CHAPTER

17

Air Quality

NORTH STAR TO NSW/QUEENSLAND BORDER ENVIRONMENTAL IMPACT STATEMENT

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

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17. Air Quality

17.1 Scope of chapter

An air quality impact assessment has been undertaken that details how the environmental values of air will be protected during the construction and operational phases of the North Star to NSW/Queensland Border project (the proposal). A detailed description of the proposal can be found in Chapter 6: The Proposal. The underpinning technical report that details the air quality impact assessment is provided in Appendix L: Air Quality Technical Report. In this chapter, the potential impacts arising from the proposal on air quality are described and mitigation measures are proposed. The potential impacts are derived from desktop reviews of other studies in the area, relevant legislation, historical meteorological data, ambient air quality monitoring data and dispersion modelling.

17.1.1 Secretary's Environmental Assessment Requirements

This chapter has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) as shown in Table 17.1.

TABLE 17.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS COMPLIANCE

Desired performance outcome	12. Air quality The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.	
Current guideline	*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005) *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (DEC, 2005) *Technical Framework—Assessment and Management of Odour from Stationary Sources in NSW* (DEC, 2006)	
SEARs requirement		**EIS Section**
1.	The Proponent must undertake an air quality impact assessment (AQIA) for the establishment and operation of the borrow sites and road haulage in accordance with the current guidelines, with a particular focus on dust emissions, including $PM_{2.5}$ and PM_{10}.	Section 17.5.1
2.	The Proponent must ensure the AQIA also includes the following:	
(a)	Demonstrated ability to comply with the relevant regulatory framework specifically the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (Clean Air) Regulation (2010); and	Section 17.7
(b)	A cumulative local and regional air quality impact assessment.	Chapter 26: Cumulative Impacts, Section 26.4.7

17.2 Legislation, policies, standards and guidelines

The Commonwealth and State government legislation, policies, standards and guidelines relevant to air quality in the context of the proposal are described in Table 17.2.

TABLE 17.2 SUMMARY OF LEGISLATION, POLICIES, STANDARDS AND GUIDELINES

Legislation, policies, strategies and guidelines	Relevance to the proposal
Commonwealth	
National Environment Protection Council Act 1994 (Cth)	The primary functions of this Act are to establish National Environment Protection Measures (NEPMs) and to assess and report on the implementation and effectiveness of NEPMs in participating jurisdictions. The NEPM (Ambient Air Quality) Measure sets standards for six major air pollutants in Australia.

Legislation, policies, strategies and guidelines	Relevance to the proposal
State (NSW)	
Protection of the Environment Operations Act 1997 (NSW)	The Act sets the regulatory framework for managing air quality and setting environment protection licences for scheduled development work and scheduled activities (premise-based and non-premise-based) to control emissions to air. The act is supported by the Protection of the Environment Operations (General) Regulation 2009.
Protection of the Environment Operations (General) Regulation 2009 (NSW)	This regulation provides the administration of the licensing scheme and the economic incentives for reducing pollution. It supports the *Protection of the Environment Operations Act 1997* (NSW).
Protection of the Environment Operations (Clean Air) Regulation 2010 (NSW)	This regulation contains provisions for the regulation of a variety of areas including motor vehicles and fuels.
Approved methods for the modelling and assessment of air pollutants in NSW (NSW Environment Protection Authority (NSW EPA), 2016)	These statutory methods are the prescribed approach for assessing air quality in NSW and have been followed in this assessment. This document sets out detailed requirements for the assessment of projects in NSW and, in particular, outlines the requirements for selection and use of meteorology, receptor selection, emissions estimation and the criteria against which the modelled pollutants are compared, to assess compliance.

17.3 Methodology

The air quality assessment methodology for the construction and operation of the proposal included the following key elements:

- Desktop review to include the following:
  - Identify potential sources of air emissions for the proposal
  - Identify pollutants of interest for the proposal
  - Description of the existing environment in the study area in terms of meteorology and ambient air quality.
- Undertake the impact assessment for construction to estimate risk of potential air-quality impacts
- Undertake the impact assessment for operation to estimate potential air-quality impacts using dispersion modelling
- Recommend potential mitigation measures, where appropriate, and undertake an assessment of the residual impact with the inclusion of the recommended mitigation measures.

Further information about the impact assessment methodology is available in Appendix L: Air Quality Technical Report.

17.3.1 Pollutants of concern

Pollutants of potential concern to the proposal have been identified through a review of expected activities, applicable National Pollution Inventory (NPI) emission estimation manuals, and Environmental Impact Statement (EIS) literature for similar rail projects. The air pollutants that have been considered in the assessment for the construction and operation phases of the proposal are discussed in Table 17.3. Not all the pollutants listed in Table 17.3 have been assessed in detail.

The primary source of air pollution during the operation of the proposal will be locomotive engine exhaust. The gaseous pollutants contained in the exhaust are produced as a product of diesel combustion and include (oxides of nitrogen (NO_x) including nitrogen dioxide (NO_2), carbon monoxide (CO), fine particulate matter (PM_{10} and $PM_{2.5}$), volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs).

During the construction phase, particulate matter deposited as total suspended particulates (TSP) and airborne concentrations of PM_{10} will be of primary concern. These pollutants have the potential for nuisance impacts if not correctly managed (United Kingdom Institute of Air Quality Management (IAQM), 2014).

A detailed description of each pollutant can be found in Appendix L: Air Quality.

TABLE 17.3 POLLUTANTS CONSIDERED DURING THE AIR QUALITY ASSESSMENT

Pollutant	Description
Total suspended particulate (TSP)	TSP refers to airborne particles ranging from 0.1 micrometres (µm) to 100 µm in diameter. If the particles contain toxic materials (such as lead, cadmium, zinc), toxic effects can occur from inhalation of the dust. Dust can also cause nuisance impacts by settling on surfaces and possessions, affecting visibility, and contaminating tank water supplies. TSP has been considered in detail in the assessment.
PM_{10}	Particulate matter less than 10 µm in diameter (PM_{10}). PM_{10} is generated via combustion sources as well as mechanical sources, such as construction activities. PM_{10} can be inhaled and most commonly impacts the respiratory system in humans. PM_{10} has been considered in detail in the assessment.
$PM_{2.5}$	Particulate matter less than 2.5 µm in diameter ($PM_{2.5}$). $PM_{2.5}$ is predominantly generated via combustion sources. Due to its smaller size, $PM_{2.5}$ can travel further into respiratory systems than PM_{10}. $PM_{2.5}$ has been considered in detail in the assessment.
Oxides of nitrogen (NO_x)	NO_x describes a mixture of nitric oxide (NO) and NO_2. NO_x is colourless at low concentrations but has an odour. There are no air-quality objectives for NO_x to protect human or ecological health and therefore it has not been assessed.
Nitrogen dioxide (NO_2)	NO_2 is a brownish gas with a pungent odour. Nitrogen dioxide can cause damage to the human respiratory tract, increasing a person's susceptibility to respiratory infections and asthma. Sensitive populations, such as the elderly, children, and people with pre-existing health conditions, are most susceptible to the adverse effects of NO_2 exposure. NO_2 has been considered in detail in the assessment.
Carbon monoxide (CO)	CO is a colourless, odourless gas formed when substances containing carbon (such as petrol, gas, coal and wood) are burned with an insufficient supply of air. Concentrations of CO normally present in the atmosphere are unlikely to cause ill effects and therefore have not been considered in the assessment.
Volatile organic compounds (VOCs)	VOCs are carbon-based chemicals that readily evaporate at room temperature, including xylene, toluene and benzene. VOC species have been considered in detail in the assessment.
Polycyclic aromatic hydrocarbons (PAHs)	PAHs are a group of over 100 chemicals, which are formed through the incomplete combustion of organic materials, such as petrol or diesel. PAHs have been considered in detail in the assessment.
Trace metals, including arsenic, cadmium, lead, nickel and chromium VI	Heavy metals such as cadmium, lead, and mercury are common air pollutants that are typically emitted from industrial activities and fuel combustion. Fugitive coal dust emissions from rail transport along the alignment have potential to be deposited on surfaces that lead to rainwater tanks. Coal may contain many traces of these elements. Trace metal species have been considered in detail in the assessment.
Odour	Odour emissions can be either a single pollutant species or a mixture of species that have the potential to affect environmental amenity and cause nuisance. Nuisance impacts from odour have been considered in the assessment.
Sulphur dioxide (SO_2)	Sulphur dioxide is a colourless gas with a sharp, irritating odour. The AQIA assumes low sulphur content fuel as per the requirements of Commonwealth legislation *Fuel Quality Standards Act 2000* (Cth) (DoEE), *Fuel Standard (Automotive Diesel) Determination] 2001*)). The regulation of low sulphur content fuel in Australia has significantly decreased the generation and concentrations of SO_2 near transport sources. Due to the low likelihood of significant impact, SO_2 has not been considered in this assessment.
Ozone (O_3)	Ozone is not emitted directly from fuel combustion but, rather, is a secondary pollutant formed via chemical reaction of other pollutant species in the local atmosphere. Assessment of the formation of ozone and other secondary pollutants has not been considered in this assessment.

17.3.2 Construction-phase impact assessment

The main pollutant of concern during the construction phase is particulates—predominantly dust as PM_{10}.

In the absence of NSW- or Australian-specific assessment guidance, the assessment methodology used for the construction phase is the IAQM *Guidance on the assessment of dust from demolition and construction* (IAQM, 2014). NSW EPA provides an *Air Quality Guidance Note for Construction Sites* (NSW, EPA, 2017), which discusses construction air emission sources, potential impacts and mitigation measures; however, the NSW EPA guidance note does not provide an assessment methodology and, therefore, the IAQM assessment methodology has been adopted.

The IAQM process is a four-step qualitative, risk-based assessment of dust emissions associated with demolition, including land clearing and earth moving, and construction activities. The methodology of the IAQM risk assessment procedure is tailored specifically to the assessment of emissions to air from construction activities and is considered the most appropriate method for the assessment.

The IAQM risk assessment method considers the sensitivity of the study area to air-quality impacts based on separation distance and existing air quality, and the potential risk of adverse impacts based on the emissions magnitude of the construction activities. Although written for the UK, the IAQM method is a robust procedure and is suitable for assessment of Australian projects. Where required, the assessment method has been modified to suit local conditions (e.g. assessment against air-quality objectives applicable to NSW).

Construction emissions for large linear infrastructure projects are complex due to the number of construction activities, the distribution of sites across a large geographical area, and the transitory nature of many individual construction activities at particular locations. As such, the potential construction air-quality impacts associated with the proposal were risk assessed considering the nature of proposed works, plant and equipment, potential emission sources and relevant air-quality objectives.

A breakdown of each step and the associated findings of the construction dust impact assessment is detailed in Appendix L: Air Quality Technical Report.

In addition to construction dust, odour and VOCs will be emitted from fuel tanks located at laydown areas. Impacts from fuel storage have been assessed qualitatively based on the separation distance to receptors.

In addition to assessment using the IAQM method, construction impacts from crushing and blasting at borrow pits have also been assessed qualitatively considering the Environment Protection Authority Victoria (EPA Victoria) guideline, *Recommended separation distances for industrial residual air emissions* (EPA Victoria, 2013), which provides guidance on suitable separation distances between mining and extractive activities and neighbouring sensitive receptors. The EPA Victoria guideline has been used in the absence of NSW-specific guidance. The EPA Victoria guideline is commonly applied for air-quality assessments in other Australian states and is considered appropriate for the assessment of the proposal.

17.3.3 Operation-phase impact assessment

Dispersion modelling addressing line source emissions (i.e. emissions from freight trains travelling along the track) was undertaken to assess the degree to which the proposal complies with the specified air-quality objectives at sensitive receptor locations. The air dispersion modelling was undertaken using the CALPUFF modelling suite and supplemented with meteorological data processed by The Air Pollution Model (TAPM). The data available for this proposal and a discussion of the methodologies required to implement CALPUFF are detailed in Appendix L: Air Quality Technical Report.

An emissions inventory was compiled and used to inform the dispersion modelling. The emissions inventory links activities during the operations phase to the potential emission sources. Information used in the emissions inventory included the proposed track alignment, frequency and speed of trains, and emissions factors for diesel engines. Detailed discussion of the emissions inventory developed for the proposal is provided in Appendix L: Air Quality Technical Report.

The assessment method used has followed the levels of assessment prescribed by the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2016). The levels of assessment are summarised as follows:

- Level 1: Screening-level dispersion modelling technique using worst-case input data
- Level 2: Refined dispersion modelling technique using site-specific input data.

The following statement is provided by the NSW EPA to inform the selection of the assessment level:

'The impact assessment levels are designed so that the impact estimates from the second level should be more accurate than the first. This means that, for a given facility, the result of a Level 1 impact assessment would be more conservative and less specific than the result of a Level 2 assessment. It is not intended that an assessment should routinely progress through the two levels. If air quality impact is considered to be a significant issue, there is no impediment to immediately conducting a Level 2 assessment. Equally, if a Level 1 assessment conclusively demonstrates that adverse impacts will not occur, there is no need to progress to Level 2.'

The assessment of the operational phase of the proposal has been generally undertaken in accordance with the Level 2 assessment method. The methodology is summarised as follows:

- For the assessment of TSP and $PM_{2.5}$, the maximum measured background concentrations (refer Section 17.4.1) have been assumed as the background (Level 1 assessment method)
- For the assessment of PM_{10} and NO_2, hourly monitoring data for 2013 (which is contemporaneous with the meteorological data used) has been used, with the dispersion model prediction at each receptor added to the corresponding hour's measured background concentration (e.g. the first hourly average dispersion model prediction is added to the first hourly average background concentration) to obtain hourly predictions of total impact (Level 2 assessment method)
- Assessment of VOC species and heavy metals have not been considered cumulatively due to the absence of significant known emission sources in the area surrounding the proposed activity.

Discussion of the development of the emissions inventory, as well as the full set of model inputs and assumptions, can be found in Appendix L: Air Quality.

17.3.4 Proposal air-quality objectives

The air-quality objectives for the proposal are set out in Table 17.4. They are based on the requirements of the *Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2016).

TABLE 17.4 AIR QUALITY OBJECTIVES FOR THE PROPOSAL

Pollutant	Air quality objective ($\mu g/m^3$)	Averaging period	Statistic
1,3-butadiene	40	1 hour	99.9th percentile
Arsenic and compounds	0.09	1 hour	99.9th percentile
Benzene	29	1 hour	99.9th percentile
Cadmium and compounds	0.018	1 hour	99.9th percentile
Chromium and compounds	0.09	1 hour	99.9th percentile
Chromium (III) compounds	9	1 hour	99.9th percentile
Dioxins and furans	2.0×10^{-06}	1 hour	99.9th percentile
NO_2	246	1 hour	Maximum
	62	Annual	Maximum
Lead	0.5	Annual	Average
PM_{10}	50	24 hours	Maximum
	25	Annual	Average
$PM_{2.5}$	25	24 hours	Maximum
	8	Annual	Average
PAHs (as benzo[a]pyrene)	0.04	1 hour	99.9th percentile
TSP	90	Annual	Average
Zinc oxide	90	1 hour	99.9th percentile

Source: NSW EPA, 2016

17.4 Existing environment

The existing environment has the potential to influence the level of air pollutants adjacent to a particular site. Aspects of the ambient environment relevant to this assessment include:

- Existing air quality due to regional and local sources of air pollution (natural and anthropogenic) that emit similar air pollutants to those being assessed
- Meteorological conditions.

The study area considered in the review of the existing environment includes the operational and construction footprints of the proposal, including construction works along the track, utility works, borrow pits and laydown areas, and all access tracks and haulage routes.

In addition to discussion of existing air quality and meteorological conditions, this section also introduces and presents the locations of sensitive receptors near the proposal site that have been considered in the assessment.

17.4.1 Background air quality

Air quality monitoring data is available from monitoring stations operated by the Department of Planning, Infrastructure and Environment (DPIE) (formerly the Office of Environment and Heritage (OEH)) and private industry. The air-quality monitoring station measure pollutants from both anthropogenic (industry, motor vehicles, domestic sources such as fires, and construction) and natural (bushfires, dust storms, pollen, marine particles) sources. A variety of pollutants are present in emissions from anthropogenic and natural sources, with the contribution of each source at a monitoring station dependent on the monitor's location, sources of pollution in the surrounding environment and meteorological conditions.

The monitoring stations that have been considered in the assessment are summarised in Table 17.5. The monitoring stations considered include six DPIE stations and two industry operated monitoring stations, located at Maules Creek and Wil-gai. The pollutant species monitored at each station and the commissioning date for each station is presented in Table 17.5. Monitoring data available from the period of 2013 to 2018 has been considered in the assessment.

Compliant monitoring of TSP is not undertaken at any of the monitoring stations considered in the assessment. As such, the annual average background concentration of TSP used in the assessment was estimated from the measured annual average PM_{10} concentration using a ratio of 2.5, which is based on a PM_{10}:TSP ratio of 0.4, as reported by the Australian Coal Association Research Program (ACARP, 1999). This is considered a conservative estimate and is likely an over estimation of the actual TSP present; however, this is a common ratio for dust and is considered appropriate in the absence of recently monitored data.

TABLE 17.5 AIR QUALITY MONITORING STATIONS AND POLLUTANTS MONITORED

Monitoring station	Station operated by	Commissioned	Pollutant species monitored				
			PM_{10}	$PM_{2.5}$	TSP	NO_2	Meteorology
Gunnedah (SE)[a.]	DPIE	2003	x	x	x	-	-
Gunnedah	DPIE	2017 (December)	x	x	-	x	x
Moree[a.]	DPIE	2008	-	-	x	-	-
Muswellbrook	DPIE	2010	x	x	-	x	x
Tamworth	DPIE	2000	x	x	-	-	x
Maules Creek	Industry	2011	x	x	-	-	-
Wil-gai	Industry	2012	x	x	-	-	-
Narrabri	DPIE	2017 (December)	x	x	-	-	x

Table notes:
a. Pollutant monitoring completed at these stations use 'indicative' non-compliance methodologies and are not appropriate for use in this air-quality assessment.
'x' indicates that the pollutant type is monitored at this station, '-' indicates that the pollutant species is not monitored.

All of the pollutants listed in Table 17.5 are emitted from diesel trains and, therefore, will need to be considered cumulatively with the background pollutant concentrations, as required by *Approved methods for the modelling and assessment of air pollutants in NSW* (NSW EPA, 2016). The background pollutant concentrations adopted for this assessment to determine the cumulative impacts have been presented in Table 17.6.

Assessment of cumulative VOC species is not required by the EPA unless there are significant known emissions of VOC in the area surrounding a proposed activity. Given the lack of VOC sources along the North Star to NSW/QLD Border (NS2B) route, background VOC concentrations have been assumed to be negligible and have not been considered cumulatively.

There is no ambient monitoring data for metals available for the assessment. There are no significant sources of metals along the NS2B route and, therefore, concentrations have been assumed to be negligible and have not been considered cumulatively.

Further information regarding air-quality monitoring data availability and validity is detailed in Appendix L: Air Quality.

TABLE 17.6 ADOPTED BACKGROUND AIR QUALITY POLLUTANT CONCENTRATIONS

Pollutant	Averaging period	Adopted concentration[1] ($\mu g/m^3$)	Objective[2]	Station data
TSP	Annual average	41.5	90	Calculated from Tamworth PM_{10} (2013)[3]
PM_{10}	24-hour average	47.5	50	Tamworth air quality monitoring station
	Annual average	16.6	25	Tamworth air quality monitoring station
$PM_{2.5}$	24-hour average	21.0	25	Wil-gai air quality monitoring station
	Annual average	3.8	8	Wil-gai air quality monitoring station
NO_2	1-hour average	51.3	246	Muswellbrook air quality monitoring station
	Annual average	15.4	62	Muswellbrook air quality monitoring station

Table notes:
1 Maximum recorded value below the objective has been adopted as the background concentration where exceedances of the objective has occurred
2 Source: NSW EPA, 2016
3 Annual average TSP was estimated from the measured annual PM_{10} concentration at Tamworth (16.6 $\mu g/m^3$) using a multiplier of 2.5.

17.4.2 Meteorology and climate

The Bureau of Meteorology (BoM) station that is nearest to the study area is located at Moree, approximately 80 km to the south of the proposal. A summary of the long-term climatic data recorded at this BoM station is provided below:

- The warmest temperatures occur between November and March, with the warmest average maximum temperatures occurring in January (34.0°C)
- The coldest temperatures are recorded in the winter months, with the lowest average minimum temperature occurring in July (4.5°C)
- The highest average rainfall is recorded in January (81.0 mm), while April is the driest month (23.4 mm)
- Humidity is relatively low, with recorded levels typically between 30 and 70 per cent
- Wind speeds are typically higher at 3.00 pm compared to 9.00 am.

Winds recorded at Moree at 9.00 am blow predominantly from the northwest at an average wind speed of 4.8 m/s (17.4 km/hr). In the afternoons, recorded 3.00pm winds blow predominantly from the north and southwest with an average wind speed of 4.6 m/s (16.5 km/hr).

Long-term wind roses, which show the frequency of occurrence of winds by direction and strength, are provided in Appendix L: Air Quality (Appendix A).

17.4.3 Sensitive receptors

The proposal is located in a rural setting, a significant distance away from major population centres. As a result, the only sensitive receptor types that apply to the proposal are scattered rural dwellings, schools, agricultural land and protected areas.

There are a small number of residential receptor locations spread along the length of the proposal site, with several sensitive receptors concentrated within the locality of North Star. A total of 128 existing sensitive receptor locations were identified and included in the assessment of operational air-quality impacts, with the location of these receptors presented in Figure 17.1. The sensitive receptors were identified via a desktop review and no field verification was undertaken. The 128 sensitive receptor locations included in the assessment of operational impacts were chosen as they represent the receptors with the highest potential to be impacted by the proposal.

The methodology used for the assessment of construction dust impacts considers the total number of sensitive receptors near construction emission sources and the distance to these sources. One construction workers accommodation facility is included in the proposal, with this facility to be located at laydown area CMP000.1, which is located at the southern extent of the proposal site in North Star, to the east of Wilby Street and the north of North Star Road. This accommodation will be present during the construction phase of the proposal and, therefore, the construction air-quality assessment considered a total of 129 receptors.

17.5 Potential air-quality impacts

A description of the proposal is available in Chapter 6: The Proposal and Chapter 7: Construction of the Proposal. The following sections summarise the potential air-quality impacts that may arise as a result of construction and operation of the proposal.

17.5.1 Construction

The main pollutant of concern during the construction phase is particulates, predominantly airborne PM_{10} and deposited dust (TSP). Although the proportion of gaseous (e.g. NO_x) and $PM_{2.5}$ emissions from diesel combustion vehicles is generally high, due to the low volume of construction vehicles, it is expected that they will be significantly lower than particulate emissions (PM_{10} and TSP) generated from construction activities. As such, these diesel vehicle emissions from construction plant and vehicles are unlikely to result in an exceedance of air-quality objectives and have not been assessed.

The main construction activities considered in the assessment of construction dust include earthworks, material handling and haulage, vehicle travel, construction of the rail line and the use of laydown areas.

In addition to construction dust, odour and VOCs will be emitted from fuel tanks located at laydown areas. Impacts from fuel storage have been assessed qualitatively in this section.

In addition to assessment using the IAQM method, construction impacts from crushing and blasting at borrow pits have also been assessed individually using guidance relevant to these activities.

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation, in partnership with the private sector.

NORTH STAR TO NSW/QLD BORDER

Figure 17.1a:
Sensitive receptor locations

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Adjoining alignments
- Major roads
- Minor roads

4 km

Coordinate System: GDA 1994 MGA Zone 56

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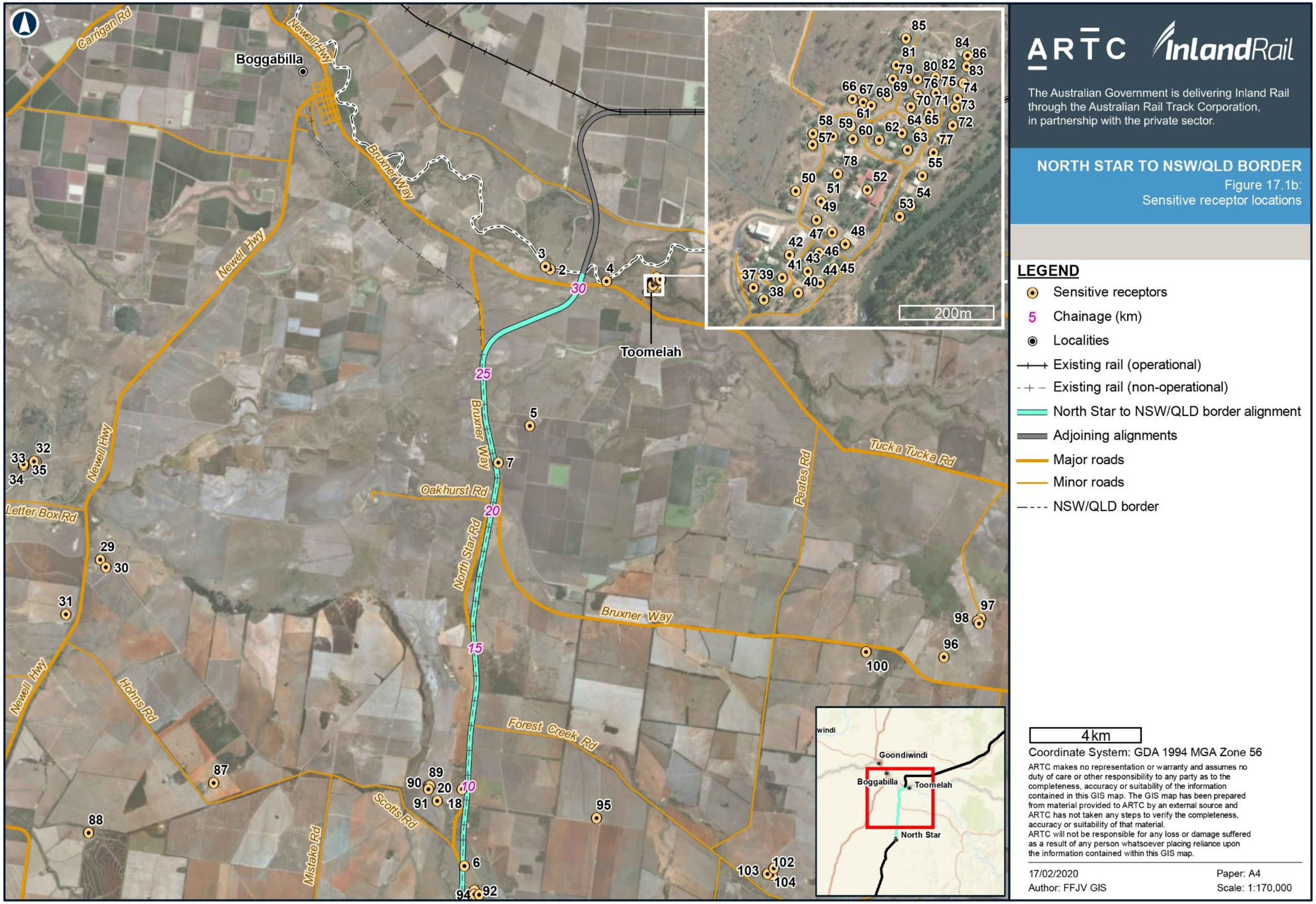

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17.5.1.1 Construction dust

A qualitative impact assessment of construction dust impacts from was completed using the IAQM assessment methodology (UK IAQM, 2014). A detailed description of each stage of the construction phase assessment, as well as a description of potential sources and impacts can be found in Appendix L: Air Quality Technical Report.

The result of the qualitative air-quality risk assessment shows that the unmitigated air emissions from the construction phase of the proposal poses a 'low' risk of human health impacts but a 'medium' risk of dust deposition, as presented in Table 17.7.

TABLE 17.7 WITHOUT MITIGATION DUST RISK IMPACTS FOR PROPOSAL CONSTRUCTION ACTIVITIES

	Risk			
Potential impact	Demolition	Earthworks	Construction	Trackout
Scale of Activity (IAQM Table 4)	Small	Large	Medium	Large
Dust deposition	Low	Medium	Medium	Medium
Human health	Negligible	Low	Low	Low

A high- or medium-level risk rating means that suitable mitigation measures must be implemented during the proposal.

It is anticipated that the proposal will not constitute an atypical case and that with implementation of the proposed mitigation measures described in Section 17.6.3, the residual effect (impacts) will be 'not significant' in regard to dust deposition and human health impacts.

17.5.1.2 Tank fuel storage

Fuel tank storage locations are proposed at four locations along the proposal site during the construction of the proposal. Table 17.8 presents the proposed construction areas that will include diesel fuel storage areas, volumes proposed, and distances to the closest identified sensitive receptors.

TABLE 17.8 FUEL TANK STORAGE LOCATIONS

Construction area ID	Location	Fuel storage proposed	Distance to closest sensitive receptor
NS2B-LDN007.4	North Star Road	10,000 L	450 m
NS2B-LDN020.0	North Star Road	2 x 10,000 L	1,100 m
NS2B-LDN029.8	Tucka Tucka Road	10,000 L	850 m
NS2B-LDN035.6	Kildonan Road	2 x 10,000 L	4,500 m

The closest diesel storage tank proposed will be greater than 450 m from the nearest sensitive receptor and have a capacity of less than 10,000 litres. The additionally proposed storage locations will be greater than 850 m from the closest sensitive receptor. It is anticipated that for the proposed fuel storage volumes and associated separation distances, pollutant emissions and impacts to nearby sensitive receptors will be negligible and, as such, have not been considered further in this assessment.

17.5.1.3 Crushing plant

Onsite crushing may be required at the Site 2 borrow pit, which is the southernmost borrow pit in the study area. The need for crushing will be confirmed and is dependent on the nature of the material excavated from the borrow pit.

If crushing is required, crushing plant will be located within the Site 2 borrow pit boundary. The exact model of crushing plant proposed is not known at this time. Crushing would generate dust emissions and these emissions have the potential to impact sensitive receptors.

Recommended separation distances for industrial residual air emissions (EPA Victoria, 2013) provides guidance on suitable separation distances between mining and extractive activities and neighbouring sensitive receptors, including for crushing. Table 17.9 presents the recommended separation distances for crushing associated with different mining and extractive activities.

TABLE 17.9 SEPARATION DISTANCES FOR CRUSHING ASSOCIATED WITH MINING AND EXTRACTIVE INDUSTRIES

Mining or extractive operation	Type of activity	Recommended separation distance (m)
Open-cut coal mine	Harvesting, crushing, screening, stockpiling and conveying of coal	1,000
Mine for other minerals	Crushing, screening, stockpiling and conveying of other minerals	250
Quarry	Quarrying, crushing, screening, stockpiling and conveying of rock	250 (without blasting) 500 (with blasting or with respirable crystalline silica)

The nearest sensitive receptor to the boundary of the Site 2 borrow pit is located approximately 2.4 km to the south-east, which is greater than the recommended separation distances presented in Table 17.9. Based on the separation distance to sensitive receptors, it is expected that crushing at the Site 2 borrow pit will have minimal impact on air quality at sensitive receptors in the study area.

17.5.1.4 Blasting

Blasting is proposed for the excavation of borrow material from borrow pits. Blasting will generate dust, which has the potential to impact sensitive receptors.

Australian Rail Track Corporation's (ARTC) *Guideline for Blasting in Proximity to ARTC Infrastructure* (ARTC, n.d.) outlines the procedure proposed to ensure that blasting operations do not have a detrimental effect on ARTC assets or operations or impact the safety of people or property. The guideline states that ARTC will assess risks from blasting in two stages, as required:

- Stage 1: ARTC will undertake an initial appraisal and provide 'in principle' approval to blast in proximity to ARTC infrastructure
- Stage 2: Detailed assessment and approval.

Recommended separation distances for industrial residual air emissions (EPA Victoria, 2013) includes a recommended separation distance of 500 m for quarries that undertake blasting (refer Table 17.9). Of the 129 receptors considered in the construction dust assessment, three receptors are located within 500 m of a borrow pit:

- Receptor 18: located 307 m to the north-west of the Site 7 borrow pit
- Receptor 100: located 408 m to the west of the Site 9 borrow pit
- Receptor 106: located 486 m to the north of the Site 1 borrow pit.

Based on the EPA Victoria guideline, dust emissions from blasting at the Site 7, Site 9 and Site 1 borrow pits may impact sensitive receptors.

To minimise the risk of impact to sensitive receptors it is recommended that blasting is not undertaken at the Site 7, Site 9 and Site 1 borrow pits if the prevailing wind conditions are likely to transport dust emissions toward the nearest sensitive receptors. For example, for receptor 18 and the Site 7 borrow pit, blasting should not be undertaken if the prevailing wind direction is a south-easterly wind (blowing towards the north-west), as this wind would transport dust towards receptor 18.

In accordance with the *Guideline for Blasting in Proximity to ARTC Infrastructure* (ARTC, n.d.) it is recommended that the risk assessments undertaken for blasting at borrow pits include consideration of the potential impact to air quality at sensitive receptors.

17.5.2 Operation

The results of the dispersion modelling for the operation of the proposal are shown in Table 17.10. The tabulated results show the highest predicted cumulative concentrations at the worst-affected modelled sensitive receptor.

The concentrations shown in Table 17.10 are the 100th percentile (maximum predicted concentration) for all pollutants, with the exception of VOCs and heavy metals, which are hourly predictions and are required to be assessed as the 99.9th percentile (ninth-highest hourly prediction of the modelled 8,760 hours in the year) of all predicted concentrations, in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2016).

Assessment for NO_2 and PM_{10} has been completed as a cumulative contemporaneous assessment within the dispersion model, adding hourly background data to hourly model predictions. As such, only cumulative predicted concentrations have been presented for these pollutants.

TABLE 17.10 HIGHEST PREDICTED GROUND-LEVEL CONCENTRATIONS AT SENSITIVE RECEPTORS

Pollutant	Average period	Source only predicted ground-level concentration (µg/m^3)	Cumulative ground-level concentration (µg/m^3)	EPA objectives (µg/m^3)
TSP	Annual average	0.5	40.0	90
PM_{10}	24-hour maximum	-	48.1	50
	Annual average	-	17.0	25
$PM_{2.5}$	24-hour maximum	2.5	23.5	25
	Annual average	0.4	4.2	8
NO_2	1 hour maximum	-	168	246
	Annual average	-	28.2	62
Arsenic and compounds	1 hour, 99.9th percentile	0.08	-	0.09
Cadmium and compounds	1 hour, 99.9th percentile	0.007	-	0.018
Chromium III and compounds	1 hour, 99.9th percentile	0.05	-	9
Chromium VI and compounds	1 hour, 99.9th percentile	0.023	-	0.09
Lead and compounds	Annual	0.0050	-	0.5
Zinc and compounds	1 hour, 99.9th percentile	0.08	-	90
Dioxins and furans	1 hour, 99.9th percentile	2.94×10^{-10}	-	2.00×10^{-06}
PAHs (as benzo[a]pyrene)	1 hour, 99.9th percentile	0.006	-	0.4
1,3-butadiene	1 hour, 99.9th percentile	1.1	-	40
Benzene	1 hour, 99.9th percentile	1.2	-	29

Cumulative concentration contours have been prepared for predicted concentrations for PM_{10} (maximum 24-hour average); $PM_{2.5}$ (annual average concentration); and NO_2 (maximum 1-hour average) and are shown in Figure 17.2 to Figure 17.4.

As the concentration contours are cumulative, the concentrations plotted can be compared against the relevant air-quality objectives for each pollutant. All pollutants are compliant with the relevant objectives.

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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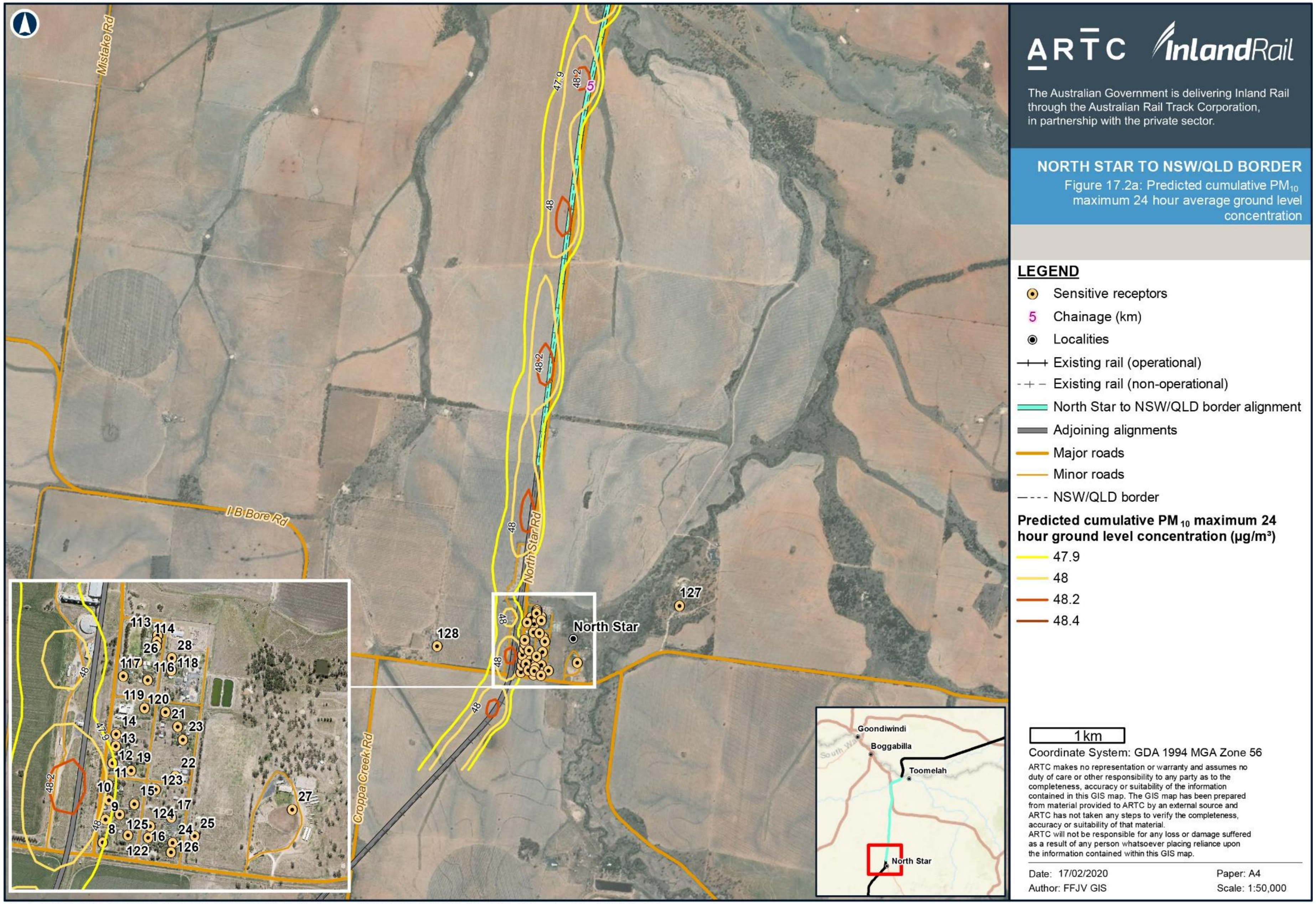

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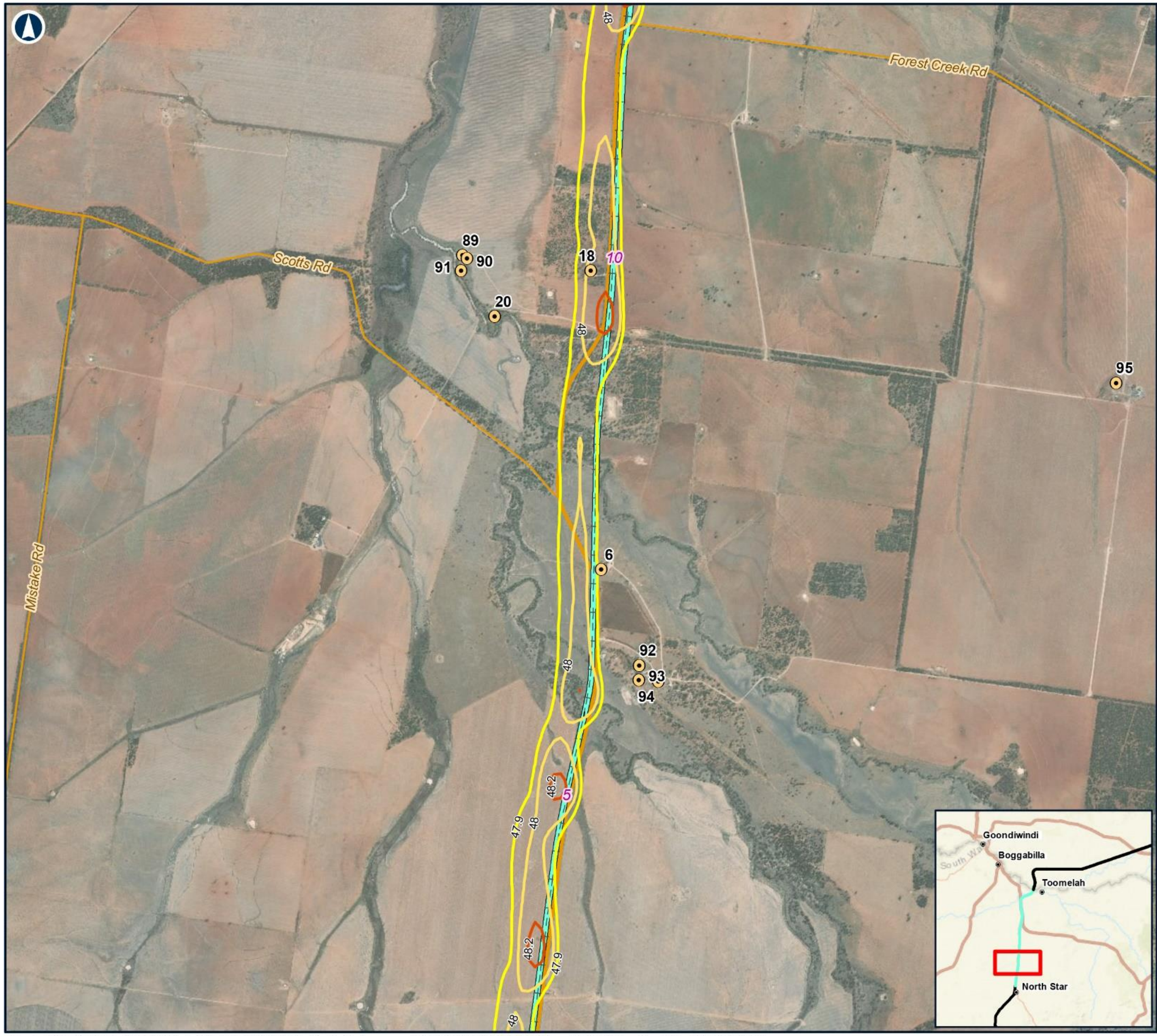

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NORTH STAR TO NSW/QLD BORDER

Figure 17.2b: Predicted cumulative PM_{10} maximum 24 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative PM_{10} maximum 24 hour ground level concentration (µg/m³)

- 47.9
- 48
- 48.2
- 48.4

1 km

Coordinate System: GDA 1994 MGA Zone 56

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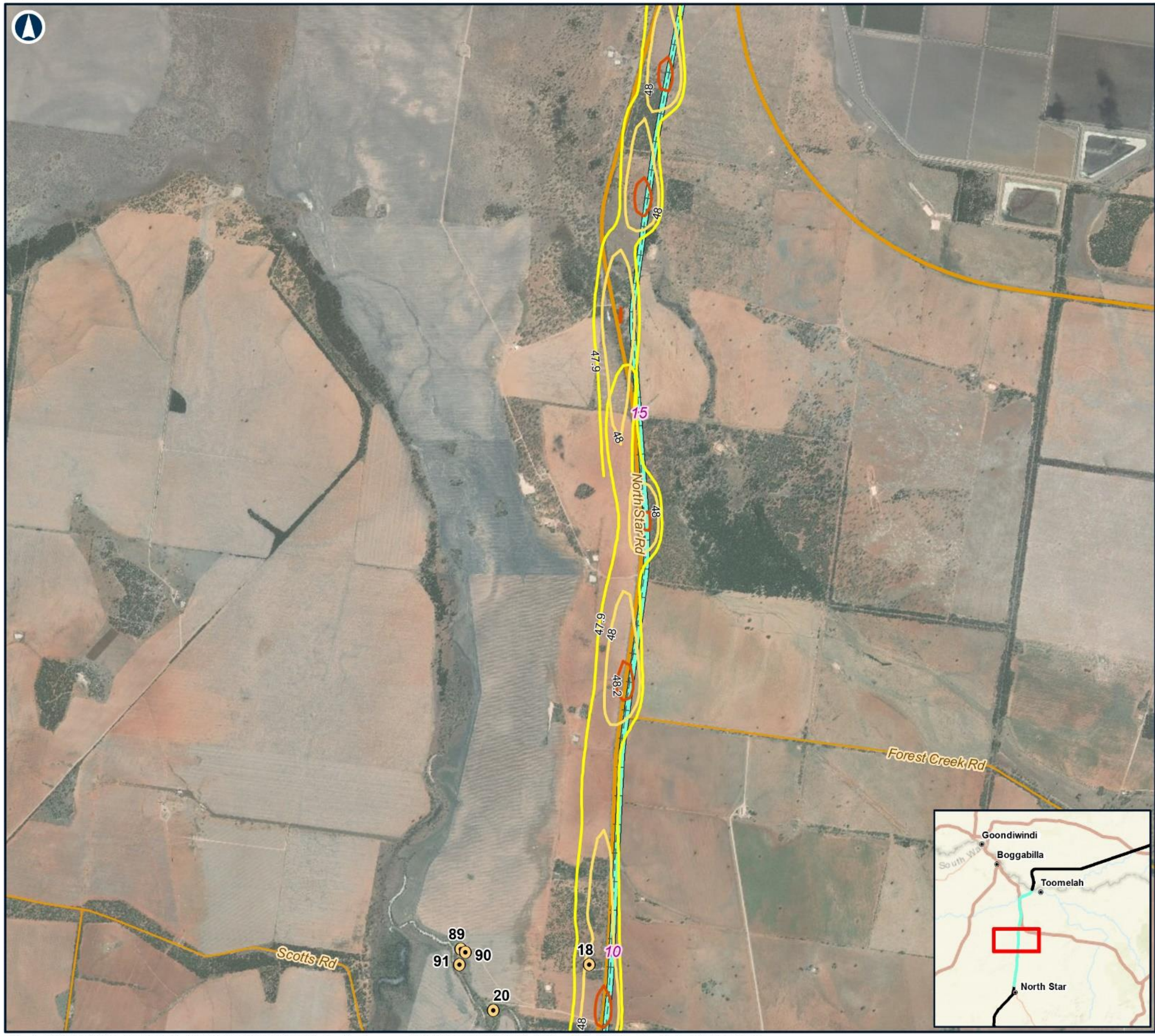

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NORTH STAR TO NSW/QLD BORDER

Figure 17.2c: Predicted cumulative PM_{10} maximum 24 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative PM_{10} maximum 24 hour ground level concentration (µg/m³)

- 47.9
- 48
- 48.2
- 48.4

1 km

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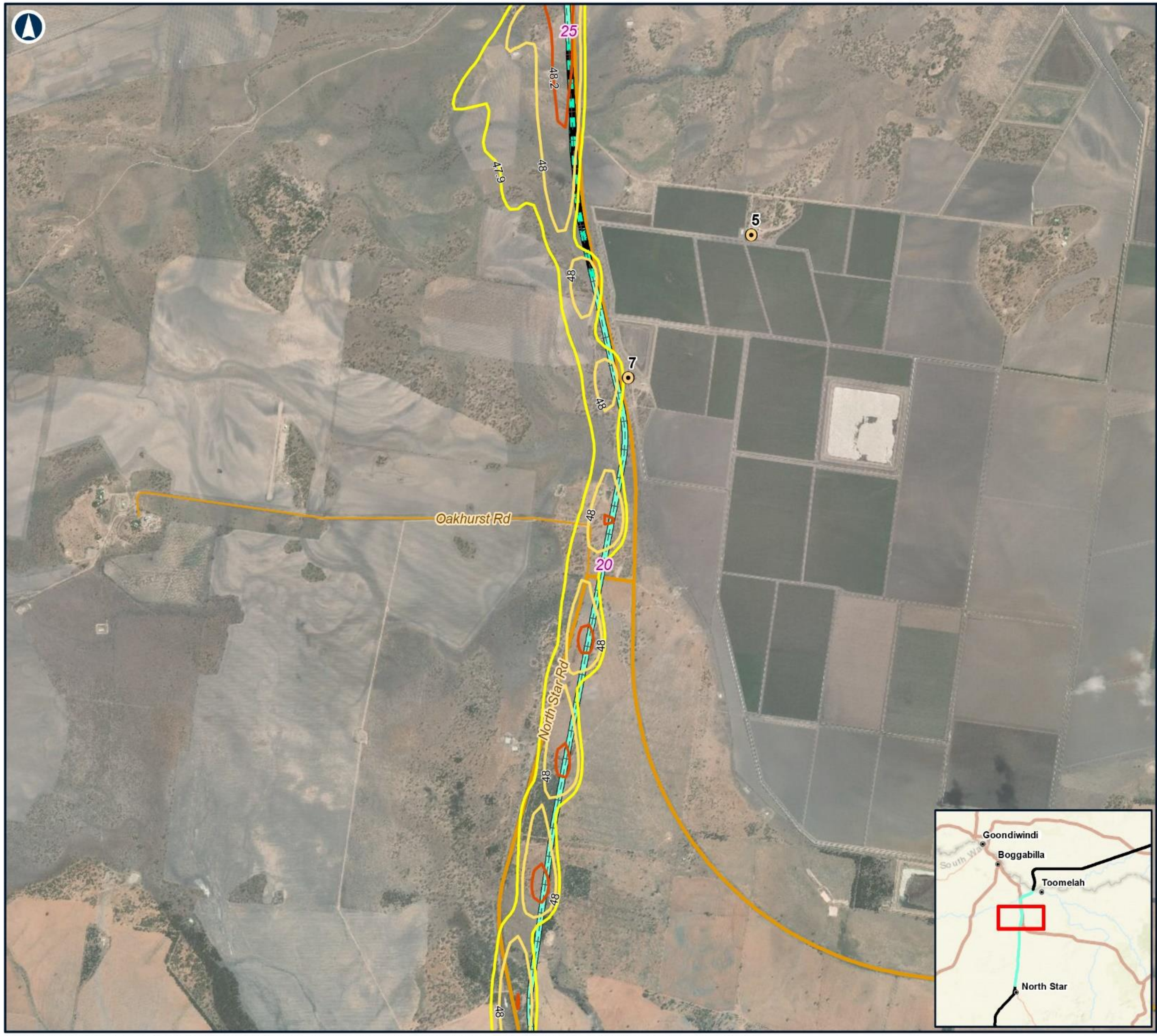

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NORTH STAR TO NSW/QLD BORDER

Figure 17.2d: Predicted cumulative PM_{10} maximum 24 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Crossing loops
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative PM_{10} maximum 24 hour ground level concentration (µg/m³)

- 47.9
- 48
- 48.2
- 48.4

1 km

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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
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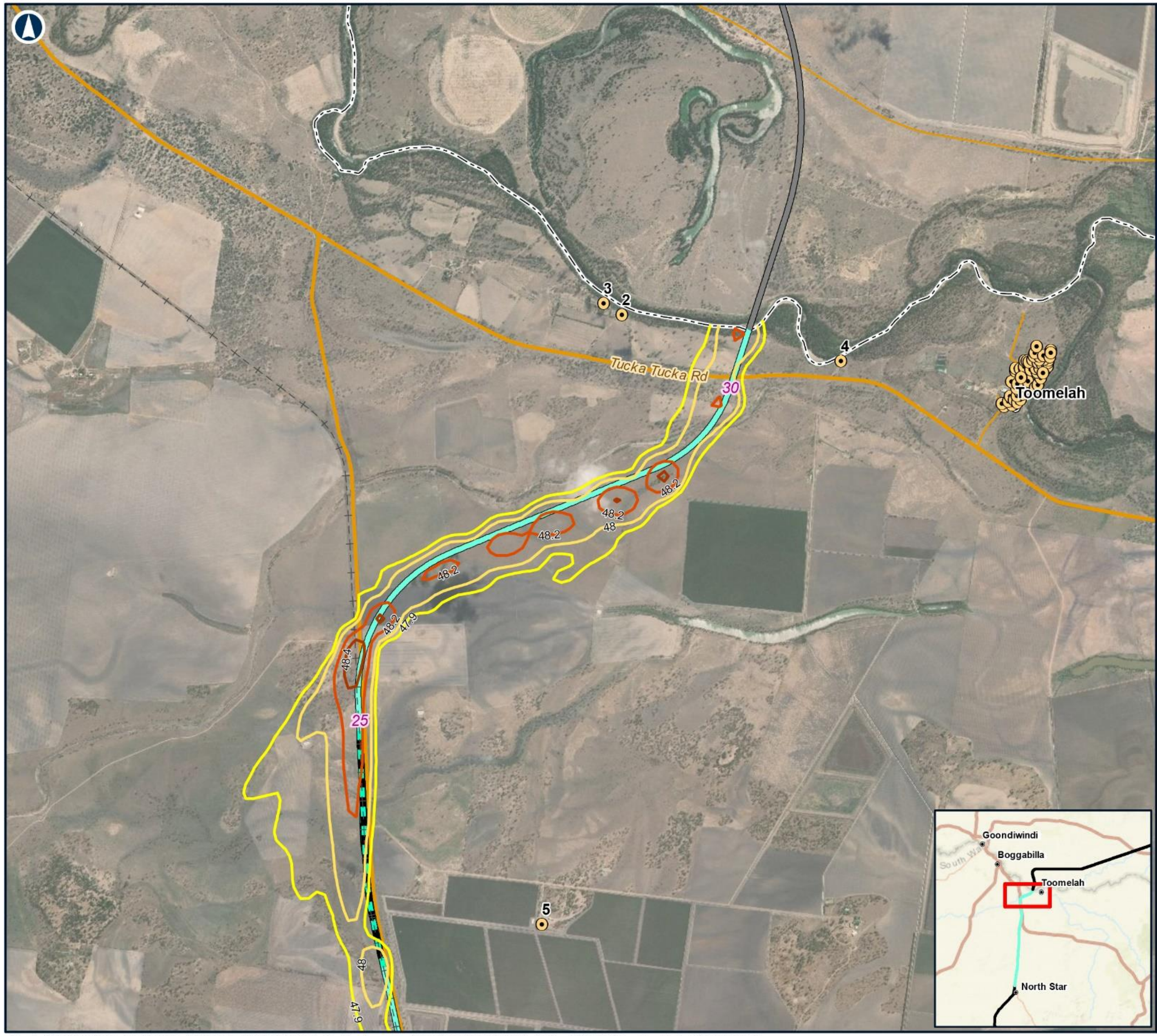

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NORTH STAR TO NSW/QLD BORDER

Figure 17.2e: Predicted cumulative PM_{10} maximum 24 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Crossing loops
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative PM_{10} maximum 24 hour ground level concentration (µg/m³)

- 47.9
- 48
- 48.2
- 48.4

1km

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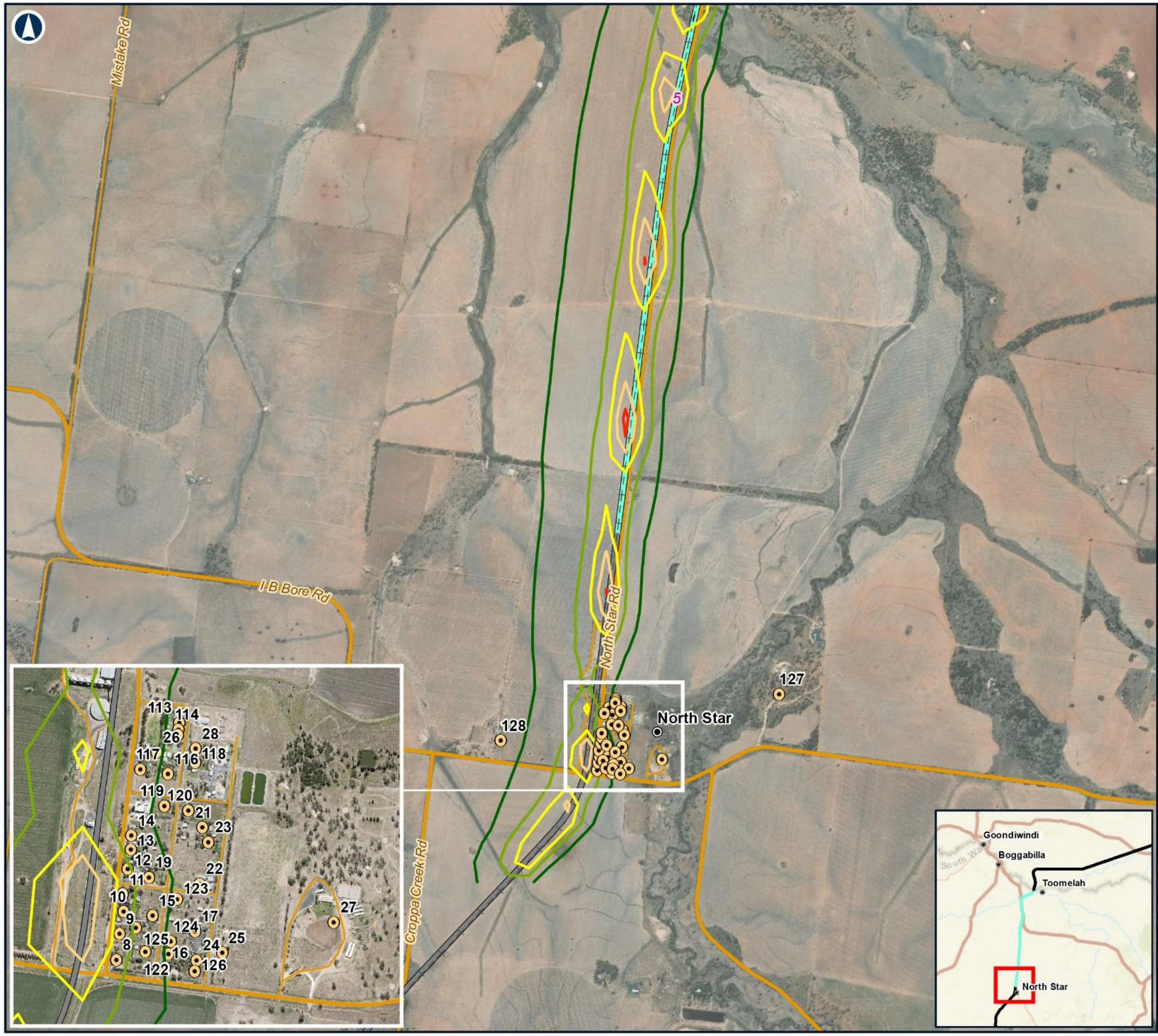

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NORTH STAR TO NSW/QLD BORDER

Figure 17.3a: Predicted cumulative $PM_{2.5}$ annual average ground level concentration

LEGEND

- Sensitive receptors
- Chainage (km)
- Localities
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Adjoining alignments
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative $PM_{2.5}$ annual average ground level concentration (μg/m³)

- 3.9
- 4
- 4.1
- 4.2
- 4.3

1 km

Coordinate System: GDA 1994 MGA Zone 56

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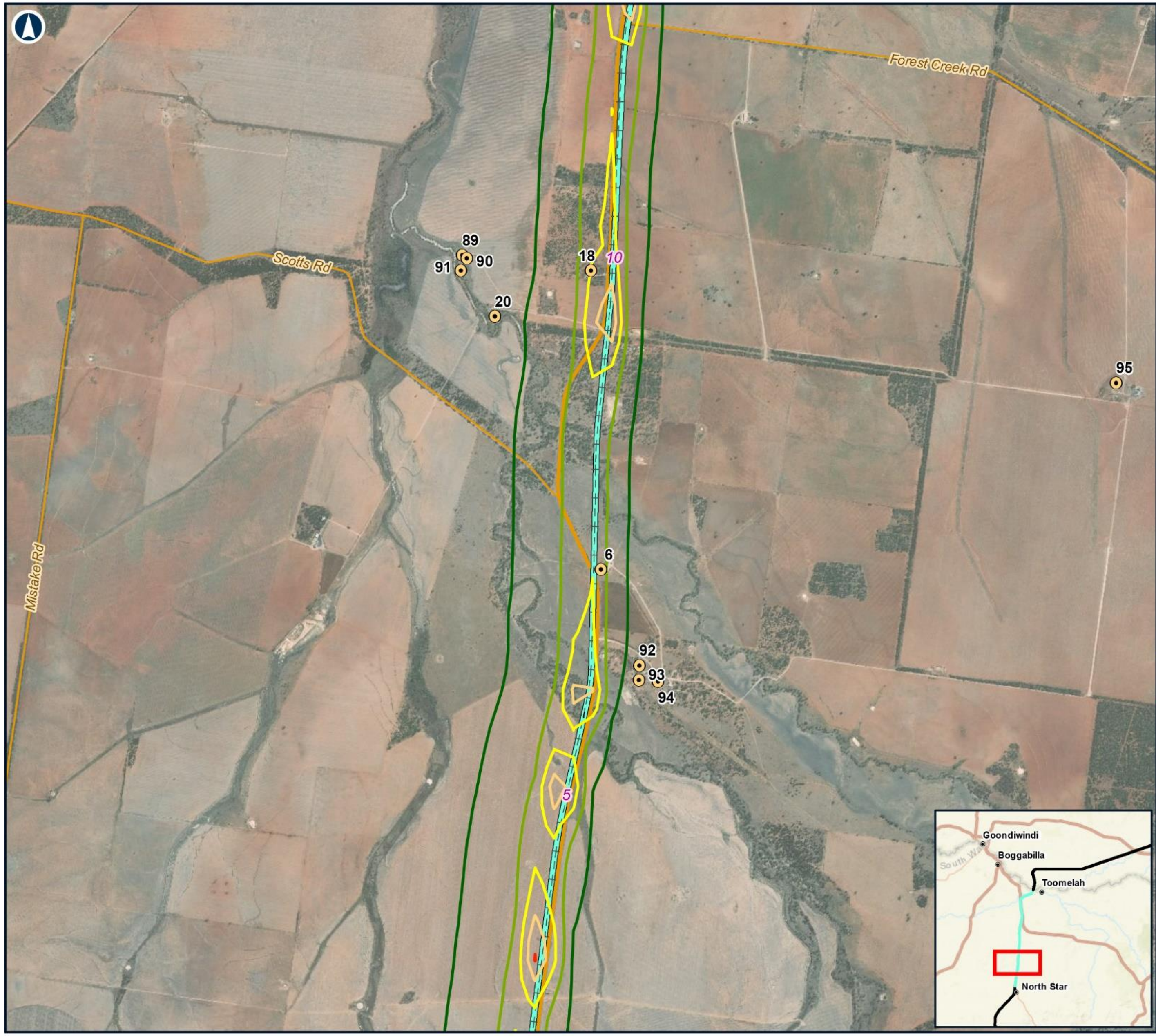

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NORTH STAR TO NSW/QLD BORDER

Figure 17.3b: Predicted cumulative $PM_{2.5}$ annual average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative $PM_{2.5}$ annual average ground level concentration (µg/m³)

- 3.9
- 4
- 4.1
- 4.2
- 4.3

1 km

Coordinate System: GDA 1994 MGA Zone 56

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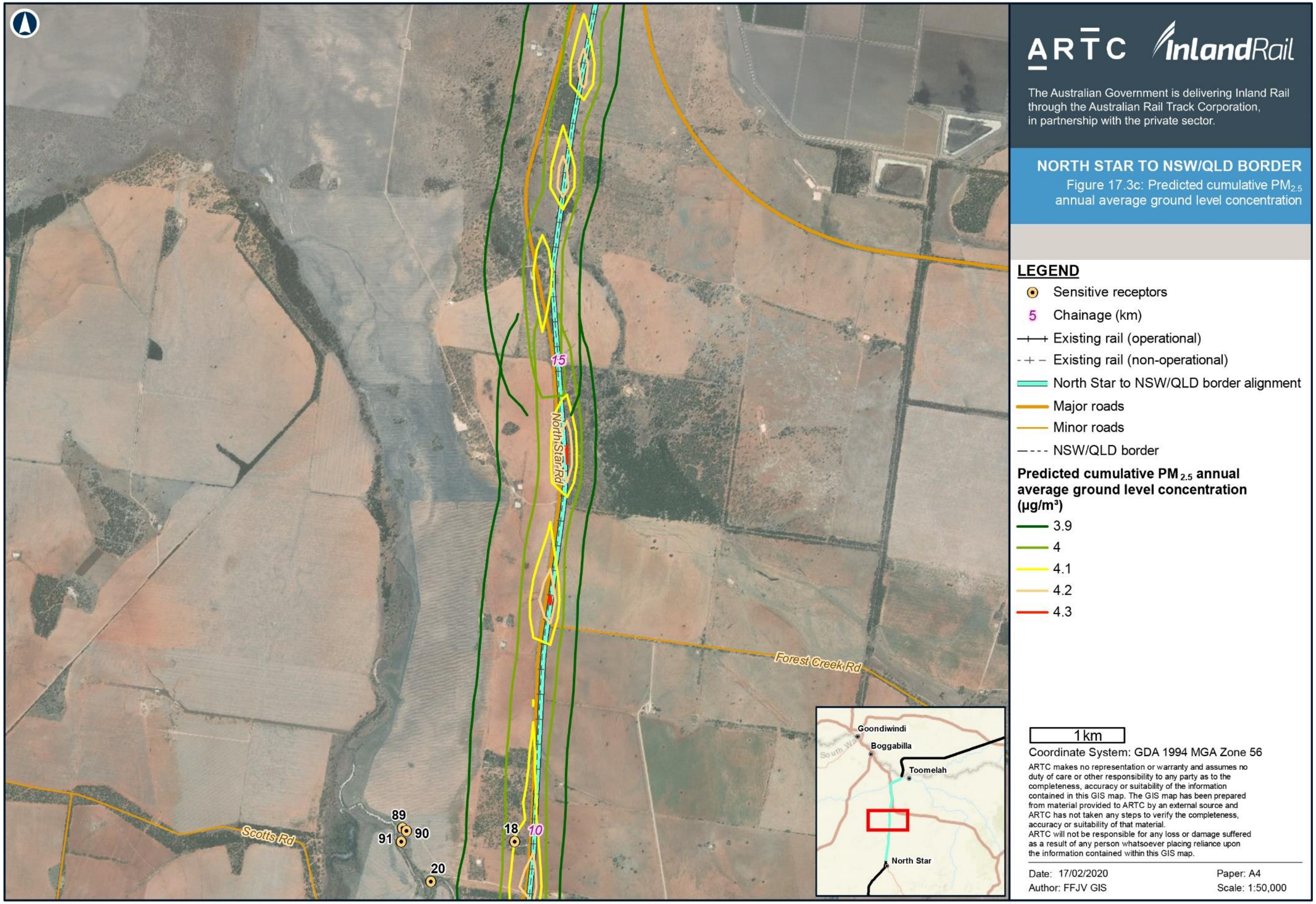

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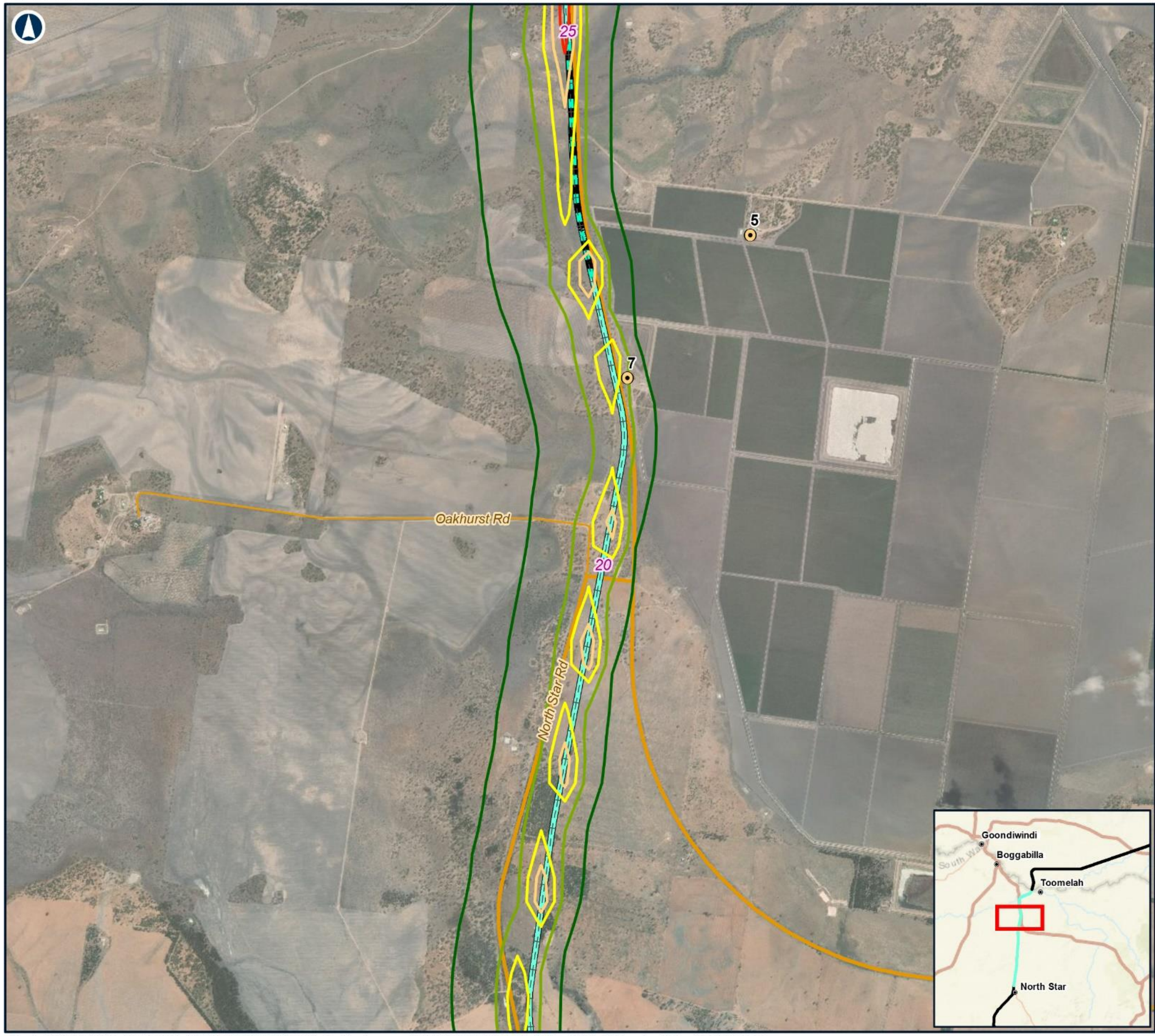

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NORTH STAR TO NSW/QLD BORDER

Figure 17.3d: Predicted cumulative $PM_{2.5}$ annual average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Crossing loops
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative $PM_{2.5}$ annual average ground level concentration ($\mu g/m^3$)

- 3.9
- 4
- 4.1
- 4.2
- 4.3

1 km

Coordinate System: GDA 1994 MGA Zone 56

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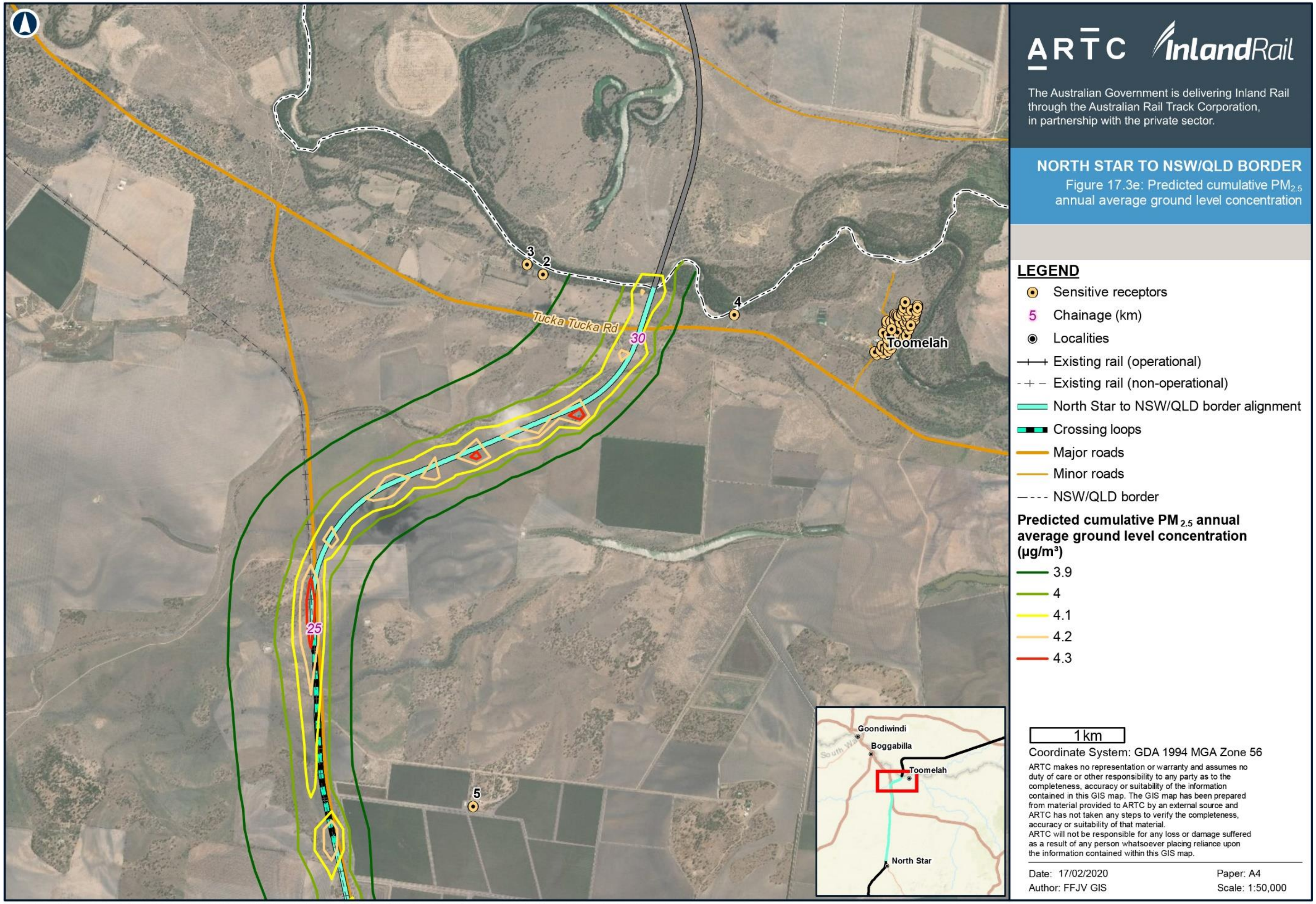

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NORTH STAR TO NSW/QLD BORDER

Figure 17.4a: Predicted cumulative NO_2 maximum 1 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Adjoining alignments
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative NO_2 maximum 1 hour ground level concentration (µg/m³)

- 100
- 150
- 200
- 246 (NO_2 1 hour maximum criterion)
- 300

1 km

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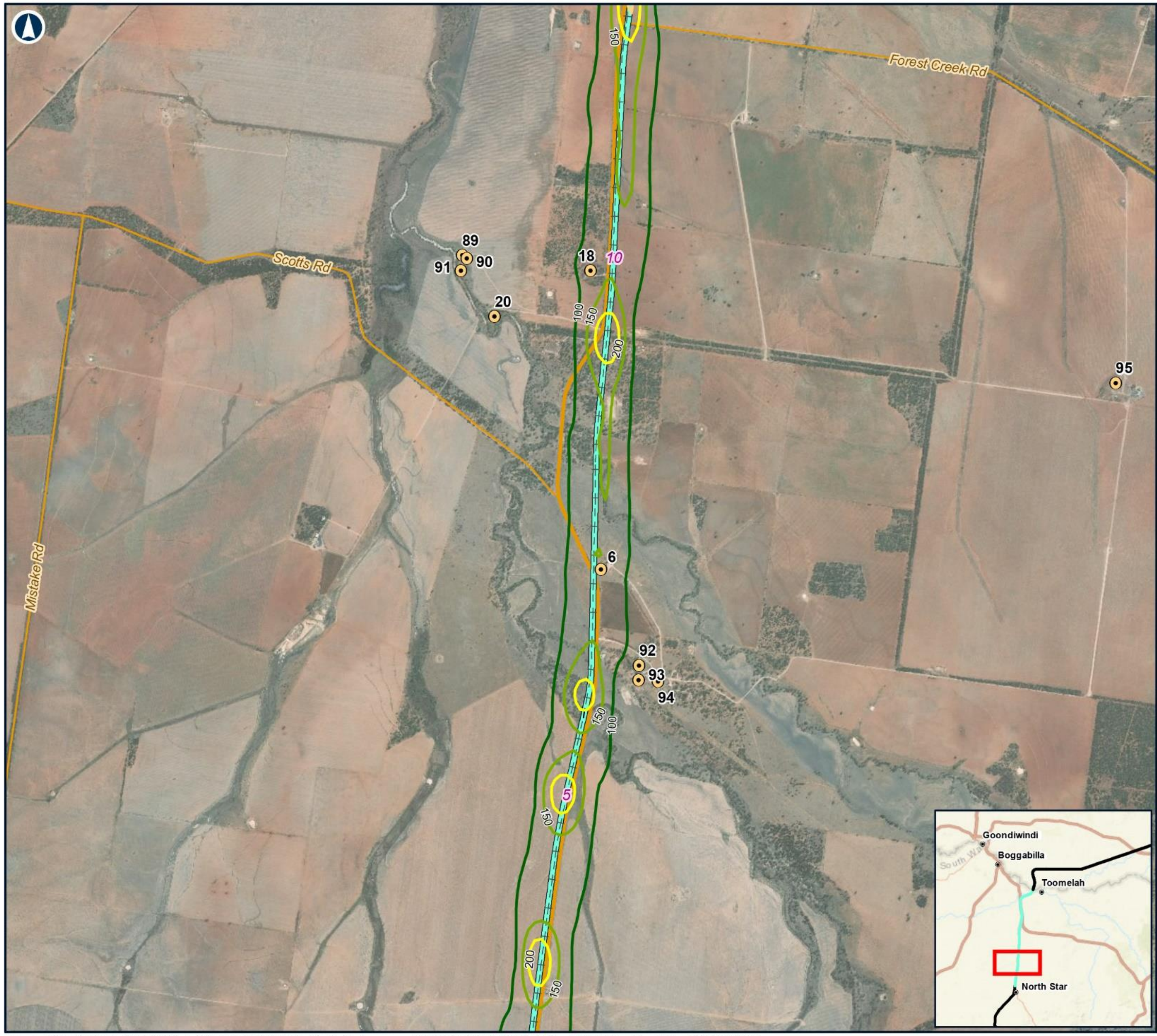

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NORTH STAR TO NSW/QLD BORDER

Figure 17.4b: Predicted cumulative NO_2 maximum 1 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative NO_2 maximum 1 hour ground level concentration (µg/m³)

- 100
- 150
- 200
- 246 (NO_2 1 hour maximum criterion)
- 300

1 km

Coordinate System: GDA 1994 MGA Zone 56

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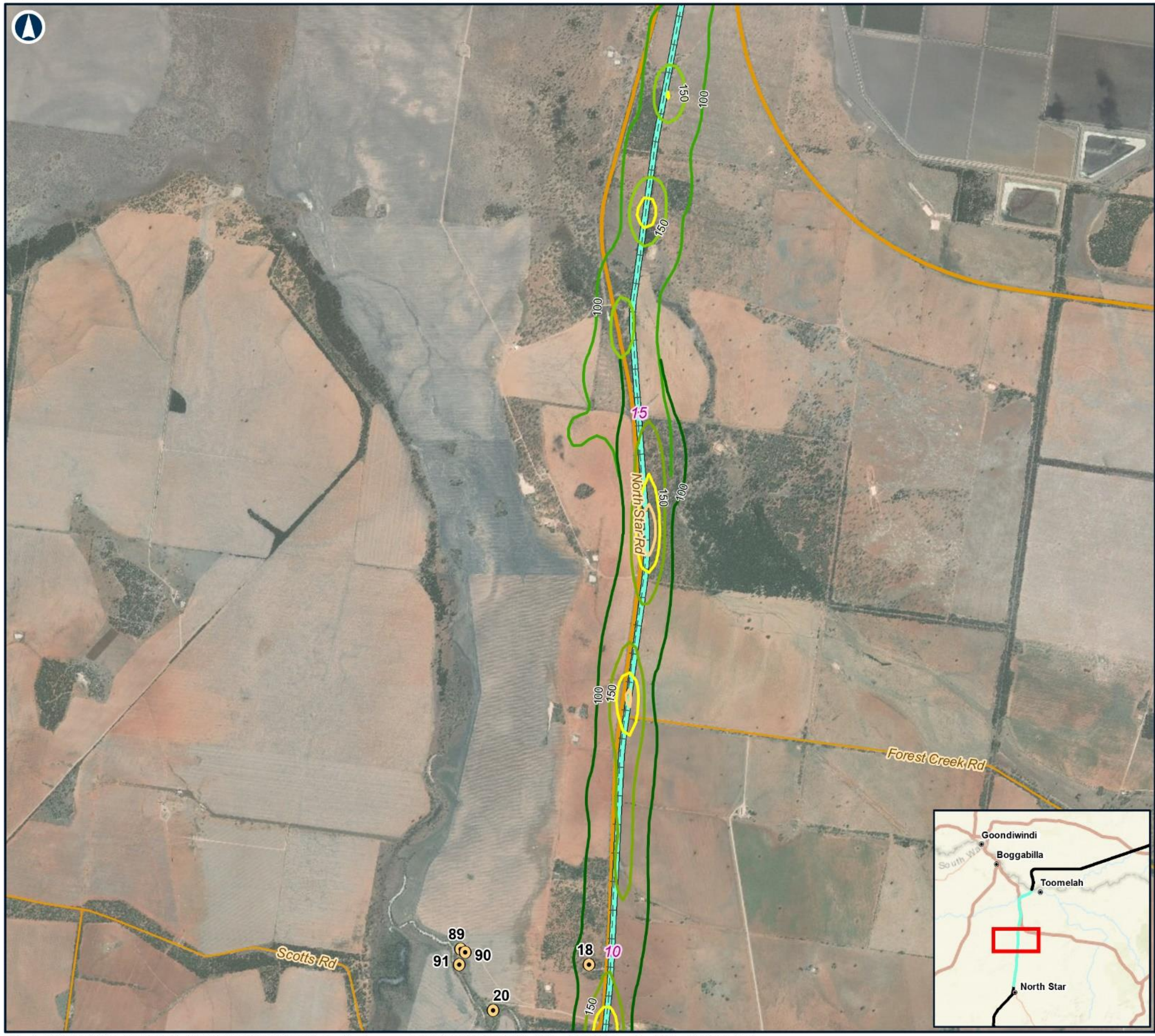

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NORTH STAR TO NSW/QLD BORDER

Figure 17.4c: Predicted cumulative NO_2 maximum 1 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative NO_2 maximum 1 hour ground level concentration (µg/m³)

- 100
- 150
- 200
- 246 (NO_2 1 hour maximum criterion)
- 300

1 km

Coordinate System: GDA 1994 MGA Zone 56

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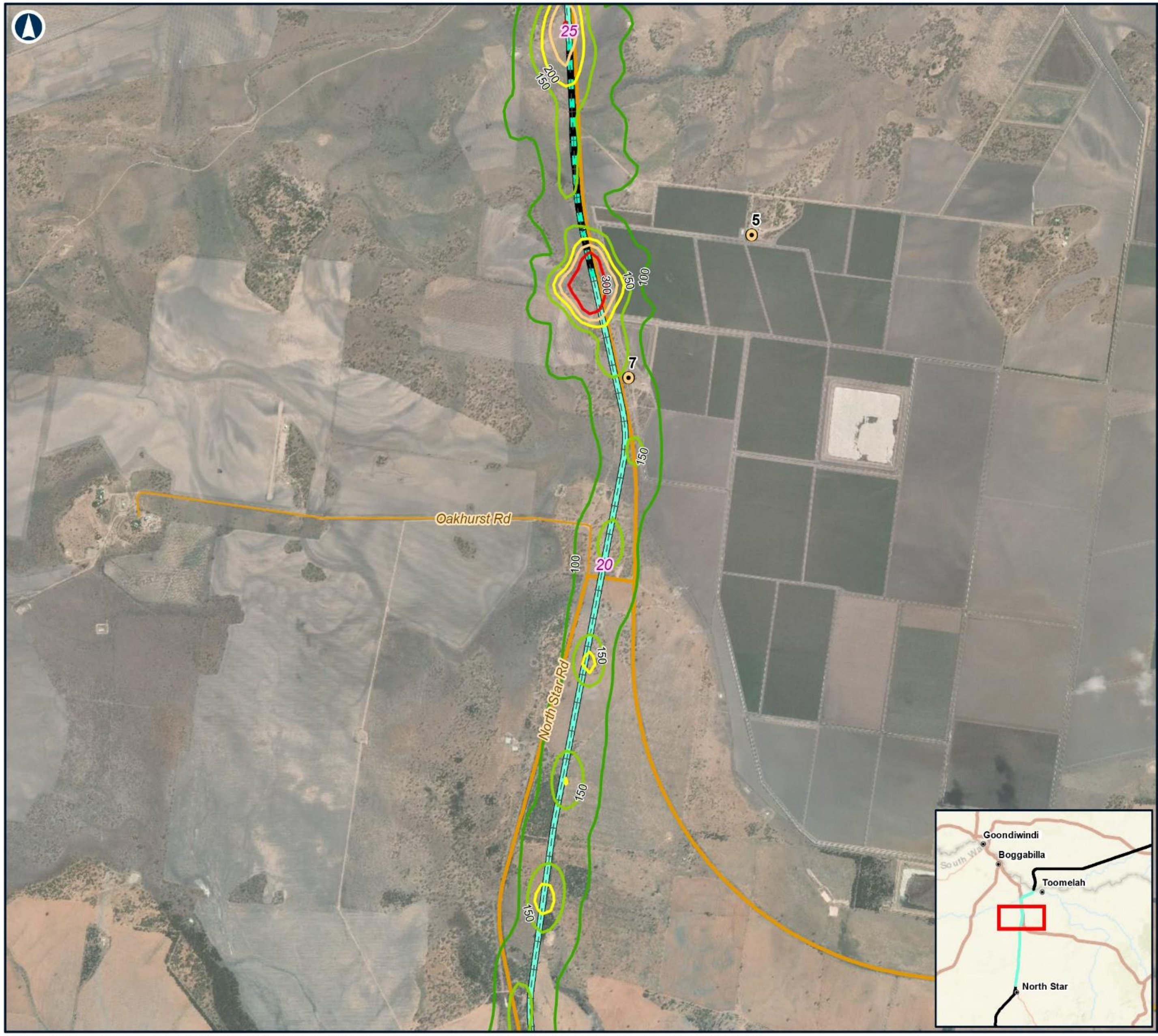

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NORTH STAR TO NSW/QLD BORDER

Figure 17.4d: Predicted cumulative NO_2 maximum 1 hour average ground level concentration

LEGEND

- Sensitive receptors
- 5 Chainage (km)
- Existing rail (operational)
- Existing rail (non-operational)
- North Star to NSW/QLD border alignment
- Crossing loops
- Major roads
- Minor roads
- NSW/QLD border

Predicted cumulative NO_2 maximum 1 hour ground level concentration (µg/m³)

- 100
- 150
- 200
- 246 (NO_2 1 hour maximum criterion)
- 300

1 km

Coordinate System: GDA 1994 MGA Zone 56

Date: 17/02/2020 Paper: A4
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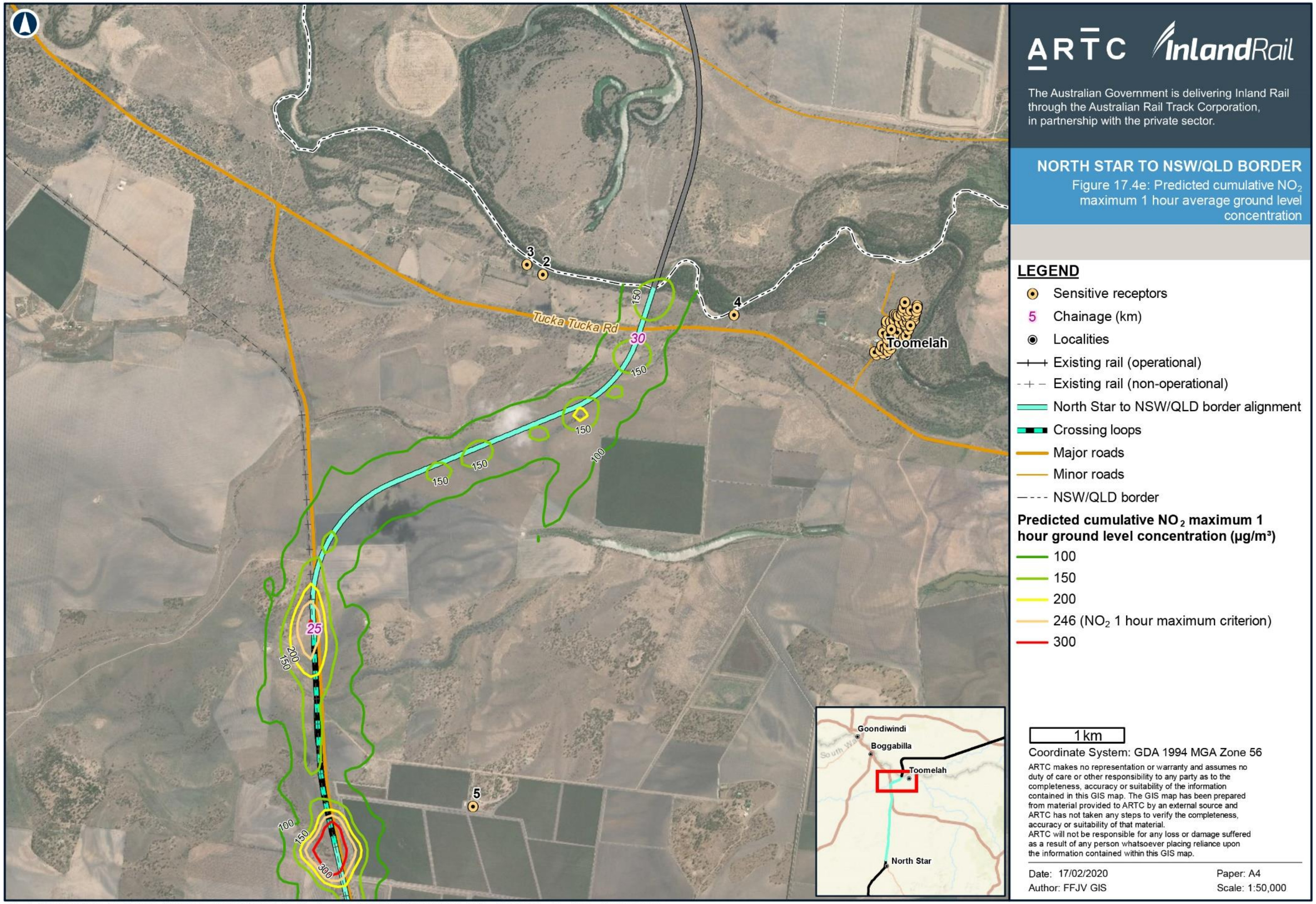

Map by: MEF Z:\GIS\GIS_270_NS2B\Tasks\270-EAP-201906051626_Air_Quality_Assessment\270-EAP-201906051626_Fig17.4b-e_NO2_ARTC_rev3.mxd Date: 17/02/2020 13:56

17.6 Mitigation measures

This section outlines the initial mitigation measures included in the proposal design and identifies proposed mitigation measures to manage predicted environmental impacts in the preconstruction, and construction and operational phases of the proposal.

17.6.1 Initial mitigation—design measures

The initial mitigation measures presented in Table 17.11 have been incorporated into the proposal design. These design measures have been identified through collaborative development of the design and consideration of environmental constraints and issues, including proximity to sensitive receptors. These design measures are relevant to both construction and operational phases of the proposal.

TABLE 17.11 INITIAL MITIGATION IN DESIGN

Aspect	Initial mitigation
Emissions from refuelling activities during construction	The planning, siting and assessment of potential fuel storage locations has taken into consideration the location of sensitive receptors.
Fugitive dust emissions (windborne erosion) during construction and operation	The disturbance footprint defined in proposal design has aimed to minimise clearing extents to that required to construct and operate the works. Railway batters and other exposed surfaces have been designed to enable stabilisation to reduce fugitive dust emissions.
Emissions from idling locomotives	The planning and siting of the crossing loop between Ch 22.7 km to Ch 24.9 km has considered the location of sensitive receptors.

17.6.2 Operational mitigation measures

Dust and air quality mitigation measures will be incorporated into the frameworks that will apply to third-party freight train operators as part of network access agreements. The access agreements established will require train operators to prepare suitably detailed environmental management plans for their operations to detail how the operator will manage all risks. These plans will include clear performance requirements and traceable corrective measures and be subject to verification and auditing by the operator.

Prior to accessing the Inland Rail network, ARTC will ensure any and all operators:

- Develop and implement their plan in a manner that is consistent with ARTC's Environmental Management Plans
- Comply with all relevant conditions of approval, licences, permits, consent or other requirements of any authority, body or organisation having jurisdiction in connection with the Inland Rail network.

At all times while accessing the Inland Rail network, all operators will be required to:

- Perform activities in a satisfactory manner consistent with the principles of best-practice management
- Undertake activities on the Inland Rail network in a proper and efficient manner to minimise emissions
- Seek opportunities to improve the management of air quality and reduce fugitive emissions through the adoption of suitable procedures.

Maintenance activities with the potential to generate dust or air-quality impacts will be managed in accordance with the measures prescribed in the ARTC Operational Environmental Management Plan.

17.6.3 Proposed mitigation measures

To manage proposal risks during construction, a number of mitigation measures have been proposed for implementation in future phases of proposal delivery, as presented in Table 17.12. These proposed mitigation measures have been identified to address proposal-specific issues and opportunities, legislative requirements, accepted government plans, policy and practice.

In the pre-construction and construction phases of the proposal, dust sources will be variable and transitory in nature and the potential for impacts will vary with proximity to sensitive receptors.

Table 17.12 identifies the relevant proposal phase, the aspect to be managed and the proposed mitigation measure, which is then factored into the assessment of residual significance in

Table 17.13.

Chapter 27: Environmental Management Plan provides further context and the framework for implementation of these proposed mitigation measures.

TABLE 17.12 AIR QUALITY MITIGATION MEASURES

Delivery phase	Aspect	Proposed mitigation measures
Detailed design	Dust generation (windborne erosion) from construction or operation	Incorporate treatments in earthworks and landscape design of railway batters and other exposed surfaces. Define and design temporary access tracks to minimise dust generation, e.g. appropriate surface treatments for the predicted construction traffic movements, installation of rumble grids, concrete pads or other physical measures to reduce trackout. Define proposed stockpile locations, considering proximity to sensitive receptors.
	Emissions from refuelling activities during construction	Review and refine the location of proposed fuel tank storage locations, particularly where the separation distance to a sensitive receptor is less than 50 m.
Construction	Dust generation from earthworks, clearing and grubbing, construction activities and exposed areas within the construction disturbance footprint	Limit clearing to that required to construct and operate the proposal. Where practical, stage clearing and grubbing, and construction activities to limit the size of exposed areas. Implement controls to prevent or minimise dust generation during activities involving excavation or disturbance of soils or vegetation, or handling ballast (e.g. use water sprays or water carts for dust suppression as required). Stabilise disturbed areas and exposed surfaces as soon as practical. Long-term stockpiles should be avoided wherever possible; however, where necessary, long-term stockpiles should be established in locations with suitable separation from sensitive receptors and not in the path of prevailing winds (which would transport dust towards sensitive receptors). Stabilise and protect long-term stockpiles from erosive processes while not in use. Provide timely, meaningful responses to air quality or dust complaints. This may include investigations, corrective actions, monitoring or notification to relevant authorities. Establish and communicate the protocol for notifying relevant stakeholders when potentially dust-generating activities are planned to be carried out, with contact details for queries or complaints. Visually monitor dust generation (visible plumes) throughout construction. In addition, undertake visual inspection at the boundary of the disturbance footprint in areas in proximity to sensitive receptors to inform when corrective actions are required.
	Dust generation and deposition as a result of adverse weather conditions	Avoid ground-disturbing activities during windy conditions. When this is not practical, implement additional management measures, such as enhanced watering of access roads and works areas to minimise the potential increase in dust generation. Implement additional dust suppression controls prior to the onset of adverse weather, including covering of stockpiles and additional watering of access roads.
	Emissions from refuelling activities	Refuelling activities to be located and operated in accordance with a risk assessment to minimise odour and air-quality issues at a sensitive place.
	Emissions from combustion engines (construction vehicles and generators)	Maintain and operate construction plant, vehicles and machinery in accordance with manufacturers' recommendations. Turn off idling plant, equipment and vehicles when not in use.

Delivery phase	Aspect	Proposed mitigation measures
Construction	Use of non-potable water for dust suppression	Water used in dust suppression must be of suitable quality and not result in environmental or human health risks, or impact rehabilitation outcomes. Water additives used to improve dust-suppression effectiveness (e.g. the addition of soil binders to water for dust suppression on roads or handstand areas) are to be risk assessed prior to adoption.
	Dust generated by traffic on access tracks	Where sensitive receptors are located within 350 metres of construction works, or visible dust is generated from vehicles using unsealed access roads, road watering or other appropriate controls are to be implemented. Adjust access road watering or treatments as required to prevent visible dust generation or impacts to sensitive receptors.
	Dust emissions from vehicles transporting materials to and from site	Cover vehicles transporting potentially dust- and/or spillage-generating material to and from the construction site immediately after loading (prior to traversing public roads). Visually inspect vehicles entering/exiting the site and implement additional controls if corrective actions are required.

17.7 Impact assessment

Chapter 10: Assessment Methodology presents the qualitative (significance) and quantitative (compliance) assessment methods adopted for this impact assessment. Potential air-quality impacts during construction have been assessed in accordance with the qualitative impact assessment methodology. A quantitative (compliance) assessment has been undertaken for potential operational impacts, as predicted concentrations at sensitive receptors have been assessed against legislative and other nominated air-quality objectives. The results of the quantitative assessment of potential operational impacts are detailed in Section 17.5.2.

Potential impacts to sensitive receptors due to construction of the proposal have been assessed in Table 17.13. These impacts have been assessed following the IAQM risk assessment methodology as discussed in Section 17.3.2.

The initial significance assessment is undertaken on the assumption that the design measures factored into the reference design phase (refer Table 17.11) have been implemented. The residual significance level of the potential impacts is reassessed, taking into consideration the implementation of the proposed additional mitigation measures listed in Table 17.12.

The IAQM construction dust assessment guidance states:

> *'For almost all construction activity, the aim should be to prevent significant effects on sensitive receptors through the use of suitable and effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be "not significant".'*

Table 17.13 shows that the residual significance with the proposed mitigation measures is low or negligible. Consistent with the IAQM statement, it is expected that with implementation of the proposed mitigation measures the impacts to air quality, with respect to dust deposition and human health, will not be significant. This table has been structured to maintain consistency with the IAQM methodology, which is activity-based and, as such, earthworks are assessed across both the pre-construction and construction phase.

Trackout has also been assessed across both the pre-construction and construction phases. Trackout is the transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network, including vehicle travel on unsealed roads.

Given the uncertainty associated with timeframe for decommissioning, this phase has not been considered in this impact assessment.

TABLE 17.13 INITIAL AND RESIDUAL SIGNIFICANCE ASSESSMENT FOR POTENTIAL AIR QUALITY IMPACTS ASSOCIATED WITH CONSTRUCTION

Activity	Aspect[1]	Potential impact	Receptor sensitivity	Initial significance[2]		Residual significance[3]	
				Emission magnitude	Significance	Emission magnitude	Significance
Demolition	All dust-generating sources associated with demolition	Dust deposition	Medium	Small	Low	Small	Low
		Human health	Low	Small	Negligible	Small	Negligible
Earthworks associated with pre-construction and construction phase	All dust-generating sources associated with pre-construction and construction phase earthworks	Dust deposition	Medium	Large	Medium	Small	Low
		Human health	Low	Large	Low	Small	Negligible
Construction	All dust-generating sources associated with construction phase for the proposal	Dust deposition	Medium	Medium	Medium	Small	Low
		Human health	Low	Medium	Low	Small	Negligible
Trackout associated with pre-construction and construction phase.	All dust-generating sources associated with pre-construction and construction phase traffic associated with the proposal	Dust deposition	Medium	Large	Medium	Medium	Low
		Human health	Low	Large	Low	Medium	Low

Table notes:
1. Refer to Table 17.12 for reference to the proposed additional mitigation measures relevant to each aspect.
2. Includes implementation of initial mitigation specified in Table 17.11.
3. Assessment of residual risk with the implementation of the mitigation measures identified in Table 17.12.

17.8 Conclusions

An air-quality impact assessment has been conducted to examine the proposal, to ensure emissions along the rail corridor are understood and to assess any potential impacts on receptors near the proposal site. Based on the assessment, the following conclusions in relation to potential air-quality impacts can be made:

- A construction environmental management plan will be required for the construction of the proposal to manage potential impacts from dust emission
- Atmospheric dispersion modelling of operational activities undertaken as part of the assessment predicts air-quality pollutants to be below proposal objectives at the nearest sensitive receptors.