









#### **5.1.2.2.** Flooding

The total length of floodplain crossed by the Conceptual Alignment is estimated at 46 km. This total length includes the floodplains of:

- Macintyre River (5.3 km)
- Macintyre Brook (14.8 km)
- Condamine River (south, main and north branches) (22.4 km)
- Westbrook Creek (1.3 km)
- Gowrie Creek (2.1)

The estimate of these floodplain lengths is derived from the Queensland Floodplain Assessment Overlay (DNRM, 2013).

The Study Area crosses extensive sections of floodplain at the Condamine River. During high flow events, the Condamine River breaks out into a complex floodplain formed by three main branches, the Northern Branch, Main Branch and Southern Branch (also known as Grasstree Creek). The main Condamine 1% Annual Exceedance Probability (AEP) floodplain crossing length, as estimated using a 2D TUFLOW model is approximately 12.5 km, although the total floodplain length at this location extends further when tributaries such as Back Creek and Learmonth Gully are included.

As part of the previous route option comparison process managed by the Department of Infrastructure and Regional Development, a guided tour of the area was undertaken on 18 January 2017 with 23 landholders. Historical water depths from 2010/11 flood and debris markers were photographed, measured and recorded. These water depths were compared against the results of the TUFLOW flood model established to simulate the 2010/11 flood.

The comparison found that the 2010/11 flood model results are within a reasonable level of accuracy to observed flood markers, generally within  $\pm 0.1$  m. The greatest difference in model results was  $\pm 0.66$  m near the Condamine River South Branch (Grasstree Creek). It is believed that this difference could be attributed to timing of coincident flood peaks between Back Greek and Grasstree Creeks, and associated backwater effects.

Model calibration in this location will be considered in more detail during the EIS.

#### 5.1.2.3. Groundwater

Groundwater within the Study Area is regulated under the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017, Water Plan (Condamine and Balonne) 2004 and the Water Plan (Border Rivers) 2003.

There is a strong agricultural reliance on groundwater situated in alluvial deposits associated with the network of watercourses in the Study Area.

Salinity is predominantly an ephemeral occurrence that is dependent on a combination of bio-physical conditions (e.g. rainfall, groundwater levels, geology, soils) and land management practices (e.g. removal of vegetation cover, cropping regimes, soil compaction processes). Salinity occurrences are located throughout the eastern Darling Downs, particularly along the boundary of the Tertiary Main Range Volcanics and the alluvial plains.



#### 5.1.3. Air Quality and Noise

## **Ambient Air Quality**

Ambient air quality data, published by the Queensland Department of Science, Information Technology and Innovation (DSITI) in the vicinity of the Border to Gowrie Project has been utilised to characterise existing air quality in the Study Area. The monitoring stations at Toowoomba (North) and Jondaryan are likely to provide good indications of existing air quality in the northern section of the Study Area. However, these monitoring locations would not be representative for the middle and southern sections of the Study Area where land uses and sources of emissions differ. As such, the air quality data from Toowoomba (North) and Jondaryan presented in Table 5-3 are indicative only of ambient conditions in the northern section of the Study Area.

Table 5-3 Air Quality Background Concentrations (μg/m³)

Pollutant	Averaging Period	Adopted Background Concentration (μg/m³)	Monitoring Station
СО	8 Hour	224.7	Toowoomba
NO <sub>2</sub>	1 Hour	42.7	
	Annual	11.8	
PM <sub>10</sub>	24 Hour	24.3	Jondaryan
PM <sub>2.5</sub>	24 Hour	6.6	Toowoomba
	Annual	4.3	

Source: DSITI, 2017

The land use in the Study Area is characterised by an urbanised area centred on Toowoomba, with smaller population centres in Southbrook, Pittsworth, Brookstead, Millmerran, Inglewood and Yelarbon. Between the major centres, the land use is largely rural and dominated by rural activities. Existing air quality emissions in the region principally relate to dust from agricultural activities and wind erosion. Specific industrial emissions occur on the outskirts of Toowoomba, and in some of the regional towns.

The Queensland Government Air Quality Index rates air quality based on the relationship between observed pollutant and pollutant goal concentrations. Using this air quality rating system, the adopted pollutant background concentrations (Table 5-3) in the northern portion of the Study Area for carbon monoxide (CO) and nitrogen dioxide (NO<sub>2</sub>) are rated as 'Very Good' and PM<sub>10</sub> and PM<sub>2.5</sub> as 'Good'.

## **Noise and Vibration**

Major sources of noise and vibration situated within the Study Area are as follows:

- Main linear sources:
  - Operational rail lines: South Western Line, Millmerran Branch Railway, West Moreton Line
  - State controlled roads: Cunningham Highway, Millmerran-Inglewood Road, Gore Highway, Millmerran-Leyburn Road, Pampas-Horane Road, Brookstead-Norwin Road, Oakey-Pittsworth Road, Pittsworth-Felton Road, Toowoomba-Cecil Plains Road and Warrego Highway.



- Local roads
- Main point sources:
  - Commodore Mine
  - Brisbane West Wellcamp Airport
  - Communities within the Study Area: Yelarbon, Inglewood, Millmerran, Brookstead, Pittsworth, Southbrook, Gowrie Mountain and Gowrie.

Noise monitoring undertaken at locations in Pampas and Brookstead in 2016 found noise levels to be typical of a rural township environment, with generally low background noise levels.

## 5.1.4. Ecosystems

This section describes the protected areas, mapped remnant vegetation (QLD regional ecosystems) and mapped essential habitat likely to be present in the Study Area. Aquatic habitats (creeks in the Study Area) are also described. Matters of National Environmental Significance (MNES) are described in Section 6.6. Preliminary ecological surveys were conducted in 2016 to inform the development of the conceptual alignment and identify ecological values within the study area.

#### 5.1.4.1. Protected Areas

Two State Forests declared under the *Forestry Act 1959* are partially situated within the Study Area, being Whetstone State Forest between Yelarbon and Inglewood and Bringalily State Forest between Inglewood and Millmerran. Where the Conceptual Alignment passes through the Whetstone State Forest, it is likely to comprise an upgrade to the existing South Western railway line. The Conceptual Alignment through Bringalily State Forest will require new rail corridor and is proposed to align with Millmerran-Inglewood Road.

There are no national parks, regional parks or areas protected by international treaties (e.g. Ramsar wetlands) within the Study Area.

## 5.1.4.2. Matters of State Environmental Significance

Matters of State Environmental Significance (MSES) identified within the Study Area include remnant vegetation consistent with Endangered and Of Concern Regional Ecosystems (REs), riparian vegetation fringing water courses and Essential Habitat.

Habitat for Endangered, Vulnerable or Near Threatened (EVNT) flora and fauna are also classified as MSES. Some cleared areas are also potential habitat for EVNT species, in particular the suite of flora species found in disturbed roadside reserves and rail corridors on the Darling Downs.

MSES that are known to or have potential to occur within the Study Area are discussed in Section 5.1.5.

The impacts of the project on these matters, including opportunities for avoidance and mitigation during construction will be assessed through the EIS process.

## 5.1.4.3. Ecological Corridors

Overall ecological connectivity within the Study Area is generally low, with most areas of remnant vegetation being small and/or narrow, surrounded by non-remnant grazing pastures and cultivation. Although these areas may provide some stepping-stone connectivity value, due to the highly disturbed state of the surrounds, their overall connectivity value is considered low.



Areas providing significant connectivity values include remnant vegetation associated with watercourses and drainage lines and areas of State Forest (Figure 5-3). These areas provide movement corridors between larger patches of remnant vegetation. The potential value of the riparian areas as movement corridors was evident by the observation of Koala scats and scratches during initial field surveys.

#### 5.1.4.4. Regional Ecosystems

The following section provides a summary of the broad remnant vegetation that occurs within the Study Area. Where appropriate, reference has been made to the relevant Regional Ecosystem (RE) code under the *Vegetation Management Act 1999* (Qld) (VMA). State significant environmental values are mapped on Figure 5-3.

#### Drainage lines and alluvial plains

River red gum (*Eucalyptus camaldulensis*) and/or forest red gum (*E. tereticornis*) woodlands (RE 11.3.25, least concern) occur on fringing drainage lines that cross the Study Area.

Areas with broader alluvial/flood plains support poplar box (*E. populnea*) (11.3.2, of concern) and/or forest red gum (11.3.4, of concern) woodlands although many of these areas have been extensively cleared, particularly in the more fertile valleys surrounding the Macintyre Brook and the Condamine River.

Areas of natural grassland (11.3.21, endangered and 11.3.24, endangered) previously occurred on the alluvial plains of the Darling Downs in the northern parts of the Study Area although there is little of this vegetation type remaining intact and no remnant areas (as defined under the VMA) were observed during initial field surveys.

Areas of non-riverine wetlands (11.3.27, least concern) are mapped as part of a mosaic on the Condamine River floodplain within the Study Area. However, these areas are not situated along the Conceptual Alignment.

# Yelarbon Desert

This vegetation type (RE 11.5.14, of concern) occurs in the south western parts of the Study Area around Yelarbon. Fensham *et al.* (Fensham, 2007) noted that ephemeral wetlands were a common component of this ecosystem, although these were not observed by initial field surveys.

## Eucalypt woodlands with cypress pine/bull oak on plains

Areas of flat to undulating plains on texture contrast soils occur where the Conceptual Alignment traverses Bringalilly State Forest between Inglewood and Millmerran. The vegetation group includes a series of eucalypt woodlands dominated by poplar box (11.3.18, least concern), poplar box or narrow leaved-ironbark (*E. crebra*) (11.5.1, least concern), gum topped box (*E. woollsiana*) (11.9.13, of concern and 11.5.20, least concern) and dirty gum (*E. chloroclada*) (11.5.4, least concern), with a low tree layer usually dominated by cypress pine (*Cypress glaucophylla*) and bull oak.

## Mountain coolibah on undulating rises and low hills

Mountain coolibah (*E. orgadophila*) woodlands occur on the crests and lower slopes hills of mainly basalt (11.8.5, least concern) or less often sediments (11.9.2, least concern). This vegetation occurs within the Study Area on steeper hills with rock outcrops, although these areas will typically be avoided by the alignment due to topographical constraints. Small areas on lower slopes of basalt hills are mapped as natural grasslands (11.8.11, of concern) although no areas of this RE was observed in initial field surveys.

# Brigalow woodland and Semi Evergreen Vine Thicket on undulating plains

Brigalow (*Acacia harpophylla*) and/or belah (*Casuarina cristata*) woodlands (11.3.1, endangered; 11.4.3, endangered and 11.9.5, endangered) occur scattered across flat and gently undulating clay plains, mainly in the southern half of



the Study Area, although scattered patches were also recorded to the east of the Condamine River floodplain. Most of these areas have been cleared and only isolated remnants/regrowth patches remain. There were small areas of Semi-evergreen vine thicket (SEVT) (11.8.3, of concern) mapped and observed north of Millmerran and also near Gowrie within the Study Area.

## 5.1.4.5. Aquatic Ecosystems

Under the provisions of the *Fisheries Act 1994*, a waterway barrier is defined as any structure that limits fish movement along a waterway. Waterway barriers can have a significant impact on native fish numbers such as by preventing the movement of fish species and changing the natural flow patterns of a river or creek. Examples of waterway barriers include dams, bridges and culverts.

A search of the Department of Agriculture and Fisheries (DAF) Waterways for Waterway Barrier Works Mapping has identified numerous mapped waterways within the Study Area. These are summarised in Table 5-4.

Table 5-4 Watercourse classifications crossed by the Conceptual Alignment

WATERCOURSE CLASSIFICATION UNDER <i>THE FISHERIES</i> ACT 1994	NUMBER CROSSED BY THE CONCEPTUAL ALIGNMENT	
Purple (Major)	11	
Red (High)	8	
Amber (Moderate)	27	
Green (Low)	46	

The aquatic values of watercourses within the Study Area were not assessed by initial field surveys. However, most of the larger streams were lined by River Red Gum (*E. camaldulensis*) or Forest Red Gum (*E. tereticornis*) riparian woodlands. These areas would typically provide fauna breeding habitat such as hollows, and connectivity to other habits for a range of fauna species including the Greater Glider and Koala.











