

TABLE OF CONTENTS

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT

ARTC

INLAND
RAIL 
An Australian Government Initiative

Contents

Glossary and abbreviations

Proposal summary

Chapter 1

1.	INTRODUCTION	1-1
1.1	Overview	1-1
1.2	The proposal	1-1
1.2.1	Location	1-2
1.2.2	Key features	1-2
1.2.3	Timing and operation	1-3
1.2.4	Value of the proposal	1-3
1.3	Objectives of the proposal and Inland Rail	1-3
1.4	EIS purpose and structure	1-6

Chapter 2

2.	GENERAL BIOPHYSICAL AND CULTURAL ENVIRONMENT	2-1
2.1	Regional setting	2-1
2.1.1	N2NS corridor	2-1
2.2	Description of the proposal site	2-1
2.2.1	Definition	2-2
2.2.2	Description	2-2
2.3	General biophysical environment of the proposal site	2-2
2.3.1	Biodiversity	2-2
2.3.2	Geology and soils	2-3
2.3.3	Water quality, hydrology and groundwater	2-4
2.3.4	Air	2-5
2.3.5	Noise and vibration	2-5
2.3.6	Existing transport	2-6
2.3.7	Landscape and visual	2-6
2.4	General cultural environment of the proposal	2-6
2.4.1	Land use and property	2-6
2.4.2	Heritage	2-7
2.4.3	Socio-economic	2-8
2.5	Existing rail facilities and operations	2-8
2.5.1	Overview	2-8
2.5.2	Branches	2-8
2.5.3	Passenger services	2-8

Chapter 3

3.	STATUTORY CONTEXT	3-1
3.1	Overview of the planning approval pathway	3-1
3.2	Environmental Planning and Assessment Act 1979	3-1
3.2.1	Part 5 of the EP&A Act	3-1
3.2.2	Division 5.2 of the EP&A Act	3-1
3.2.3	Landowner's consent and notification requirements	3-2
3.2.4	Environmental Planning and Assessment Regulation 2021	3-3
3.2.5	Environmental Planning and Assessment (Major Projects) Regulation 2021	3-3
3.3	NSW Environmental Planning Instruments	3-3
3.3.1	State Environmental Planning Policy (Transport and Infrastructure) 2021	3-3
3.3.2	State Environmental Planning Policy (Planning Systems) 2021	3-3
3.3.3	Other Environmental Planning Instruments	3-4
3.4	Other NSW legislative requirements	3-4
3.4.1	Approvals not required	3-4
3.4.2	Approvals to be applied consistently	3-4
3.4.3	Consideration of requirements under other NSW Acts	3-4
3.5	Commonwealth requirements	3-7
3.5.1	Environment Protection and Biodiversity Conservation Act 1999	3-7
3.5.2	Native Title Act 1993	3-8
3.6	Summary of approval and notification requirements	3-8
3.7	Summary of the assessment process	3-8
3.7.1	Environmental assessment requirements	3-8
3.7.2	Public exhibition and submissions	3-9
3.7.3	Assessment and determination	3-9

Chapter 4

4.	CONSULTATION	4-1
4.1	Consultation objectives and strategy	4-1
4.1.1	Consultation requirements	4-1
4.1.2	Overall objectives	4-1
4.2	Consultation approach	4-2
4.2.1	Stakeholder identification	4-2
4.2.2	Community and stakeholder contact and information tools	4-3
4.2.3	General activities	4-4
4.2.4	Consultation background	4-6

4.3	Consultation relevant to the EIS	4-8
4.3.1	EIS consultation approach	4-8
4.3.2	Overview of consultation activities	4-11
4.3.3	Results of consultation relevant to the EIS	4-15
4.3.4	Response to consultation feedback	4-16
4.4	Ongoing stakeholder engagement	4-18
4.4.1	Consultation during exhibition of the EIS	4-18
4.4.2	Submissions report	4-19
4.4.3	Consultation and communication during design and delivery of the proposal	4-19
4.5	Complaints management	4-19

Chapter 5

5.	NEED FOR THE INLAND RAIL PROGRAM AND THE STRATEGIC CONTEXT OF THE PROPOSAL	5-1
5.1	The existing situation	5-1
5.2	The opportunity and challenges	5-3
5.2.1	Growth in freight demand	5-3
5.2.2	Existing freight capacity and infrastructure issues	5-4
5.2.3	Assessment of demands for Inland Rail	5-4
5.3	Need for Inland Rail	5-5
5.4	Need for the proposal	5-6
5.5	National, state and regional planning policies and strategies	5-6
5.6	Key benefits	5-8
5.6.1	Inland Rail	5-8
5.6.2	The proposal	5-10

Chapter 6

6.	INLAND RAIL PROGRAM DEVELOPMENT, ALTERNATIVES AND THE PROPOSAL	6-1
6.1	Alternatives to Inland Rail	6-1
6.1.1	Strategic alternatives—alternative freight transport solutions	6-1
6.2	The ‘do nothing’ alternative	6-3
6.3	Alternative route options for Inland Rail	6-4
6.3.1	North–South Rail Corridor Study	6-4
6.3.2	Melbourne–Brisbane Inland Rail Alignment Study	6-5
6.3.3	Melbourne to Brisbane Inland Rail Route History 2006–2019	6-6
6.4	Initial project development for N2NS	6-6
6.4.1	Initial route selection	6-7
6.4.2	2015 alignment refinement	6-8
6.4.3	2016–2017 alignment refinement	6-8
6.4.4	2018–2019 preferred alignment	6-9
6.4.5	Multi-criteria analysis	6-10

6.5	Development of the proposal	6-12
6.5.1	Overview	6-12
6.5.2	Approach to avoiding or minimising impacts	6-12
6.5.3	Options for key features of the proposal	6-13
6.6	Refinement of the proposal	6-15

Chapter 7

7.	PROPOSAL FEATURES AND OPERATION	7-1
7.1	Overview	7-1
7.1.1	The proposal	7-1
7.2	Description of key proposal features	7-11
7.2.1	Track upgrade and realignment	7-11
7.2.2	Camurra bypass	7-12
7.2.3	Turnouts	7-12
7.2.4	Bridges	7-12
7.2.5	Culverts	7-13
7.2.6	Level crossings	7-14
7.2.7	Road modifications	7-18
7.3	Ancillary works and infrastructure	7-18
7.3.1	Track drainage	7-18
7.3.2	Rail maintenance access road	7-18
7.3.3	Signalling and communications	7-19
7.3.4	New fencing	7-19
7.3.5	Fauna crossings	7-20
7.3.6	Signage	7-21
7.3.7	Spoil mounds	7-21
7.4	Land acquisition	7-21
7.5	Operation of the proposal	7-22
7.5.1	Train operations	7-22
7.5.2	Maintenance activities	7-22

Chapter 8

8.	CONSTRUCTION OF THE PROPOSAL	8-1
8.1	Overview of construction scope and approach	8-1
8.1.1	Approach to avoiding or minimising impacts during construction	8-1
8.2	Indicative construction methodology	8-1
8.2.1	Site establishment and enabling works	8-2
8.2.2	Demolition of existing structures	8-3
8.2.3	Earthworks and ground improvements	8-3
8.2.4	Camurra hairpin	8-4
8.2.5	Bridges	8-5
8.2.6	Culverts	8-5
8.2.7	Level crossings	8-5
8.2.8	Rail maintenance access road	8-6
8.2.9	Road modifications	8-6
8.2.10	Rehabilitation	8-6
8.2.11	Testing and commissioning	8-7
8.2.12	Finishing works	8-7
8.2.13	Location of significant activities	8-7

8.3	Timing, staging and working hours	8-17	9.5	Mitigation and management	9-44
8.3.1	Timing and sequencing	8-17	9.5.1	Approach to mitigation and management	9-44
8.3.2	Rail possessions	8-19	9.5.2	Consideration of the interactions between mitigation measures	9-44
8.3.3	Working hours	8-19	9.5.3	Summary of mitigation measures Chapter 10	9-44
8.4	Construction compounds and material laydown	8-20	10	BIODIVERSITY	10-1
8.5	Site servicing requirements	8-20	10.1	Summary of impacts	10-1
8.6	Construction workforce	8-20	10.2	Assessment approach	10-2
8.6.1	Workforce numbers	8-20	10.2.1	Methodology	10-2
8.6.2	Workforce accommodation requirements	8-20	10.2.2	Legislative and policy context	10-5
8.7	Construction resources	8-21	10.3	Existing environment	10-5
8.7.1	Quarried material sources	8-21	10.3.1	Land category assessment	10-6
8.7.2	Mobile batch plants	8-21	10.3.2	Landscape assessment	10-6
8.7.3	Construction water supply	8-21	10.3.3	Plant Community Types	10-8
8.8	Plant and equipment	8-22	10.3.4	Vegetation zones	10-14
8.9	Other construction elements	8-23	10.3.5	Ecosystem credit species	10-14
8.9.1	Construction amenity	8-23	10.3.6	Species credit species	10-15
8.9.2	Demobilisation, rehabilitation and landscaping	8-24	10.3.7	Matters of National Environmental Significance	10-17
8.10	Transport, access and haulage arrangements	8-24	10.3.8	Weeds	10-17
8.10.1	Property access and temporary occupation	8-24	10.3.9	Aquatic ecology	10-18
8.10.2	Emergency access	8-24	10.4	Impact assessment	10-18
8.10.3	Access and egress along the rail corridor	8-26	10.4.1	How potential impacts have been avoided	10-18
8.10.4	Haul routes	8-32	10.4.2	Risk assessment	10-18
8.10.5	Construction traffic numbers	8-32	10.4.3	Direct impacts	10-18
8.11	Public utilities	8-32	10.4.4	Indirect impacts	10-19
8.11.1	Description of utility types and ownership	8-32	10.4.5	Prescribed impacts	10-20
8.11.2	Utility interface with proposal	8-32	10.4.6	Serious and irreversible impacts	10-20
8.11.3	Impacts and mitigation	8-33	10.4.7	Impacts that are uncertain	10-21
8.12	Approach to avoiding or minimising impacts during construction	8-34	10.4.8	Key Threatening Processes	10-21
8.12.1	Potential impacts	8-34	10.4.9	Fisheries Management Act impacts	10-21
8.12.2	Mitigation measures	8-34	10.4.10	EPBC Act impacts	10-22
8.12.3	Mehi and Gwydir rivers floodplain	8-35	10.5	Mitigation and management	10-22
			10.5.1	Key strategies	10-22
			10.5.2	Adaptive management strategy	10-25
			10.5.3	Requirements for offsetting	10-26
			10.5.4	Summary of mitigation measures	10-28

Chapter 9

9	LAND USE AND PROPERTY	9-1
9.1	Summary of impacts	9-2
9.2	Assessment approach	9-2
9.2.1	Key tasks	9-2
9.2.2	Legislative and policy context	9-3
9.3	Existing environment	9-3
9.3.1	Land use	9-3
9.3.2	Agricultural land uses	9-21
9.4	Impact assessment	9-31
9.4.1	Risk assessment	9-31
9.4.2	Construction	9-40
9.4.3	Operation	9-41

Chapter 11

11	TRAFFIC AND TRANSPORT	11-1
11.1	Summary of impacts	11-2
11.1.1	Construction	11-2
11.1.2	Operation	11-2
11.2	Assessment approach	11-3
11.2.1	Methodology	11-3
11.2.2	Legislative and policy context	11-4
11.3	Existing environment	11-4
11.3.1	Road network	11-4
11.3.2	Road safety	11-7
11.3.3	Rail network	11-7
11.3.4	Level crossings	11-7

11.3.5	Public transport	11-10
11.3.6	Active transport	11-11
11.3.7	Parking	11-11
11.4	Impact assessment	11-11
11.4.1	Construction impacts	11-11
11.4.2	Operational impacts	11-19
11.5	Mitigation and management	11-21
11.5.1	Approach to mitigation and management	11-21
11.5.2	Consideration of the interactions between mitigation measures	11-21
11.5.3	Summary of mitigation measures	11-21

Chapter 12

12	HYDROLOGY AND FLOODING	12-1
12.1	Summary of impacts	12-3
12.2	Assessment approach	12-3
12.2.1	Relevant legislation, policies and guidelines	12-3
12.2.2	Available data	12-5
12.2.3	Methodology	12-5
12.3	Existing environment	12-14
12.3.1	Catchments and major watercourses	12-14
12.3.2	Land uses	12-15
12.3.3	Topography	12-17
12.3.4	Soil erodibility	12-17
12.3.5	Climate and rainfall	12-17
12.3.6	Existing flooding patterns and flood risk	12-17
12.3.7	Existing rail infrastructure and flood risk	12-18
12.4	Stakeholder consultation	12-18
12.5	Impact assessment	12-19
12.5.1	Proposed flood planning levels and rail flood immunity	12-19
12.5.2	Proposed cross-drainage infrastructure	12-20
12.5.3	Risk assessment	12-20
12.5.4	Flood impact assessment	12-21
12.5.5	Impacts under extreme events	12-37
12.5.6	Cumulative impact assessment	12-37
12.5.7	Key outcomes	12-39
12.6	Mitigation and management	12-39
12.6.1	Construction phase mitigation and management measures	12-39
12.6.2	Operation phase mitigation and management measures	12-40
12.6.3	Mitigation of cumulative impact of N2NS Phases 1 and 2 on Moree	12-41
12.6.4	Summary of mitigation and management measures	12-42

Chapter 13

13	SURFACE WATER QUALITY IMPACT ASSESSMENT	13-1
13.1	Summary of impacts	13-2
13.2	Assessment approach	13-3
13.3	Relevant legislation, policies and guidelines	13-3
13.4	Development of assessment criteria	13-4
13.4.1	Water quality trigger values	13-5
13.5	Existing environment	13-5
13.5.1	Catchments and major watercourses	13-5
13.5.2	Land uses	13-7
13.5.3	Topography	13-7
13.5.4	Climate and rainfall	13-7
13.5.5	Water quality	13-8
13.5.6	Sensitive receiving environments	13-10
13.6	Impact assessment	13-11
13.6.1	Construction-phase impact assessment	13-11
13.6.2	Operational phase impact assessment	13-12
13.7	Mitigation and management	13-14
13.7.1	Construction phase mitigations	13-14
13.7.2	Operational phase mitigation and management measures	13-16
13.7.3	Summary of mitigation measures	13-16

Chapter 14

14	GROUNDWATER	14-1
14.1	Summary of impacts	14-3
14.2	Assessment approach	14-3
14.2.1	Methodology	14-3
14.2.2	Legislative and policy context	14-6
14.3	Existing environment	14-8
14.3.1	Hydrogeology and groundwater levels	14-8
14.3.2	Groundwater quality	14-12
14.3.3	Sensitive receptors	14-12
14.3.4	Existing groundwater balance	14-14
14.3.5	Conceptual hydrogeological model	14-14
14.4	Construction water	14-15
14.5	Risk and impact assessment	14-16
14.5.1	Risk assessment	14-16
14.5.2	Impact assessment	14-17
14.6	Mitigation and management	14-19
14.6.1	Approach to mitigation	14-19
14.6.2	Consideration of the interaction between mitigation measures	14-19
14.6.3	Mitigation measures	14-19

Chapter 15

15	CULTURAL HERITAGE	15-1
15.1	Summary of impacts	15-2
15.1.1	Aboriginal heritage	15-2
15.1.2	Non-Aboriginal heritage	15-2
15.2	Assessment approach	15-3
15.2.1	Study area	15-3
15.2.2	Methodology	15-3
15.2.3	Legislative and policy context	15-4
15.3	Existing environment	15-7
15.3.1	Aboriginal heritage	15-7
15.3.2	Non-Aboriginal heritage	15-13
15.4	Impact assessment	15-18
15.4.1	Risk assessment	15-18
15.4.2	Construction	15-19
15.4.3	Operation	15-21
15.5	Mitigation and management	15-23
15.5.1	Approach to mitigation	15-23
15.5.2	Consideration of the interactions between mitigation measures	15-23
15.5.3	Summary of mitigation measures	15-23

Chapter 16

16	NOISE AND VIBRATION	16-1
16.1	Summary of impacts	16-2
16.1.1	Construction noise and vibration	16-2
16.1.2	Operational noise and vibration	16-2
16.2	Assessment approach	16-2
16.2.1	Study area	16-2
16.2.2	Key tasks	16-5
16.2.3	Legislative and policy context	16-6
16.2.4	Proposed construction hours	16-7
16.3	Noise and vibration management levels/criteria	16-8
16.3.1	Construction	16-8
16.3.2	Operation—rail	16-10
16.4	Existing environment	16-12
16.4.1	Noise monitoring	16-12
16.4.2	Sensitive receivers	16-12
16.5	Impact assessment	16-14
16.5.1	Risk assessment	16-14
16.5.2	Construction	16-14
16.5.3	Operation—rail	16-21
16.6	Mitigation and management	16-23
16.6.1	Community consultation	16-23
16.6.2	Approach to mitigation	16-24
16.6.3	Residual impacts	16-25
16.6.4	Approach to construction noise and vibration management	16-26
16.6.5	Summary of mitigation measures	16-28

Chapter 17

17	SOCIAL IMPACT ASSESSMENT	17-1
17.1	Summary of impacts	17-1
17.2	Assessment approach	17-2
17.2.1	Methodology	17-2
17.2.2	Legislative and policy context to the assessment	17-2
17.2.3	Study area	17-3
17.2.4	Stakeholder consultation	17-4
17.3	Key features of the study areas	17-6
17.3.1	Regional study area: Moree Plains Shire	17-6
17.3.2	Nearby communities	17-6
17.3.3	Local study area	17-6
17.3.4	Movement and access	17-7
17.3.5	Demographic indicators	17-7
17.3.6	Regional indicators	17-7
17.3.7	Housing affordability	17-9
17.3.8	Income and disadvantage	17-9
17.3.9	Community connectivity	17-9
17.3.10	Journey to work	17-9
17.3.11	Social infrastructure	17-10
17.4	Impact assessment	17-10
17.4.1	Risk assessment	17-10
17.4.2	Construction impacts	17-10
17.4.3	Operational impacts	17-14
17.5	Mitigation and management	17-17
17.5.1	Approach to mitigation	17-17
17.5.2	Consideration of the interactions between mitigation measures	17-17
17.5.3	Summary of mitigation measures	17-18

Chapter 18

18	ECONOMICS	18-1
18.1	Guidelines and local and regional policies and planning documents	18-2
18.1.1	Guidelines	18-2
18.1.2	Local and regional policies and planning documents	18-2
18.2	Impact assessment area	18-4
18.3	Methodology	18-6
18.3.1	Existing economic environment	18-6
18.3.2	Economic impact assessment	18-6
18.3.3	Economic benefits assessment	18-6
18.3.4	Regional impact analysis	18-7
18.3.5	Cumulative impact assessment	18-7
18.3.6	Limitations of the assessment methodology	18-7
18.4	Existing environment	18-8
18.4.1	Labour market and employment	18-8
18.4.2	Business and industry	18-11
18.4.3	Local businesses and industry	18-11
18.5	Inland Rail economic impacts	18-12

18.6	Business and industry impacts	18-13
18.6.1	Agriculture industry	18-13
18.6.2	Tourism industry	18-14
18.6.3	Mineral resources	18-14
18.7	Economic benefits assessment	18-14
18.7.1	Base case and project case	18-15
18.7.2	Benefit categories	18-15
18.7.3	Economic benefits assessment results	18-16
18.7.4	Cost–benefit analysis: Inland Rail Programme Business Case	18-16
18.8	Regional economic impact analysis	18-16
18.8.1	Key considerations	18-17
18.8.2	Regional economic impact analysis results	18-17
18.9	Cumulative impacts	18-21
18.10	Impact management	18-22
18.11	Conclusions	18-25

Chapter 19

19	VISUAL IMPACT ASSESSMENT	19-1
19.1	Summary of impacts	19-1
19.2	Assessment approach	19-2
19.2.1	Methodology	19-2
19.2.2	Policy context to the assessment	19-4
19.3	Existing environment	19-4
19.3.1	Landscape character zones	19-5
19.3.2	Visibility of the proposal	19-9
19.3.3	Key viewpoints	19-9
19.4	Impact assessment	19-17
19.4.1	Risk assessment	19-17
19.4.2	Construction impacts	19-18
19.4.3	Operational impacts	19-19
19.5	Mitigation and management	19-28
19.5.1	Approach to mitigation and management	19-28
19.5.2	Consideration of the interactions between mitigation measures	19-30
19.5.3	Summary of mitigation measures	19-30

Chapter 20

20	SOILS AND CONTAMINATION	20-1
20.1	Summary of impacts	20-1
20.2	Assessment approach	20-1
20.3	Methodology	20-2
20.4	Legislative and policy context	20-2
20.5	Existing environment	20-3
20.5.1	Geology and soils	20-3
20.5.2	Contamination	20-8
20.6	Impact assessment	20-12
20.6.1	Risk assessment	20-12

20.6.2	Construction impacts	20-13
20.6.3	Operation impacts	20-14
20.7	Mitigation and management	20-14
20.7.1	Approach to mitigation	20-14
20.7.2	Interactions between mitigation measures	20-15
20.7.3	Summary of mitigation measures	20-16

Chapter 21

21	WASTE	21-1
21.1	Summary of impacts	21-1
21.2	Assessment approach	21-2
21.2.1	Methodology	21-2
21.2.2	Legislative and policy context to the assessment	21-2
21.3	Impact assessment	21-3
21.3.1	Potential impacts	21-4
21.3.2	How potential impacts would be avoided	21-4
21.3.3	Decommissioning impacts	21-10
21.4	Mitigation and management	21-11
21.4.1	Approach to mitigation and management	21-11
21.4.2	Decommissioning management measures	21-15
21.4.3	Consideration of the interactions between mitigation measures	21-15
21.4.4	Summary of mitigation measures	21-15

Chapter 22

22	CLIMATE CHANGE	22-1
22.1	Summary of impacts	22-1
22.2	Assessment approach	22-2
22.3	Legislation, policies, standards and guidelines	22-2
22.4	Impact assessment methodology	22-3
22.4.1	Climate change risk assessment	22-3
22.5	Existing environment	22-4
22.5.1	Existing and future climate	22-4
22.5.2	Observed local climate	22-4
22.6	Potential impacts	22-6
22.6.1	Construction	22-7
22.6.2	Operation	22-7
22.7	Mitigation and adaptation	22-10
22.7.1	Climate adaptation actions	22-10
22.7.2	Residual risk assessment	22-11
22.7.3	Summary of mitigation measures	22-12

Chapter 23

23	SUSTAINABILITY	23-1
23.1	Assessment approach	23-1
23.2	Legislation, policies, standards and guidelines	23-3
23.3	Methodology	23-4
23.3.1	Infrastructure Sustainability rating framework	23-4
23.3.2	Adoption of the Infrastructure Sustainability Council of Australia rating scheme during the planning phase	23-6
23.3.3	Preliminary weightings assessment	23-7
23.3.4	Approach to undertaking the preliminary weightings assessment	23-7
23.3.5	Previous studies relating to sustainability	23-7
23.3.6	Preliminary performance assessment	23-8
23.4	Sustainability management and measures	23-9
23.4.1	Sustainability management plan	23-9
23.4.2	Sustainability in design	23-9
23.4.3	Initiatives implemented during the EIS design	23-9
23.4.4	Future sustainability opportunities at Program and proposal level	23-13
23.4.5	Broad-scale sustainability opportunities	23-13
23.4.6	Skills and legacy	23-14
23.4.7	Summary of mitigation measures	23-14

Chapter 24

24	AIR QUALITY AND GREENHOUSE GAS	24-1
24.1	Summary of impacts	24-1
24.1.1	Construction	24-1
24.1.2	Operation	24-2
24.2	Air quality	24-2
24.2.1	Assessment approach	24-2
24.2.2	Assessment criteria	24-4
24.2.3	Existing environment	24-4
24.2.4	Impact assessment	24-12
24.2.5	Mitigation and management	24-15
24.3	Greenhouse gas	24-15
24.3.1	Assessment approach	24-15
24.3.2	Impact assessment	24-17
24.3.3	Mitigation and management	24-20
24.4	Summary of mitigation measures of air quality and greenhouse gas emissions	24-20

Chapter 25

25	HEALTH AND SAFETY (INCLUDING HAZARDOUS MATERIALS)	25-1
25.1	Summary of impacts	25-1

25.2	Assessment approach	25-1
25.2.1	Methodology	25-1
25.2.2	Legislative and policy context to the assessment	25-2
25.3	Existing environment	25-2
25.3.1	Receivers	25-2
25.3.2	Dangerous goods and hazardous materials	25-2
25.3.3	External weather events	25-3
25.3.4	Contamination	25-4
25.4	Impact assessment	25-4
25.4.1	Risk assessment	25-4
25.4.2	Construction	25-5
25.4.3	Operation	25-8
25.5	Mitigation and management	25-9
25.5.1	Approach to mitigation and management	25-9
25.5.2	Consideration of the interactions between mitigation measures	25-10
25.5.3	Summary of mitigation measures	25-10

Chapter 26

26	COMBINED CUMULATIVE IMPACTS	26-1
26.1	Summary of impacts	26-1
26.2	Overview	26-2
26.3	Assessment approach and methodology	26-2
26.3.1	Cumulative assessment	26-3
26.4	Cumulative impacts	26-13
26.4.1	Land use and property	26-13
26.4.2	Biodiversity	26-14
26.4.3	Traffic and transport	26-16
26.4.4	Hydrology and flooding	26-17
26.4.5	Water quality	26-19
26.4.6	Groundwater	26-20
26.4.7	Cultural heritage	26-21
26.4.8	Noise and vibration	26-22
26.4.9	Social impact	26-23
26.4.10	Economics	26-24
26.4.11	Landscape and visual impact	26-25
26.4.12	Soils and contamination	26-25
26.4.13	Waste	26-26
26.4.14	Climate change risk adaption and sustainability	26-27
26.4.15	Air quality and greenhouse gases	26-27
26.4.16	Health and safety	26-28
26.5	Summary of results	26-28
26.6	Residual impacts	26-29
26.6.1	Medium impact significance	26-29
26.6.2	High impact significance	26-29
26.7	Mitigation and management	26-30

Chapter 27

27	APPROACH TO ENVIRONMENTAL MANAGEMENT AND MITIGATION	27-1
27.1	Impacts that have not been able to be avoided	27-1
27.2	Proposal uncertainties	27-2
27.3	Approach to environmental management	27-4
27.3.1	Construction environmental management plan (CEMP)	27-5
27.3.2	Operational environmental management plan (OEMP)	27-5
27.4	Approach to design refinements	27-6
27.5	Compilation of performance outcomes	27-6
27.6	Summary of mitigation measures	27-10

Chapter 28

28	CONCLUSION AND JUSTIFICATION OF THE PROPOSAL	28-1
28.1	Summary of the proposal	28-1
28.1.1	Proposal key features	28-1
28.1.2	Operation	28-2
28.1.3	Construction	28-2
28.2	Compliance with statutory requirements	28-2
28.2.1	Summary of the approval process	28-2
28.2.2	Summary of the assessment process	28-3
28.2.3	Monitoring and compliance	28-3
28.3	Justification of the proposal	28-4
28.3.1	Summary of proposal justification	28-4
28.3.2	Summary of proposal benefits	28-4
28.3.3	Consequences of not proceeding	28-4
28.3.4	Environmental considerations	28-5
28.3.5	Design measures to avoid and minimise impacts	28-8
28.4	Consultation and issues raised	28-10
28.4.1	Results of consultation relevant to the EIS	28-10
28.4.2	Ongoing consultation	28-11
28.5	Concluding statement	28-11

Chapter 29

29	REFERENCES	29-1
-----------	-------------------	-------------

Appendices

Appendix A	Secretary's Environmental Assessment Requirements
Appendix B	Statutory requirements
Appendix C	Environmental risk assessment
Appendix D	Community consultation
Appendix E	Preliminary land requirements
Appendix F	Construction Environment Management Plan outline
Appendix G	Rapid Assessment Framework checklist

Technical Papers

Technical Paper 1	Biodiversity development assessment report
Technical Paper 2	Post-wet aquatic ecology assessment
Technical Paper 3	Traffic impact assessment
Technical Paper 4	Hydrology and flooding impact assessment
Technical Paper 5A	Surface water impact assessment
Technical Paper 5B	Groundwater impact assessment
Technical Paper 6	Aboriginal cultural heritage assessment report—Redacted
Technical Paper 7	Statement of heritage impact
Technical Paper 8	Social impact assessment
Technical Paper 9	Economic impact assessment
Technical Paper 10	Construction noise and vibration impact assessment
Technical Paper 11	Operational noise and vibration impact assessment

Tables

Chapter 1

Table 1-1	Purpose and structure of the EIS	1-6
-----------	----------------------------------	-----

Chapter 2

Table 2-1	Railway operating dates	2-8
-----------	-------------------------	-----

Chapter 4

Table 4-1	Consultation SEARS requirements	4-1
Table 4-2	Contact points available during the preparation of the EIS	4-3
Table 4-3	Consultation tools	4-4
Table 4-4	Consultation highlights preceding N2NS Phase 2 EIS	4-7
Table 4-5	Summary of consultation activities during the development of the EIS	4-13
Table 4-6	Issues raised during EIS consultation	4-15
Table 4-7	Feedback incorporated into design	4-16

Chapter 5

Table 5-1	Consistency with national planning policies and strategies	5-6
-----------	--	-----

Chapter 6

Table 6-1	Proposal development and alternatives SEARS requirements	6-1
Table 6-2	Bypass options for Moree	6-9
Table 6-3	Design compliance requirements for Mehi River bridge	6-15

Chapter 7

Table 7-1	SEARs relevant to the proposal features and operation	7-1
Table 7-2	Proposed new bridges	7-13
Table 7-3	Summary of public road crossings	7-17
Table 7-4	Summary of private road crossings	7-17
Table 7-5	Land use and land area required for the proposal	7-21

Chapter 8

Table 8-1	Track formation material quantities available	8-4
Table 8-2	Estimated additional material requirements for the proposal	8-4
Table 8-3	Proposed construction activities	8-7
Table 8-4	Proposed site compounds	8-9
Table 8-5	Indicative sequencing of the proposal	8-17
Table 8-6	Indicative construction plant and equipment	8-22

Table 8-7	Proposed access and egress links	8-26
Table 8-8	Indicative vehicle types and movements	8-32
Table 8-9	Indicative impacts to utilities from construction of the proposal	8-33

Chapter 9

Table 9-1	SEARs for land use and property	9-1
Table 9-2	Land use in Moree Plains LGA	9-3
Table 9-3	Major crops grown in Moree LGA	9-21
Table 9-4	Livestock numbers in Moree LGA	9-21
Table 9-5	Temporary property impacts	9-40
Table 9-6	Permanent property acquisitions	9-42
Table 9-7	Summary of mitigation measures	9-44

Chapter 10

Table 10-1	SEARs requirements relevant to biodiversity	10-1
Table 10-2	PCTs within the subject land	10-8
Table 10-3	Current vegetation integrity scores for each vegetation zone within the subject land	10-14
Table 10-4	Candidate species credit species returned for this proposal	10-15
Table 10-5	Candidate species credit species returned for this proposal	10-17
Table 10-6	Potential direct impacts of the proposal to biodiversity	10-19
Table 10-7	Potential indirect impacts of the proposal to biodiversity	10-19
Table 10-8	Relevant Key Threatening Processes and requirements under the legislation	10-21
Table 10-9	Ecosystem credits required	10-26
Table 10-10	Species credits required	10-27
Table 10-11	Biodiversity—summary of mitigation measures	10-29

Chapter 11

Table 11-1	Secretary's Environmental Assessment Requirements relevant to traffic and transport	11-1
Table 11-2	Roads within the study area	11-6
Table 11-3	Existing performance of Gwydir Highway/Moree bypass intersection	11-8
Table 11-4	Key intersections located near the proposal site	11-8
Table 11-5	Likely vehicle movements during construction stage	11-14
Table 11-6	Level crossing changes for the proposal	11-15
Table 11-7	Alice Street delays per train	11-19
Table 11-8	Performance of Gwydir Highway/Moree bypass intersection (with proposal) based on 60 km/h train speeds	11-20
Table 11-9	Summary of mitigation measures	11-21

Chapter 12

Table 12-1	Secretary's Environmental Assessment Requirements for hydrology and flooding	12-1
Table 12-2	1% AEP 48-hour storm peak flows for main river and local catchments in the Moree and Environs flood model	12-7
Table 12-3	Hydrological design events	12-8
Table 12-4	Flood impact criteria	12-12
Table 12-5	Summary of afflux for general land uses (excluding buildings and roads)	12-21
Table 12-6	Summary of impacts at residential receivers (where flood levels increase is greater than 10 mm)	12-26
Table 12-7	Summary of impacts at other sensitive receivers	12-27
Table 12-8	Summary of impacts along the Newell Highway	12-28
Table 12-9	Flood hazard categorisation assessment for the Newell Highway	12-28
Table 12-10	Summary of impacts along the Carnarvon Highway	12-30
Table 12-11	Summary of impacts along Gwydirfield Road	12-30
Table 12-12	Summary of impacts along Back Pally Road	12-31
Table 12-13	Selected locations for 1% AEP velocity impacts on floodplain near Skinners Creek	12-33
Table 12-14	Summary of mitigation measures	12-43

Chapter 13

Table 13-1	Secretary's Environmental Assessment Requirements for surface water	13-1
Table 13-2	Key water quality objectives	13-5
Table 13-3	Construction activities and risks without mitigation	13-11
Table 13-4	Operational activities and risks without mitigation	13-13
Table 13-5	Post development mean annual pollutant load reduction	13-13
Table 13-6	Mitigation measures for construction activities that have potential to impact water quality	13-16

Chapter 14

Table 14-1	SEARs for land use and property	14-1
Table 14-2	Observed groundwater levels from GW030456	14-9
Table 14-3	Proposal phases	14-16
Table 14-4	Groundwater risk summary	14-17
Table 14-5	Groundwater risk summary	14-17
Table 14-6	Mitigation measures	14-19

Chapter 15

Table 15-1	SEARs—Cultural Heritage	15-1
------------	-------------------------	------

Table 15-2	Newly identified Aboriginal sites within the construction impact zone	15-9
Table 15-3	Areas of Aboriginal archaeological potential within the construction impact zone	15-10
Table 15-4	Identified Aboriginal cultural values	15-12
Table 15-5	Scientific significance assessment	15-13
Table 15-6	Heritage items within the proposal site and visual assessment area	15-15
Table 15-7	Potential unlisted heritage items	15-16
Table 15-8	Non-Aboriginal archaeological potential and assessment of significance	15-18
Table 15-9	Proposed impact to Aboriginal sites and areas of PAD	15-19
Table 15-10	Summary of built heritage impact assessment	15-20
Table 15-11	Potential archaeological remains which would meet the threshold for local significance	15-21
Table 15-12	Mitigation measures	15-23

Chapter 16

Table 16-1	SEARs requirements relevant to noise and vibration	16-1
Table 16-2	Assessment guidelines	16-6
Table 16-3	Noise management levels at residential receivers	16-9
Table 16-4	Noise management levels for non-residential sensitive receivers	16-9
Table 16-5	Road traffic noise criteria for receivers on existing roads affected by additional traffic from land use developments	16-9
Table 16-6	Rail airborne noise trigger levels for residential land uses	16-10
Table 16-7	Rail airborne noise trigger levels for sensitive land uses other than residential	16-10
Table 16-8	Groundborne rail noise trigger levels for residential and sensitive land uses	16-11
Table 16-9	Summary of unattended noise monitoring results	16-12
Table 16-10	Non-residential noise sensitive receivers	16-13
Table 16-11	Construction scenarios and locations	16-14
Table 16-12	Predicted noise level assessment	16-16
Table 16-13	Maximum noise level assessment (sleep disturbance)	16-16
Table 16-14	Number of receivers exceeding standard hours noise management levels by magnitude	16-17
Table 16-15	Number of receivers exceeding OOHW period 1 noise management levels by magnitude	16-17
Table 16-16	Number of receivers exceeding OOHW period 2 noise management levels by magnitude	16-18
Table 16-17	Predicted noise level assessment—non-residential sensitive receivers	16-18
Table 16-18	Background traffic volumes	16-20

Table 16-19	Receivers within minimum working distances	16-20
Table 16-20	Noise sensitive receivers predicted to exceed the rail airborne noise trigger levels—no mitigation	16-22
Table 16-21	Construction noise and vibration management framework additional mitigation measures	16-26
Table 16-22	Implementation of construction noise and vibration management framework additional noise management measures	16-27
Table 16-23	Implementation of construction noise and vibration management framework additional vibration management measures	16-27
Table 16-24	Summary of operational and construction noise and vibration mitigation measures	16-28

Chapter 17

Table 17-1	Secretary's Environmental Assessment Requirements for social impacts for the proposal	17-1
Table 17-2	Mitigation measures and management	17-18

Chapter 18

Table 18-1	SEARs requirements for—Economics	18-1
Table 18-2	Summary of labour force characteristics, March Quarter 2020	18-10
Table 18-3	Youth labour force, 2016	18-10
Table 18-4	Results of the economic benefits assessment, present value terms (\$2019)	18-16
Table 18-5	Economic appraisal results for Inland Rail (\$2015)	18-16
Table 18-6	Summary of the direct and indirect economic impacts of the proposal	18-17
Table 18-7	Social Impact Management sub-plans	18-23
Table 18-8	Summary of proposed management and mitigation measures for agricultural impacts	18-24

Chapter 19

Table 19-1	Secretary's Environmental Assessment Requirements—Visual amenity	19-1
Table 19-2	Defining magnitude of change	19-3
Table 19-3	Defining landscape and visual sensitivity	19-3
Table 19-4	Impact significance rating matrix	19-4
Table 19-5	Landscape character zones	19-5
Table 19-6	Key public viewpoints	19-10
Table 19-7	Key sensitive receiver viewpoints	19-10
Table 19-8	Landscape character impact	19-19
Table 19-9	Public viewpoint impact	19-20
Table 19-10	Visual impact assessment	19-26
Table 19-11	Specific mitigation measures at public viewpoints	19-29

Table 19-12	Specific mitigations for moderately impacted sensitive receivers	19-30
Table 19-13	Summary of mitigation measures	19-30

Chapter 20

Table 20-1	Secretary's Environmental Assessment Requirements for soils and contamination	20-1
Table 20-2	Soil landscape types for creek lines within the study area	20-3
Table 20-3	Summary of subsurface conditions identified in the GHD geotechnical assessment (GHD, 2017)	20-6
Table 20-4	Typical soil and rock materials encountered within N2NS test pits identified in the IRDJV geotechnical investigations (2018)	20-6
Table 20-5	Summary of soil and contamination mitigation measures	20-16

Chapter 21

Table 21-1	Secretary's Environmental Assessment Requirements for Waste	21-1
Table 21-2	ARTC waste-related Inland Rail commitments	21-3
Table 21-3	Construction waste classification and quantities	21-5
Table 21-4	Spoil generation and balance summary	21-7
Table 21-5	Local waste facilities	21-7
Table 21-6	Operational waste classification and quantities	21-10
Table 21-7	Waste management hierarchy	21-11
Table 21-8	Colour-coding scheme for waste segregation	21-12
Table 21-9	Construction waste management measures	21-12
Table 21-10	Operational waste management measures	21-14
Table 21-11	Waste mitigation and management measures	21-15

Chapter 22

Table 22-1	Secretary's Environmental Assessment Requirements for climate change	22-1
Table 22-2	Summary of legislation, policies, strategies or guidelines	22-2
Table 22-3	Primary and secondary climate effects	22-5
Table 22-4	Detailed climate change projections	22-6
Table 22-5	Climate change risk to proposal construction (2030) prior to mitigation	22-7
Table 22-6	Climate change risk to proposal operation (2090) prior to mitigation	22-7
Table 22-7	Adaptation options associated with the N2NS Phase 2 Climate Change Risk Assessment	22-10

Table 22-8	High-rated risk to proposal construction (2030) following application of adaptation measures	22-12
Table 22-9	High-rated risks to proposal operation (2090) following application of adaptation measures	22-12
Table 22-10	Summary of mitigation measures	22-12

Chapter 23

Table 23-1:	Secretary's Environmental Assessment Requirements for sustainability	23-1
Table 23-2:	Inland Rail sustainability commitments and the application of these on the proposal	23-1
Table 23-3:	Legislative, policy and guideline context	23-3
Table 23-4	IS Rating Scheme framework	23-5
Table 23-5:	Infrastructure Sustainability rating levels	23-6
Table 23-6:	Sustainability in design measures implemented during the Reference Design phase	23-9
Table 23-7	Sustainability opportunities that may be implemented during the future phases of the proposal	23-13
Table 23-8	Summary of mitigation measures	23-14

Chapter 24

Table 24-1	SEARs for land use and property	24-1
Table 24-2	Key pollutants of interest	24-3
Table 24-3	Adopted air quality assessment criteria	24-4
Table 24-4	Particulate matter concentrations measured at Narrabri Airport—representative of background levels for the proposal	24-12
Table 24-5	Summary of estimated construction phase greenhouse gas emissions for N2NS Phase 2	24-17
Table 24-6	Summary of estimated operational phase greenhouse gas emissions for N2NS Phase 2	24-19
Table 24-7	Summary of mitigation measures	24-20

Chapter 25

Table 25-1	Dangerous goods volumes and RH SEPP thresholds	25-5
Table 25-2	Mitigation measures	25-10

Chapter 26

Table 26-1	Secretary's Environmental Assessment Requirements for cumulative impacts	26-1
Table 26-2	Assessment matrix	26-3
Table 26-3	Cumulative risk rating factors	26-3

Table 26-4	Projects considered for the cumulative assessment	26-5
Table 26-5	Land use and property	26-14
Table 26-6	Land use impact significance	26-14
Table 26-7	Biodiversity	26-15
Table 26-8	Biodiversity impact significance	26-16
Table 26-9	Traffic and transport	26-17
Table 26-10	Traffic and transport impact significance	26-17
Table 26-11	Hydrology and flooding	26-19
Table 26-12	Hydrology and flooding impact significance	26-19
Table 26-13	Water quality	26-20
Table 26-14	Water quality impact significance	26-20
Table 26-15	Groundwater impact significance	26-20
Table 26-16	Groundwater impact significance	26-21
Table 26-17	Cultural heritage	26-22
Table 26-18	Heritage impact significance	26-22
Table 26-19	Noise and vibration	26-22
Table 26-20	Noise and vibration impact significance	26-23
Table 26-21	Social impact	26-23
Table 26-22	Social impact significance	26-23
Table 26-23	Economic impact	26-24
Table 26-24	Economic impact significance	26-24
Table 26-25	Landscape and visual	26-25
Table 26-26	Landscape and Visual impact significance	26-25
Table 26-27	Soils and contamination	26-26
Table 26-28	Soil and contamination impact significance	26-26
Table 26-29	Waste management	26-26
Table 26-30	Waste management impact significance	26-26
Table 26-31	Air quality	26-27
Table 26-32	Air quality impact significance	26-28
Table 26-33	Health and safety	26-28
Table 26-34	Health and safety impact significance	26-28
Table 26-35	Summary of results	26-28

Chapter 27

Table 27-1	Secretary's Environmental Assessment Requirements for environmental management and mitigation	27-1
Table 27-2	Proposal uncertainties	27-3
Table 27-3	Compilation of environmental performance outcomes	27-6
Table 27-4	Summary of key potential impacts	27-10

Chapter 28

Table 28-1	Secretary's Environmental Assessment Requirements for the synthesis	28-1
------------	---	------

Figures

Chapter 1

Figure 1-1	Location of the proposal	1-4
Figure 1-2	Project overview	1-5

Chapter 4

Figure 4-1	Landowner consultation	4-12
------------	------------------------	------

Chapter 5

Figure 5-1	Inland Rail alignment	5-2
------------	-----------------------	-----

Chapter 6

Figure 6-1	Stages and development of the proposal	6-8
Figure 6-2	Moree Bypass and Camurra hairpin options	6-11

Chapter 7

Figure 7-1	Key features of the proposal	7-3
Figure 7-2	Representation of the existing rail corridor in proximity to the Newell Highway	7-11
Figure 7-3	Representation of a typical new track alignment on embankment	7-12
Figure 7-4	Artist impression of the crossing of the Mehi and Gwydir Rivers	7-13
Figure 7-5	Representation of the vertical arrangement of culvert design on the Gwydir Mehi floodplain	7-14
Figure 7-6	Typical active level crossings with flashing lights and boom gate (RX5)	7-15
Figure 7-7	Typical passive level crossings with static warning signs (RX2)	7-16
Figure 7-8	Typical fauna fencing arrangement	7-20
Figure 7-9	Typical fence arrangement over culvert or fauna crossing	7-20

Chapter 8

Figure 8-1	Proposal construction activities and site establishments	8-9
Figure 8-2	Indicative construction program	8-19
Figure 8-3	Indicative location of Moree Hospital	8-25
Figure 8-4	Proposed access and egress points and haul routes for the proposal	8-27

Chapter 9

Figure 9-1	Land use zones	9-5
Figure 9-2	Specific land uses	9-13
Figure 9-3	Land and soil capabilities	9-23
Figure 9-4	Property impacts of the proposal—permanent acquisition and temporary occupation	9-32

Chapter 10

Figure 10-1	Development footprint overview and land categorisation	10-7
Figure 10-2	Plant Community Types and Threatened Ecological Communities within the development footprint	10-9

Chapter 11

Figure 11-1	Road network within the study area	11-5
Figure 11-2	Level crossing locations	11-9
Figure 11-3	North-western NSW train and coach services	11-10

Chapter 12

Figure 12-1	Surface water features and historic flooding locations within the proposal	12-16
Figure 12-2	Aerial photo showing flooding around Gwydirfield Road level crossing during February 2012 flood event (SIX Maps, 2021)	12-18
Figure 12-3	Peak flood afflux—proposed design scenario event (5% AEP)	12-23
Figure 12-4	Peak flood afflux—proposed design scenario event (1% AEP)	12-24
Figure 12-5	Example of rock apron for culvert scour protection extending beyond the rail corridor	12-32
Figure 12-6	Design case velocities in the vicinity of the bridge and culverts at Skinners Creek	12-33
Figure 12-7	Visualisation of typical floodplain culvert bank showing variable culvert floor levels	12-34
Figure 12-8	Excerpt from 10% AEP afflux map showing flow path diversion in the Camurra hairpin area	12-35
Figure 12-9	Effect of initial flood model testing of mitigation measures to remove 1% AEP afflux impact on Moree	12-42

Chapter 13

Figure 13-1	Local waterways within the proposal	13-6
Figure 13-2	Monthly average rainfall at Moree Aero station F	13-7
Figure 13-3	Location of water sampling sites	13-9

Chapter 14

Figure 14-1	Groundwater study area	14-5
Figure 14-2	Registered groundwater bores within the study area	14-10
Figure 14-3	Groundwater levels from monitoring bore GW030456	14-11
Figure 14-4	Groundwater dependent ecosystems within the study area	14-13
Figure 14-5	Lower Gwydir Alluvium groundwater budget 2006/2007 to 2015/2016	14-14

Chapter 15

Figure 15-1	Extensive AHIMS search results	15-8
Figure 15-2	Aboriginal archaeological results	15-11
Figure 15-3	Heritage items	15-17
Figure 15-4	Significant non-Aboriginal archaeological potential	15-22

Chapter 16

Figure 16-1	Study area, noise monitoring locations and NCAs	16-4
Figure 16-2	Standard and out of hours works periods	16-8

Chapter 17

Figure 17-1	Study area boundaries	17-5
-------------	-----------------------	------

Chapter 18

Figure 18.1	Proposal impact assessment area and regional economic catchment	18-5
Figure 18.2	Employment by industry, impact assessment area, 2016	18-8
Figure 18.3	Local workers occupation, impact assessment area, 2016	18-9
Figure 18.4	Industry by employment, impact assessment area, 2016	18-11
Figure 18.5	Cost–benefit analysis approach and the economic benefits assessment	18-15
Figure 18.6	Macroeconomic results: construction phase, slack labour markets	18-18
Figure 18.7	Macroeconomic results: construction phase, tight labour markets	18-18
Figure 18.8	Direct and indirect employment results, construction phase	18-19
Figure 18.9	Industry employment results: construction phase, slack labour markets	18-20
Figure 18.10	Industry employment results: construction phase, tight labour markets	18-21

Chapter 19

Figure 19-1	Landscape character zones and public viewpoints	19-6
Figure 19-2	Key sensitive receivers	19-11
Figure 19-3	Viewpoint 1: Existing view from Oak Street	19-14
Figure 19-4	Viewpoint 2: Existing view of Mehi River Bridge from Gwydirfield Road (south)	19-14
Figure 19-5	Viewpoint 3: Existing view of Gwydirfield Road (north) crossing	19-15
Figure 19-6	Viewpoint 4: Existing view east from Moree TAFE entrance	19-15
Figure 19-7	Viewpoint 5: Existing view from Newell Highway at Ch 672.500	19-16
Figure 19-8	Viewpoint 6: Existing view of Gwydir River underbridge from Newell Highway	19-16
Figure 19-9	Viewpoint 7: Existing view south from Back Pally Road (Gwydir River underbridge in the background)	19-17
Figure 19-10	Viewpoint 2: Mehi River and Gwydirfield Road south crossing—before and after	19-22
Figure 19-11	Viewpoint 3: Gwydirfield Road north crossing—before and after	19-23
Figure 19-12	Viewpoint 5: View from Newell Highway at chainage 672.500—before and after	19-24
Figure 19-13	Viewpoint 7: New alignment at Gwydir River bridge and Back Pally Road crossing—before and after	19-25

Chapter 20

Figure 20-1	Soil landscape profile	20-5
Figure 20-2	ARTC contaminated land register	20-10
Figure 20-3	ISCA 1.2 sustainability hierarchy for remediation	20-15

Chapter 21

Figure 21-1	Landfill locations	21-9
-------------	--------------------	------

Chapter 23

Figure 23-1	Infrastructure Sustainability Council of Australia IS Rating Scheme process	23-6
Figure 23-2:	Applicability of Infrastructure Sustainability Version 1.2 rating to different proposal phases	23-8

Chapter 24

Figure 24-1	Location of sensitive receivers	24-5
Figure 24-2	Meteorological monitoring location	24-9
Figure 24-3	Annual variation in temperature and rainfall based on historic observations at Moree Aero (1995–2020)	24-10
Figure 24-4	Annual wind rose based on historic observations at Moree Aero (2015–2020)	24-10
Figure 24-5	Annual variation in wind speed based on historic observations at Moree Aero (1995–2020)	24-11
Figure 24-6	Distribution of exceedances for the PM ₁₀ 24-hour averaging period recorded at Narrabri Airport	24-12
Figure 24-7	Overview of scopes and emissions (WRI, 2004)	24-16
Figure 24-8	Estimated construction stage greenhouse gas emissions (tCO ₂ -e) for N2NS Phase 2	24-18
Figure 24-9	Estimated operational stage greenhouse gas emissions (tCO ₂ -e) for N2NS Phase 2	24-19
Figure 24-10	Graphical representation of distribution of estimated whole-of-life greenhouse gas emissions (tCO ₂ -e)	24-20

Chapter 26

Figure 26-1	Projects assessed for cumulative assessment with the proposal	26-12
-------------	---	-------