland Rail sections regarding the scheduling of construction activities to avoid simultaneous undertaking of noisy construction activities. ▸ Consultation with sensitive receptors within the extent of impact from noise and vibration generated by construction activities for the Project to agree appropriate mitigation measures.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
	Increased noise and vibration levels at sensitive receptors—operation	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts from noise and vibration from Interlink SQ and the Project is considered to be low. Potential cumulative impacts will be managed through inspection and maintenance of the Inland Rail network, including noise attenuation measures within the rail corridor, in accordance with ARTC's network procedures. Operation of the InterLinkSQ facility would also be required to meet operational noise criteria which are separate to the rail operations criteria. This would manage potential cumulative impacts.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Asterion Medicinal Cannabis Facility	Increased noise and vibration levels at sensitive receptors—construction	Probability of the impact	Medium (2)	6	Low	The potential for cumulative noise and vibration impacts during construction will be managed through: ▸ Implementation of the CEMP for the Project. ▸ ARTC will facilitate discussions between respective contractors on adjoining Inland Rail sections regarding the scheduling of construction activities to avoid simultaneous undertaking of noisy construction activities. ▸ Consultation with sensitive receptors within the extent of impact from noise and vibration generated by construction activities for the Project to agree appropriate mitigation measures.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increased noise and vibration levels at sensitive receptors—operation	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts from noise and vibration is considered to be low, therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through inspection and maintenance of the Inland Rail network in accordance with ARTC's network procedures.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Commodore Mine and Millmerran Power Station—expansion	Increased noise and vibration levels at sensitive receptors—construction	Duration of the impact	Medium (2)	6	Low	It is noted from a review of the existing Commodore Mine Environmental Authority EPML00841513 that the mine currently operates to a prescribed noise limit of 35 dBA LAeq. Since this limit is 10 dBA below the non-standard hours noise limit for the Project, the contribution of noise from the mine would not result in an overall increase in noise levels at sensitive receptors adjacent to the Project. Notwithstanding this, ARTC will consult with Intergen and the community regarding scheduling of construction activities to avoid the simultaneous undertaking of activities having potential to generate disturbances.
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
	Increased noise and vibration levels at sensitive receptors—operation	Probability of the impact	Low (1)	5	Low	The potential for cumulative impacts from noise and vibration is considered to be low, therefore specific mitigation measures to address cumulative impacts are not warranted. The potential for the Project to contribute to such impacts is considered to be appropriately managed through inspection and maintenance of the Inland Rail network in accordance with ARTC's network procedures.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
North Star to NSW/QLD Border (Inland Rail)	Increased noise and vibration levels at sensitive receptors—construction	Probability of the impact	Medium (2)	8	Medium	The potential for cumulative noise and vibration impacts during construction will be managed through: ▸ Implementation of the CEMP for the Project. ▸ ARTC will facilitate discussions between respective contractors on adjoining Inland Rail sections regarding the scheduling of construction activities to avoid simultaneous undertaking of noisy construction activities, e.g. piling. ▸ Consultation with sensitive receptors within the extent of impact from noise and vibration generated by construction activities for the Project to agree appropriate mitigation measures. ▸ Operational road traffic noise impacts are not anticipated given the closest road upgrade associated with the Project is at Yelarbon approximately 29 km from the North Star to Border Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	High (3)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
Gowrie to Helidon (Inland Rail)	Increased noise and vibration levels at sensitive receptors—construction	Probability of the impact	Medium (2)	7	Medium	The potential for cumulative noise and vibration impacts during construction will be managed through: ▸ Implementation of the CEMP for the Project. ▸ ARTC will facilitate discussions between respective contractors on adjoining Inland Rail sections regarding the scheduling of construction activities to avoid simultaneous undertaking of noisy construction activities. ▸ Consultation with sensitive receptors within the extent of impact from noise and vibration generated by construction activities for the Project to agree appropriate mitigation measures. ▸ Operational road traffic noise impacts are not anticipated given the closest road upgrade associated with the Project (i.e. Warrego Highway) is approximately 3 km from the North Star to Border Project.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

23.3.10 Social

The cumulative social impact assessment considers the potential for the combined impacts of a set of projects to affect a social environment over time. The social impact cumulative AOI considers primarily the whole of the Goondiwindi LGA and Toowoomba Regional LGA. Fourteen of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to social impacts. These 14 projects are assessed in Table 23-18.

23.3.10.1 Local impacts

The local AOI for assessment of cumulative social impacts has been defined as including the Project footprint and potentially impacted communities, on the basis that the interface of multiple projects may have impacts on social conditions (e.g. housing availability, access to services or access to tradespeople). The availability of labour and skills is considered under regional impacts in Chapter 17: Social as it concerns the Project region as a whole, and tradespeople and labourers are generally mobile within and between regions.

Local amenity, traffic and character

Cumulative social impacts may occur in the Kingsthorpe/Gowrie Junction area where construction of the Project, the Gowrie to Helidon project and InterLinkSQ could coincide, where traffic may increase, and construction activities and laydown areas may temporarily detract from local character. With respect to the interface between the Project and the North Star to NSW/QLD Border project, the combined impacts of rail construction and road works may impact on scenic character in a localised area west of Kurumbul.

There may also be concerns about community safety given increased numbers of non-local workers for construction of the Project, North Star to NSW/QLD Border and Gowrie to Helidon. Project workforce management strategies that address potential concerns about community safety include enforcing a code of conduct containing requirements for positive behaviours and respect for local residents and businesses and ensuring that the contractor has appropriate work conduct policies and procedures, implemented for all Inland Rail work sites.

The Macintyre Windfarm is located at least 40 km from the Project. With the exception of the potential for cumulative increased traffic on construction traffic routes such as highways, which would be managed in accordance with the projects' respective conditions of approval, cumulative impacts on local amenity and character (e.g. near Inglewood) appear unlikely.

The Wyemo Piggery is located near Texas approximately 50 km southeast of the Project, so, if constructed, would not contribute to cumulative impacts on amenity and character. The Goondiwindi Abattoir would be located near Goondiwindi, but as the Project is located 15 km east of the town, cumulative impacts on amenity or character are unlikely. Cumulative impacts on amenity with respect to the New Acland Coal Mine are also unlikely, as this operation is located 28 km north of the Project footprint near Oakey.

Housing and accommodation impacts

Concurrent construction projects such as other Inland Rail projects in Queensland, the Wellcamp Entertainment Precinct, the new Toowoomba Hospital and the Wagners Intermodal Terminal may compete with the Project for construction personnel from the Toowoomba region, resulting in a large proportion of personnel being recruited from outside the region, and consequently cause cumulative pressure on housing and/or short term accommodation supplies in social impact assessment study area communities.

This potential impact has been recognised by ARTC and non-resident workforce accommodation facilities are proposed to minimise the Project's possible pressures on housing and short-term accommodation. The adjoining Inland Rail NS2B project proposes a non-resident workforce accommodation facility to minimise housing demands in the Goondiwindi LGA, and the Gowrie to Helidon project anticipates drawing on a large regional workforce (e.g. the Toowoomba, Lockyer Valley, Ipswich, Brisbane and Gold Coast LGAs) who live within a safe driving distance, minimising housing and accommodation requirements. It is assumed that the new Toowoomba Hospital construction will draw on the workforce living within Toowoomba and nearby regional centres, and that the Queensland Government has developed appropriate strategies for the accommodation of any non-resident workers.

Two non-resident workforce accommodation facilities at Yelarbon and Inglewood have been proposed to primarily service the accommodation requirements of workforce for the Project. If established, the non-resident workforce accommodation in Yelarbon may also be used by personnel working on the North Star to NSW/QLD Border Project. Sharing of temporary accommodation across these projects would help to minimise any contributions to demands on local housing and accommodation in the local area.

The Asterion Medicinal Cannabis Facility is proposed for a site near the Toowoomba Wellcamp Airport and the Project. This facility is expected to provide 800 construction jobs and 300 operational jobs, however the likelihood of it proceeding and the timing for construction are unknown, so assessment of any cumulative impacts (e.g. cumulative labour draw) is not possible.

Social infrastructure requirements

The coincidence of construction activities for adjacent Inland Rail projects and a cumulative increase in workers near local communities such as Goondiwindi and Gowrie Junction has the potential to affect demands for policing and emergency services with respect to traffic management, site security (e.g. responding to incidents of theft from work sites) and road safety policing.

Local fire brigades and ambulance officers could also experience increased demand with respect to any accident responses for projects such as the Inland Rail projects, the Wellcamp Entertainment Precinct and the Wagners Intermodal Terminal. Government funding for police, fire and ambulance services may require review by the relevant State agencies, informed by review of the respective projects' construction periods and their experience with projects' demands on services. The Project will provide workforce ramp-up estimates to the Queensland Police Service, Queensland Ambulance Service, Queensland Fire and Emergency Services and Queensland Health to assist with their planning.

As the construction workforces for the Macintyre Windfarm and other Inland Rail projects would be based in other LGAs, cumulative impacts on local health services are not anticipated.

There is potential for stresses associated with Inland Rail and other construction projects to increase local demands for support services. Inland Rail has developed partnerships with the Darling Downs and West Moreton public hospital network, to strengthen local access to services delivered in the Project region. The Project will also consult with the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts to identify any existing service shortfalls and monitor any increases in service demands resulting from the Project, to enable cooperative solutions to address any strain on services resulting from the Project.

Cumulative community benefits

The potential local benefits, if a number of projects are constructed concurrently, include:

- Potential for increased trade for businesses in Goondiwindi, Yelarbon, Millmerran, Gowrie Junction and Toowoomba with concurrent and adjacent Inland Rail projects
- A substantial increase in the number and diversity of operational jobs available to local residents through Inland Rail, the Southern Queensland Correctional Centre Stage 2, InterLinkSQ, Wellcamp Entertainment Precinct and Wagners Intermodal Facility
- Facilitation of long-term employment opportunities and regional development, with potential to support development of the Charlton Wellcamp Enterprise Area.

23.3.10.2 Regional impacts

The Project region is considered as the regional level for assessment of cumulative social impacts, with consideration to adjacent LGAs where other Inland Rail projects may be constructed in the same timeframe.

Traffic

The coincidence of construction of projects would have cumulative impacts on traffic volumes and potentially lead to traffic delays during the construction period, throughout the impact assessment area. Impacts would depend on the timing and location of the works of multiple projects at that time. A wide range of mitigation measures relating to safety, intersection impacts, link-road impacts, pavement impacts, and road/rail interface impacts have been proposed for construction and operation of the Project and are expected to mitigate the Project's contribution to cumulative impacts on traffic. Such measures include:

- Development and implementation of a Road Use Management Plan (RUMP) and Traffic Management Plan
- Development and implementation of traffic control plans for localised short-term activities requiring traffic control
- Consultation with DTMR and TRC through the detailed design and construction works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic
- Maximising opportunities to move materials, plant and workforce within the Project footprint, instead of using the public road network
- Implementation of a travel demand management awareness campaign to inform the public of the proposed construction works and its potential effect on local road network operations. The purpose of this awareness campaign would be to relieve congestion by encouraging travel outside of peaks and increase public awareness of planned construction works.

Employment opportunities and labour draw

Assessment of cumulative labour demands is speculative as construction personnel are generally highly mobile within and across Australian states, and project schedules will vary from current estimates.

The Project has the potential to contribute to significant cumulative increases in employment opportunities in the Project region, both directly through construction employment opportunities, and through involvement of local businesses in the supply chain.

Projects that have already commenced construction are likely to have contributed to workforce skills and capacity within the Project region and adjacent LGAs, upon which the Project, other Inland Rail projects and other projects could draw. With the completion of the metropolitan rail projects in 2024, personnel who were trained and/or employed in their construction may also become available to Inland Rail projects.

Coincidence with construction of projects such as InterLinkSQ, the new Toowoomba Hospital, Wellcamp Entertainment Precinct and the Wagners Intermodal Facility are likely, and coincidence with construction of the Wyemo Piggery and the Goondiwindi Abattoir is possible. Given existing strengths in the construction industry, particularly in Toowoomba, employment opportunities relating to Inland Rail and other projects are likely to be a significant social and economic benefit to residents in LGAs where Inland Rail projects will be constructed. However, they may also contribute to cumulative labour and skills shortages.

If the Queensland Inland Rail projects were constructed simultaneously, and all workforce peaks coincided, a total of approximately 2,866 construction personnel could be required across several LGAs (Goondiwindi, Toowoomba, Lockyer Valley, Ipswich, Scenic Rim, Logan and Brisbane). This represents a maximum and unlikely case as the North Star to Border project would have shorter construction timeframes.

In addition, the construction stages of the Toowoomba Hospital, Wellcamp Entertainment Precinct and the Wagners Intermodal Terminal are likely to coincide with the Project's construction works stage. While the anticipated peak workforces for the Wellcamp Entertainment Precinct and the Wagners Intermodal Facility are relatively modest at 130 personnel and 240 personnel respectively, construction of the new Toowoomba Hospital is expected to require more than 3,100 personnel. Cumulatively, the construction workforce requirements of these projects and Inland Rail are likely to contribute to significant draws on South East Queensland's construction workforce, which could affect access to labour and tradespeople for residents, businesses and other industries.

The Project's potential contribution to the cumulative labour demand will be managed through the implementation of the Social Impact Management Plan, particularly those elements that pertain to the provision of training and development opportunities (e.g. Inland Rail Skills Academy). The Project has committed to monitoring labour draw through consultation with local councils and industry bodies, to enable consideration of corrective actions if the Project is contributing to skills shortages (see Appendix X: Social Impact Assessment).

The expansion in the construction sector would support additional flow-on demand through the construction industry supply chain and additional spending on consumer orientated products by the construction workforce in the region. The associated supply of construction materials, the development of associated external infrastructure and complementary services will also require additional workforce beyond those directly associated with the Inland Rail and other major projects, stimulating job creation and economic development in the region.

The Project's operation would coincide with the Southern Queensland Correctional Precinct Stage 2, Toowoomba Hospital, Wellcamp Entertainment Precinct, Wagners Intermodal Facility, and the Queensland Regional Accommodation Centre (subject to any future use), contributing to strong employment growth in the Toowoomba LGA and nearby LGAs.

The Project has the potential to catalyse positive impacts for industrial development by attracting rail-dependent industry to the Charlton Wellcamp Enterprise Area, and possibly also to Goondiwindi. This would generate significant positive cumulative employment opportunities in the impact assessment area.

Social infrastructure

It is anticipated that the Project's non-resident personnel's health service requirements would primarily be met in their home communities, through provision of access to paramedic-trained personnel on site and through telehealth services; therefore, a significant contribution to cumulative demands on regional health services is less likely.

There is potential for Project workers to be transported to major hospitals in Toowoomba or Goondiwindi if treatment is required. This is not expected to be a significant drain on hospital services

Cumulative numbers of construction workers across the Project region have the potential to affect demands for policing and emergency services with respect to traffic management, site security (e.g. responding to incidents of theft from work sites), road safety policing and, potentially, community protests against Inland Rail or other projects. As for local level impacts, government funding for police, fire and ambulance services available to local communities may require review by the relevant departments to ensure cumulative project demands do not impact on community access to services. The Project will provide workforce ramp-up estimates to the Queensland Police Service, Queensland Ambulance Service, Queensland Fire and Emergency Services, Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts, and Queensland Health to assist with their planning.

Potential cumulative impacts have been designated as negative (-) or positive (+) and are summarised in Table 23-18.

TABLE 23-18 CUMULATIVE IMPACT ASSESSMENT FOR SOCIAL IMPACTS

Projects	Potential cumulative social impacts	Likelihood	Consequence	Significance
Inland Rail—North Star to NSW/QLD Border	Combined impacts of rail construction and road works may impact on scenic character in a localised area west of Kurumbul, dependent on construction staging	C	1	C1 Low (-)
	Goondiwindi and Yelarbon businesses are likely to benefit from Project and personnel expenditure of the adjacent Inland Rail projects	B	3	B3 High (+)
Inland Rail—Gowrie to Helidon	Combined impacts of rail construction may affect rural character between Gowrie Mountain and Kingsthorpe, particularly with additional proximity to InterLinkSQ site	B	1	B1 Moderate (-)
	Potential for increased trade for businesses in the Gowrie Junction area during construction	C	3	C3 High (+)
Other Inland Rail projects in Queensland–Calvert to Kagaru, Helidon to Calvert	Substantial increase in the availability of employment in the impact assessment area during construction during construction	B	3	B3 High (+)
	Potential labour draw in the impact assessment area affecting access to labour or trades by businesses, industries and households during construction	C	2	C2 Moderate (-)
	Potential for incremental increases in demands on health, police and emergency services during construction	B	2	B2 High (-)
	Potential for cumulative demands for housing, however the Project's contribution is expected to be small	C	2	C2 Moderate (-)
Toowoomba Hospital, Wellcamp Entertainment Precinct and the Wagners Intermodal Facility	Potential for significant cumulative workforce requirements during construction, coinciding with Inland Rail requirements, resulting in labour draw in the impact assessment area, affecting access to labour or trades by businesses, industries and households during construction	C	3	C3 High (-)
InterLinkSQ, New Acland Coal Mine Stage 3, Southern Queensland Correctional Centre Precinct Stage 2, Macintyre Windfarm	Substantial increase in the availability of employment, facilitation of development and future job growth in the Toowoomba LGA during operation	B	3	B3 High (+)
	Potential for incremental increases in demands on health, police and emergency services in the Toowoomba LGA	C	2	C2 Moderate (-)
Goondiwindi Abattoir, Wyemo Piggery	Requirement for civil construction labour, resulting in reduced access to skilled trades and construction labour in the Goondiwindi LGA	C	2	C2 Moderate (+)
	Increase in the availability of employment in the Goondiwindi LGA	C	3	C3 High (+)
	Potential for incremental increases in demands on health, police and emergency services in the Goondiwindi LGA during construction and operation	C	2	C2 Moderate (-)

TABLE 23-19 MITIGATION OF PROJECT CONTRIBUTIONS CUMULATIVE SOCIAL IMPACTS

Potential cumulative social impacts	Mitigation measures
Combined impacts of rail construction may affect rural character between Gowrie Mountain and Kingsthorpe, particularly with additional proximity to InterLinkSQ site	▸ Construction will be managed in accordance with Chapter 24: Draft Outline Environmental Management Plan, including measures to be detailed in the CEMP and associated plans (Noise and Vibration, Air Quality and Traffic Management to reduce the potential for impacts on rural character. ▸ Land within the temporary footprint will be rehabilitated when it is no longer required.
Potential labour draw in SIA study area exacerbating skill shortages and/or affecting access to labour or trades by businesses, industries and households during construction	▸ Inland Rail Skills Academy has been implemented to increase the availability of skilled/suitable applicants for Project jobs. ▸ The Project has committed to advising key stakeholders including local councils and business organisations of workforce ramp-up, and to monitoring labour draw in cooperation with stakeholders, to enable corrective action if impacts on local businesses or households are experienced.
Potential for incremental increases in demands on health, police and emergency services during construction and potentially operation	▸ The Project has committed to measures to reduce personnel demands on local services, and to cooperation with Queensland Health, Queensland Police Service and Queensland Fire and Emergency Services, including advising on workforce ramp-up and consultation on emergency access points.

23.3.11 Economics

The AOI for assessment of the Project's economic impacts and benefits equates to the Darling Downs – Maranoa Statistical Area 4.

The cumulative economic impact assessment refers to the potential impact of cumulative stimulus on the economy resulting from a set of existing or planned projects within or adjacent to the impact assessment area. Cumulative impacts may result from the spatial and/or temporal interaction between these projects.

The economics cumulative impact assessment has two components:

- **Inland Rail—northern sections**

  A quantitative assessment of the cumulative macroeconomic impact of Inland Rail Program on the economy, resulting from the construction of the Queensland segments of the Inland Rail Program.

  Five segments of the Inland Rail Program fall in Queensland, including the Project, Gowrie to Helidon, Helidon to Calvert, Calvert to Kagaru, and Kagaru to Acacia Ridge and Bromelton. In addition to this, the assessment also includes the construction and development costs of two Inland Rail sections in NSW that (at the time of modelling) have an overlapping timeline with the construction of the Project–Narrabri to North Star and North Star to NSW/QLD Border.

- **Broader cumulative assessment**

  A qualitative assessment of the cumulative impact of State-significant projects (that have been identified by ARTC as having a relationship to the Project) on local and regional labour markets, the supply chain and local businesses. More detail related to the broader cumulative assessment can be found in Appendix Y: Economic Impact Assessment.

The $36.5 million CAPEX for constructing the Whetstone MDC represents 1.6 per cent of the total $2.2 billion CAPEX for the Project. As the economic modelling was done at a point in time prior to the inclusion of the Whetstone MDC in the EIS process, and the need for consistency in estimating the cumulative impacts across Queensland, the additional $36.5 million CAPEX has been excluded from the modelling analysis. The minor update to CAPEX will not materially impact the results.

23.3.11.1 Inland Rail—northern sections

The construction works stages of the Queensland (Calvert to Kagaru) and two NSW segments (Narrabri to North Star and North Star to NSW/QLD Border) of the Inland Rail Program have been jointly simulated to analyse the cumulative economic impacts of these projects. Hereafter, these sections will be referred to as the northern sections. Table 23-20 summarises the cumulative macroeconomic impacts in the catchment regions of Queensland under the labour market assumptions that are believed to be most likely to materialise. The incremental economic impacts of the northern sections include an increase in real Gross Domestic Product (GDP) of $1.5 billion (measured in 2022 dollars) and an increase in the average number of jobs over the period FY2023 to FY2030 of 548 jobs per year.

The Project is the only section of Inland Rail that is located within the Darling Downs–Maranoa region. Construction activities related to this section will directly impact the Darling Downs–Maranoa economy. The remaining sections of the Inland Rail Program, which this assessment covers, will impact the Darling Downs–Maranoa economy indirectly.

The regional impact analysis detailed in Chapter 18: Economics was based on simulations when the Project was modelled in isolation. In that context, the direct and indirect incremental change to jobs in the Darling Downs—Maranoa economy was estimated to be 332 jobs per year. When all the northern sections are considered jointly, the incremental change to jobs (direct and indirect) in Darling Downs–Maranoa decreases marginally to 326 jobs per year during the Project's construction works stage (FY2024 to FY2028). The incremental change to jobs in Darling Downs–Maranoa peaks in 2026 at 559 jobs.

As discussed in the regional impact analysis in Chapter 18: Economics, the labour market conditions across regional economies in Queensland over the Inland Rail Program construction stage are generally expected to be closer to a 'tight' rather than 'slack' characterisation. In a 'tight' labour market, an increase in demand for labour is accommodated mainly through an increase in real wages, while in a 'slack' labour market, an increase in labour demand is accommodated mainly by a decrease in the unemployment rate with little impact on real wages.

TABLE 23-20 SUMMARY OF QUEENSLAND-WIDE ECONOMIC IMPACTS OVER THE PERIOD FY23 TO FY30

	Gross Regional Product/GDP ($m 2022)	Jobs (persons)		
		Average (annual)	Peak	Year of peak
Greater Brisbane	$626	277	1,099	2026
Darling Downs–Maranoa	$425	191[1]	559	2026
Toowoomba	$1,089	658	1,751	2027
Remainder of Queensland	-$90	-76	26	2025
Queensland	*$2,050*	***1,050***	***3,244***	***2026***
Remainder of Australia	-$552	-502	298	2025
Australia	$1,498	548	3,177	2026

Source: KPMG

Table note:
1 This the annual average of additional jobs over the period FY23-30, from when the first construction and development costs of all the Inland Rail segments included in the cumulative study (North Star to Border) are expected to be made to the last one (Gowrie to Helidon).

23.3.11.2 Broader cumulative assessment

Interacting projects

There is a range of projects, within or adjacent to the economic impact assessment area, that may contribute to local and regional economic impacts. These projects are assessed in Table 23-21.

TABLE 23-21 CUMULATIVE PROJECTS AND NATURE OF POTENTIAL ECONOMIC IMPACTS

Project	Nature of impact
North Star to Border Inland Rail	▸ Potential labour draw from the regional economic catchment (peak 350 FTE during construction period) ▸ Potential draw on construction materials from the regional economic catchment ▸ Businesses within the catchment area (e.g. in Goondiwindi and Yelarbon) are likely to benefit from the Project as a result of increased local expenditure from construction personnel of the combined Inland Rail projects ▸ Potential impact on rental housing availability and affordability in Goondiwindi
Gowrie to Helidon–Inland Rail	▸ Potential labour draw from the regional economic catchment (peak 596 FTE during construction period) ▸ Potential draw on construction materials from the regional economic catchment ▸ Businesses within the catchment area (e.g. in the Gowrie Junction area) are likely to benefit from the Project as a result of increased local expenditure from construction personnel of the combined Inland Rail projects ▸ Employment opportunities and regional development, in relation to the Toowoomba Enterprise Hub
Helidon to Calvert–Inland Rail	▸ Potential labour draw from the regional economic catchment (peak 410 FTE during construction period) ▸ Potential draw on construction materials from the regional economic catchment
Calvert to Kagaru–Inland Rail	▸ Potential labour draw in SEQ may reduce labour availability for more specialised roles (peak 536 FTE during the construction period) ▸ Potential regional development opportunities across SEQ's south-west industrial corridor and in the Western Gateway regional economic cluster
South East Queensland Correctional Centre Precinct Stage 2	▸ Potential labour draw in SEQ may reduce labour availability for more specialised roles
Wagners Intermodal Terminal	▸ Potential labour draw in SEQ may reduce labour availability for more specialised roles
Wellcamp Entertainment Precinct	▸ Where construction schedules overlap, potential labour draw from the regional economic catchment
InterLinkSQ	▸ Potential labour draws in SEQ with continued development until Inland Rail is operational. May reduce labour availability for more specialised roles

Project	Nature of impact
Australia Pacific LNG Project	▸ Potential labour draw in SEQ with continued gas field development
Macintyre Windfarm	▸ Where construction schedules overlap, potential labour draw from the regional economic catchment
Sapphire Feedlot	▸ Where construction schedules overlap, potential labour draw from the regional economic catchment
Wyemo Piggery	▸ Where construction schedules overlap, potential labour draw from the regional economic catchment
Goondiwindi Abattoir	▸ Potential labour was drawn from the regional economic catchment
New Acland Coal Mine Stage 3	▸ Potential labour was drawn from the regional economic catchment
Wellcamp Business Park	▸ Requirement for civil construction labour, resulting in cumulative demand for skilled trades and civil construction labour, however, development is likely to be incremental over a longer period with relatively modest labour draw ▸ Potential regional development opportunities across SEQ's south-west industrial corridor and in the Western Gateway regional economic cluster
Witmack Industry Park & Charlton Logistics Park	▸ Requirement for civil construction labour, resulting in cumulative demand for skilled trades and civil construction labour; however, development is likely to be incremental over a longer period with relatively modest labour draw ▸ Potential regional development opportunities across SEQ's south-west industrial corridor and in the Western Gateway regional economic cluster
Asterion Medicinal Cannabis Facility	▸ Where construction schedules overlap, potential labour draw from the regional economic catchment

Cumulative labour market impacts

The concurrent construction of interacting projects has the potential to increase the demand for labour in the local and regional economy, particularly for workers with trade and construction skills/knowledge. The demand for construction workers within a similar timeframe will lead to cumulative demands on construction labour, not only within the local and regional economy, but also across Queensland, NSW and, potentially, nationally.

The results of the regional economic impact assessment indicate a deterioration in the Darling Downs–Maranoa labour markets, based on observations in recent statistics, and the Project schedule may also be optimised to minimise market impact. It is reasonable to assume that the regional labour market will have some capacity to supply a portion of the workforce requirements of the Project; however, these conditions may change in the context of cumulative labour market demand. Major infrastructure projects in the adjacent and surrounding areas, including those associated with the Inland Rail Program, have the potential to put some pressure on labour markets if scheduling results in cumulative and competing demand for trades and construction labour. However, the overall labour demands of the various infrastructure projects that are expected to be constructed were modest, and that scheduling could be optimised to minimise market impact. The best estimates of prevailing trends in the Darling Downs–Maranoa labour market, and the ability of construction workers to mobilise to project locations, suggest that the risks of labour market disruption can be reduced.

There may be benefits from having additional infrastructure projects in the adjacent and surrounding areas around the same time as the Project. These benefits come in the form of lowered mobilisation costs and transfer of labour experience and skills to projects, particularly those constructed in the period leading up to, and the period following, the Project's construction works stage.

Cumulative impacts on local businesses

The expansion in construction activity and regional employment (with a subsequent increase in temporary and non-resident population) has the potential to increase demand for a range of local infrastructure and services, including housing, health care, childcare, and education. Further, spending on consumer-orientated products by the construction workforce has the potential to benefit local businesses by increasing their trading levels. Importantly, some businesses may need to scale up their current capacity to support cumulative demand, while also understanding the temporary nature of the construction period for the relevant projects and adjust capacity accordingly.

Cumulative supply chain impacts

Cumulative supply chain impacts are likely to be realised where construction timeframes occur concurrently, and comparable material is required (e.g. in the adjacent Inland Rail projects). Opportunities to supply these projects may include supply of fuels, equipment, borrow and quarried material. Where materials are sourced within the surrounding regions, increased local expenditure is likely to increase local and regional economic activity. The Project will seek opportunities to maximise efficiencies in obtaining supplies across Inland Rail segments and only source materials from commercial quarries currently in operation.

Should the demand for fill material surpass supply, resulting in a shortage of available material, input costs to the Project may increase (due to increased prices of materials) driving up the total construction cost, and negatively impacting the economic return of the Project.

23.3.12 Non-Indigenous heritage

For the purpose of non-Indigenous heritage, potential impacts to heritage sites and places have been identified as being isolated in nature and generally within 50 m of the Project footprint. Consequently, the area of impact on heritage features of the Project is not expected to overlap with other non-Inland Rail projects. The two adjoining Inland Rail projects, being North Star to NSW/QLD Border and Gowrie to Helidon are considered to have potential to result in cumulative impacts.

Two of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to non-Indigenous heritage. The two identified projects are summarised in Table 23-22.

Overall, the significance of potential cumulative impact of non-Indigenous heritage is considered to be medium.

The results of CIAs undertaken for cultural heritage sites and places must be interpreted with caution, because they are based (in part) on heritage datasets that are inevitably incomplete and contain various inconsistencies and errors. Godwin (2011) has questioned the value of cumulative impact assessments to cultural heritage management in Australia, arguing that the ‘fundamentals’ necessary for undertaking such assessments simply do not exist. The fundamentals Godwin (2011) is referring to are robust regional and national data sets for measuring proposed impacts and the determination of acceptable scientific and cultural impact thresholds.

TABLE 23-22 CUMULATIVE IMPACT ASSESSMENT FOR NON-INDIGENOUS HERITAGE

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
North Star to NSW/QLD Border (Inland Rail)	Loss of cultural heritage sites	Probability of the impact	High (3)	9	Medium	Will be managed through: ▸ Development and implementation of a Heritage Management Plan, as a component of the CEMP for the Project ▸ ARTC to ensure that compatible management measures are applied across projects within the Inland Rail Program
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			
Gowrie to Helidon (Inland Rail)	Loss of cultural heritage sites	Probability of the impact	High (3)	9	Medium	Will be managed through: ▸ Development and implementation of a Heritage Management Plan, as a component of the CEMP for the Project ▸ ARTC to ensure that compatible management measures are applied across projects within the Inland Rail Program
		Duration of the impact	High (3)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Low (1)			

23.3.13 Traffic, transport and access

The traffic tasks associated with existing developments in the region, operating at their current scale and intensity, have been factored into the background traffic numbers established for the traffic impact assessment (Chapter 20: Traffic, Transport and Access).

Therefore, for the purpose of traffic, transport and aspect, construction of new projects or expansion of existing operations that will have a temporal overlap and may result in traffic usage of the same road network as the Project are considered to have the potential to result in cumulative impacts.

A total of 13 of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to traffic, transport and access. These thirteen projects are assessed in Table 23-23.

If construction transportation tasks for the above-mentioned projects occur simultaneously to transportation tasks for the Project, then a cumulative increase in traffic volumes on the local road network may occur. Generally, the following impacts may arise because of the increased number of vehicle movements on the existing road network during construction:

- Increased journey times on road linkages used by construction traffic
- Reduced level of service on road links used by construction traffic
- Increased waiting time at intersections used by construction traffic
- Accelerated degradation of road pavements due to increased volume of traffic and greater axle load.

Overall, the significance of potential cumulative impacts is considered to be medium.

TABLE 23-23 CUMULATIVE IMPACT ASSESSMENT FOR TRAFFIC

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and mitigation measures
New Acland Coal Mine Stage 3	Increase traffic volumes on local road network	Probability of the impact	Low (1)	5	Low	The potential for cumulative traffic impacts to arise due to New Acland Coal Mine Stage 3 is considered to be low due to the separation distance between the two projects (18 km north of the Project footprint). The potential for the Project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Development and implementation of a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and TRC through the detailed design and Construction Works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Australia Pacific LNG Project	Increase traffic volumes on local road network	Probability of the impact	Low (1)	5	Low	The potential for cumulative traffic impacts to arise due to the Australia Pacific LNG Project is considered to be low due to the separation distance between the two projects (13 km north of the Project footprint). The potential for the Project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Development and implementation of a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and TRC through the detailed design and construction works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
InterLinkSQ	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	8	Medium	Both projects are expected to be reliant on the use of roads north of the Warrego Highway. The shared use of these roads could occur for a large portion of the construction period for the Project. The potential for the Project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Development and implementation of a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and TRC through the detailed design and construction works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic. ▸ Consultation with the developers and operators of InterLinkSQ, throughout construction to understand the scheduling of activities for that Project and enable time periods where cumulative traffic impacts may arise to be identified ▸ Where new potential for cumulative impacts is identified through the construction stage, additional mitigation measures will be developed in consultation with DTMR, TRC and InterLinkSQ and documented in the Traffic Management Plan and RUMP, as appropriate.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and mitigation measures
Asterion Medicinal Cannabis Facility	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	6	Low	The potential for cumulative traffic impacts to arise due to the Asterion Medicinal Cannabis Facility is considered to be low due to the short duration of overlap in construction time periods and the likely advanced status of construction of the Medicinal Cannabis Facility by the time peak construction activities for the Project occur in the area. The potential for this project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Development and implementation of a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and TRC through the detailed design and Construction Works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Commodore Mine and Millmerran Power Station–expansion	Increase traffic volumes on local road network	Probability of the impact	High (3)	9	Medium	Both projects are expected to be reliant on the use of Millmerran–Inglewood Road in the Millmerran and Clontarf areas. The shared use of this road could occur for a large portion of the construction period for the Project. The potential for the Project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and TRC through the pre-construction activities and early works and construction works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic. ▸ Consultation with the operators of Commodore Mine, Intergen, throughout the construction works stage to understand the scheduling of expansion activities for that Project and enable time periods where cumulative traffic impacts may arise to be identified. ▸ Where new potential for cumulative impacts is identified through the construction period, additional mitigation measures will be developed in consultation with DTMR, TRC and Intergen and documented in the Traffic Management Plan and RUMP, as appropriate.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
Wyemo Piggery	Increase traffic volumes on local road network	Probability of the impact	Low (1)	5	Low	The potential for cumulative traffic impacts to arise due to the Wyemo Piggery is considered to be low due to the separation distance between the two projects (8 km north of the Project footprint). The potential for the Project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and GRC through the detailed design and construction works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and mitigation measures
MacIntyre Wind Farm	Construction traffic on the local road network.	Probability of the impact	Low (1)	5	Low	The potential for cumulative traffic impacts to arise due to the MacIntyre Wind farm is considered to be low due to the separation distance between the two projects (50 km west of Warwick and 10 km south of Karara). This Project will likely import a large quantity of materials from the Port of Brisbane and use the Cunningham Highway and Toowoomba-Karara Road for the transport of these. Other construction materials will also use these routes, which differ to those used by the Inland Rail Projects.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
Goondiwindi Abattoir	Increase traffic volumes on local road network	Probability of the impact	Low (1)	6	Low	The potential for cumulative traffic impacts to arise due to the Goondiwindi Abattoir is considered to be low due to the separation distance between the two projects (13 km north of the Project footprint). The potential for the Project to contribute to increased traffic volumes on the local road network will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with DTMR and GRC through the detailed design and construction works stages of the Project to identify newly occurring issues and risks to the road network that will be used by Project traffic.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Medium (2)			
North Star to Border (Inland Rail)	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	8	Medium	There is potential for an overlap of construction traffic. A quantitative cumulative assessment has been undertaken in Appendix AA: Traffic Impact Assessment. Potential cumulative impacts will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with road network asset managers through the construction planning and construction works stage of the Project to identify newly occurring issues and risks to the road network used by Project traffic. ▸ Subject to construction contract arrangements, investigate opportunities to nominate laydown locations that can be shared between North Star to Border project and the Project. This would enable optimisation of the number of delivery movements and routes to/from the construction sites for both projects.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
Calvert to Kagaru (Inland Rail)	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	8	Medium	There is potential for an overlap of construction traffic. A quantitative cumulative assessment has been undertaken in Appendix AA: Traffic Impact Assessment. Potential cumulative impacts will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with road network asset managers through the construction planning and construction works stage of the Project to identify newly occurring issues and risks to the road network used by Project traffic.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and mitigation measures
Helidon to Calvert (Inland Rail)	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	8	Medium	There is potential for an overlap of construction traffic. A quantitative cumulative assessment has been undertaken in Appendix AA: Traffic Impact Assessment. Potential cumulative impacts will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with road network asset managers through the construction planning and construction works stage of the Project to identify newly occurring issues and risks to the road network used by Project traffic.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
Gowrie to Helidon (Inland Rail)	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	8	Medium	There is potential for an overlap of construction traffic. A quantitative cumulative assessment has been undertaken in Appendix AA: Traffic Impact Assessment. Potential cumulative impacts will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with road network asset managers through the construction planning and construction works stage of the Project to identify newly occurring issues and risks to the road network used by Project traffic. ▸ Subject to construction contract arrangements, investigate opportunities to nominate laydown locations that can be shared between the Gowrie to Helidon project and the Project. This would enable optimisation of the number of delivery movements and routes to/from the construction sites for both projects.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			
Kagaru to Acacia Ridge and Bromelton (Inland Rail)	Increase traffic volumes on local road network	Probability of the impact	Medium (2)	8	Medium	Potential cumulative impacts will be managed through: ▸ Developing and implementing a RUMP and Traffic Management Plan. ▸ Consultation with road network asset managers through the construction planning and construction works stage of the Project to identify newly occurring issues and risks to the road network used by Project traffic.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	Medium (2)			

23.3.14 Hazard and risk

The assessment of cumulative hazard and risk impacts requires consideration of various matters, some of which have been discussed in other sections of this chapter, as follows:

- Flooding and climate change
- Landslide, sudden subsidence, movement of soil or rocks
- Wildlife and biosecurity
- Traffic
- Utilities, private access and stock route
- Existing land use and infrastructure
- Contaminated land.

In regard to the transportation of hazardous chemicals and dangerous goods, two of the projects in Table 23-6 were identified as having a potential cumulative impact in relation to hazard and risk. The two projects are assessed in Table 23-24.

The project has potential to contribute to the loss of containment of hazardous chemicals and dangerous goods. Cumulative impact can arise where there is multiple loss of containment sources with an outcome that can impact the environment and people during storage, handling or transport of hazardous chemicals and dangerous goods either to and from the Project footprint (deliveries or waste removal) or within the Project footprint (moving from point of delivery to point of use). Loss of rolling stock is not considered a cumulative impact as it has a single source.

The types and quantities of hazardous chemicals and dangerous goods that are expected to be used for the construction or operation and maintenance of other projects are not considered to be sufficient to result in significant offsite impacts or the potential to contribute to cumulative impacts at the adjacent, regional and national level.

This assessment has concluded that the cumulative hazard and risk impacts of the Project are expected to be of medium significance.

TABLE 23-24 CUMULATIVE IMPACT ASSESSMENT FOR HAZARD AND RISK

Impact	Type	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
North Star to NSW/QLD Border (Inland Rail)	Loss of containment of dangerous goods through transportation during construction	Probability of the impact	Low (1)	8	Medium	Potential cumulative impacts will be managed through: ▸ Ensuring that compatible management measures are applied across projects within the Inland Rail Program ▸ Adhering to the requirements of ARTC's Safety Management System ▸ Adhering to ARTC's existing *Emergency Management Procedure* (RLS-PR-044) (2024) ▸ Development and implementation of network-wide Incident Management Plan.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	High (3)			
	Loss of containment of dangerous goods through transportation during operation	Probability of the impact	Low (1)	8	Medium	Potential cumulative impacts will be managed through: ▸ Prohibiting transportation of Class 1 explosives on the Inland Rail network ▸ Dangerous goods will be loaded, labelled, and marshalled in accordance with *the Australian Code for the Transport of Dangerous Goods by Road & Rail* (National Transport Commission, 2024) ▸ Adhering to ARTC's existing *Emergency Management Procedure* (RLS-PR-044) (2024).
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	High (3)			
Gowrie to Helidon (Inland Rail)	Loss of containment of dangerous goods through transportation during construction	Probability of the impact	Low (1)	8	Medium	Potential cumulative impacts will be managed through: ▸ Ensuring that compatible management measures are applied across projects within the Inland Rail Program ▸ Adhering to the requirements of ARTC's Safety Management System ▸ Adhering to ARTC's existing *Emergency Management Procedure* (RLS-PR-044) (2024) ▸ Development and implementation of network-wide Incident Management Plan.
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	High (3)			
	Loss of containment of dangerous goods through transportation during operation	Probability of the impact	Low (1)	8	Medium	Potential cumulative impacts will be managed through: ▸ Prohibiting transportation of Class 1 explosives on the Inland Rail network ▸ Dangerous goods will be loaded, labelled, and marshalled in accordance with *the Australian Code for the Transport of Dangerous Goods by Road & Rail* (National Transport Commission, 2024) ▸ Adhering to ARTC's existing *Emergency Management Procedure* (RLS-PR-044) (2024).
		Duration of the impact	Medium (2)			
		Magnitude/intensity of the impact	Medium (2)			
		Sensitivity of the receiving environment	High (3)			

23.3.15 Waste and resource management

The cumulative impacts arising from waste and resource management activities are expected to be isolated to the disposal of waste, which contributes to the consumption of airspace of local waste-management infrastructure. This, in turn, will reduce the local community's access to such services. For the purposes of waste management, projects that will have overlapping construction timeframes and shared demand on existing waste-management facilities within 50 km of the project footprint are regarded as having potential to result in cumulative impacts.

Two of the projects in Table 23-6 were identified as having potential cumulative impact in relation to waste and resource management. The two identified projects are assessed in Table 23-25.

Current balancing of the cut and fill volumes may result in a deficit of bulk earthworks material, depending on adjustments made during detailed design and the feasibility and success of material treatment options. The fill deficit for the Project will be met through the importation of appropriate material type from operational licenced quarries or from borrow pits established for the Project. Therefore, cumulative impacts associated with the offsite disposal of spoil are not anticipated to be a result of the Project.

The two projects relevant to the waste and resource management cumulative impact assessment are part of the broader Inland Rail Program. Therefore, despite the potential for cumulative impact on receiving waste-management facilities, ARTC will be able to liaise with the relevant operators, to negotiate appropriate waste disposal arrangements. Furthermore, the negotiation of material reuse across different projects represents a Project opportunity that will have a tangible benefit on the need for offsite (outside project) management/disposal. Some of these benefits include:

- Transport distance for earthworks materials can be minimised where possible by reuse of cut material within nearby fills, including on other Inland Rail projects. The packaging strategy being applied on the northern projects allows haul distances to be optimised, such as the boundaries being shifted to allow a 'neutral' cut fill balance.
- Beneficial reuse of material can be maximised by considering different material treatment options as part of the ongoing design. For instance, lime stabilisation of reactive soils and gypsum treatment of dispersive soils will allow reuse of materials that have poor engineering properties.
- Where appropriate in design, poorer strength materials may be used outside of the core part of rail embankments to provide protection against moisture change in soils or protection from erosion or in areas where there are lower requirements such as the rail maintenance access road.

Cumulative impacts relating to waste management are considered to be of low significance and therefore are unlikely to result in long-term cumulative impacts, providing that all assessable projects apply mitigation measures that are consistent with those proposed for this Project.

TABLE 23-25 CUMULATIVE IMPACT ASSESSMENT FOR WASTE MANAGEMENT

Project	Potential cumulative impact	Impact characteristic	Relevance factor	Sum of relevance factors	Impact significance	Comments and management measures
North Star to NSW/QLD Border (Inland Rail)	Airspace consumption of local waste-management infrastructure, thereby reducing the local community's access to such services	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through: ▸ Securing agreements with owners and operators for disposal of waste at licensed waste-disposal facilities once the construction schedule for both Inland Rail projects is confirmed ▸ Ensuring that construction contract documentation for adjoining projects have consistent clauses regarding waste management, including reduction targets ▸ Ensuring that Waste Management Plans (or equivalent) are prepared for both adjoining Inland Rail projects, and that these Plans are complementary and are consistent with the Inland Rail Environment and Sustainability Policy, the Inland Rail Sustainable Procurement Policy and the Inland Rail Environmental Management System.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			
Gowrie to Helidon (Inland Rail)	Airspace consumption of local waste management infrastructure, thereby reducing the local community's access to such services	Probability of the impact	Medium (2)	5	Low	Potential cumulative impacts will be managed through: ▸ Securing agreements with owners and operators for disposal of waste at licensed waste-disposal facilities once the construction schedule for both Inland Rail projects is confirmed ▸ Ensuring that construction contract documentation for adjoining projects have consistent clauses regarding waste management, including reduction targets ▸ Ensuring that Waste Management Plans (or equivalent) are prepared for both adjoining Inland Rail projects, and that these Plans are complementary and are consistent with the Inland Rail Environment and Sustainability Policy, the Inland Rail Sustainable Procurement Policy and the Inland Rail Environmental Management System.
		Duration of the impact	Low (1)			
		Magnitude/intensity of the impact	Low (1)			
		Sensitivity of the receiving environment	Low (1)			

23.4 Summary of cumulative assessment and mitigations

The mitigation and management measures that are proposed to be implemented to minimise the likelihood of cumulative impacts have been identified for each of the specific matters and potential impacts in Sections 23.3.1 to 23.3.15. These mitigation measures, in addition to other measures in the Draft Outline EMP (Chapter 24: Draft Outline Environmental Management Plan), have been proposed to minimise impacts of the Project, including those of a cumulative nature.

Where the potential for cumulative impacts has been identified with other projects in the Inland Rail Program, it is proposed that these potential impacts be managed through a combination of mitigation measures proposed for the Project, in isolation, in addition to the implementation of Program-wide management measures. These will be consistent with the environmental management framework contained within the Draft Outline EMP for the Project (Chapter 24: Draft Outline Environmental Management Plan).

ARTC will facilitate communication between contractors of adjoining Inland Rail projects to collaborate on construction methodologies and the scheduling of activities to be cognisant of one another and to not exacerbate the potential impacts of a single project.

Where cumulative impacts have been identified with other projects outside of the Inland Rail Program, individual proponents will be invited to participate in the Community Reference Group established for the Project. This will provide opportunities to verify outcomes of the CIA and, if necessary, identify further mitigation measures that can be implemented by ARTC within their area of control.

It is proposed that monitoring be undertaken during construction of the Project that is scheduled (i.e. groundwater, surface water and ecology) or in response to complaints (i.e. air quality, noise and vibration). Results obtained from these monitoring events will be compared to baseline data established during the detailed design stage of the Project. Where exceedances in adopted criteria are observed, ARTC will investigate the cause of that exceedance. If the exceedance is found to be attributed to non-Project activities, then one of the following actions may be taken:

- If the recorded impact is contributed to by coincident short-term activities, ARTC will consult with the proponent of the contributing activity to establish a shared understanding of activities and schedules, so as to avoid the future compounding of impacts
- If the recorded impact is contributed to by long-term activities by one or more developments, then additional measures may have to be implemented to mitigate impacts that are within ARTC's control. These additional measures would be bespoke to the type of impact, and the receptor(s) that is/are impacted.