Maitland to Minimbah Third Track
Environmental Assessment
Volume 1
May 2010









GHD

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Contents

Glossary of Terms i

List of Abbreviations v

Executive Summary I

Part A – Introduction and Context

1. Introduction 1

1.1 Overview 1
1.2 Key Features of the Project 1
1.3 Location and Setting of the Project 2
1.4 Purpose and Benefits of the Project 4
1.5 The Proponent 4
1.6 Hunter 8 Alliance 4
1.7 Guide to Approval Requirements and Environmental Assessment 4

2. Planning Framework and Statutory Requirements 8

2.1 Introduction 8
2.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 8
2.3 NSW Environmental Planning and Assessment Act 1979 10
2.4 Environmental Planning Instruments 12
2.5 Other NSW Legislation 16
2.6 The Application Process 19
2.7 Summary of Approval Requirements 22
2.8 Conclusion 23

3. Location and Setting 24

3.1 Regional Setting 24
3.2 Project Location 25
3.3 Local Setting 26

4. Consultation 33
4.1 Introduction 33
4.2 Community Consultation 34
4.3 Statutory Consultation 41

Part B – The Project

5. Strategic and Project Justification 49
5.1 Strategic Justification 49
5.2 Objectives of the Project 53
5.3 Alternatives to the Project 54
5.4 Benefits of the Project 55

6. Alternatives Considered 56
6.1 Framework for Option Selection 56
6.2 Options 59

7. Description of the Project 65
7.1 Introduction 65
7.2 Project Location 66
7.3 Rail Corridor and Property Acquisition 67
7.4 General Terminology 73
7.5 Project Outline 75
7.6 Enabling Works 76
7.7 Summary of Major Construction Activities 82
7.8 Construction Impact Zone 83
7.9 Earthworks – Design 84
7.10 Earthworks – Construction 88
7.11 Track – Design 100
7.12 Track – Construction 105
7.13 Drainage – Design 107
7.14 Drainage – Construction 112
7.15 Bridges – Design 114
7.16 Bridges – Construction 126
7.17 Station Modifications – Design 130
7.18 Station Modifications – Construction 134

7.19 Other Construction Activities 137
7.20 Construction Programming 144
7.21 Potential Additional Construction Areas 147
7.22 Operation Activities 147

Part C – Environmental Assessment

8. Environmental Risk Analysis 153
8.1 Assessment Approach 153
8.2 Methodology 156
8.3 Key Environmental Impacts 157
8.4 Conclusion 171

9. Terrestrial Flora 172
9.1 Assessment Approach 172
9.2 Existing Environment 173
9.3 Impact Assessment 187
9.4 Mitigation Measures 188

10. Terrestrial Fauna 190
10.1 Assessment Approach 190
10.2 Existing Environment 192
10.3 Impact Assessment 206
10.4 Mitigation Measures 208

11. Aquatic Ecology 211
11.1 Assessment Approach 211
11.2 Existing Environment 212
11.3 Impact Assessment 213
11.4 Mitigation Measures 215

12. Aboriginal Heritage 216
12.1 Assessment Approach 216
12.2 Existing Environment 218
12.3 Impact Assessment 220
12.4 Mitigation Measures 221

13. Non-Indigenous Heritage 224
13.1 Assessment Approach 224
13.2 Existing Environment 226

13.3 Impact Assessment 234
13.4 Mitigation Measures 238

14. Land Use 240

14.1 Assessment Approach 240
14.2 Existing Environment 242
14.3 Impact Assessment 258
14.4 Mitigation Measures 261

15. Traffic and Access 262

15.1 Assessment Approach 262
15.2 Existing Road Network Condition 263
15.3 Construction Traffic 272
15.4 Potential Impacts 274
15.5 Mitigation Measures 279

16. Air Quality 285

16.1 Assessment Approach 285
16.2 Existing Environment 286
16.3 Impact Assessment 287
16.4 Mitigation Measures 296

17. Noise and Vibration 298

17.1 Assessment Approach 298
17.2 Noise Monitoring 299
17.3 Noise and Vibration Goals 300
17.4 Existing Environment 305
17.5 Impact Assessment 324
17.6 Mitigation Measures 352

18. Surface Water 364

18.1 Assessment Approach 364
18.2 Existing Environment 367
18.3 Impact Assessment 392
18.4 Mitigation Measures 395

19. Other Environmental Issues 398

19.1 Topography, Soils and Geology 398
19.2 Contamination 409

19.3 Groundwater 413
19.4 Energy and Greenhouse Gas Emissions 419
19.5 Social Impact Assessment 421
19.6 Visual 426
19.7 Waste 432
19.8 Hazards 434

20. Cumulative Impacts 436

20.1 Assessment Approach 436
20.2 Potential Impacts 436

Part D – Environmental Management and Conclusion

21. Environmental Management 445

21.1 Draft Statement of Commitments 445
21.2 Construction Environmental Management Plan 472

22. Project Justification and Conclusion 480

22.1 Achieving Objectives 480
22.2 Consequences of Not Proceeding 480
22.3 Project Justification Having Regard to the Objects of the *Environmental Planning and Assessment Act 1979* 480
22.4 Principles of Ecologically Sustainable Development 483
22.5 Conclusion 485

References 487

Table Index

Table 2-1 Summary of Other Relevant State Legislation 16
Table 2-2 Director-General's Environmental Assessment Requirements 20
Table 2-3 Summary of Approval Requirements 22
Table 4-1 Director General's Environmental Assessment Requirements – Consultation 33
Table 4-2 Summary of Community Contacts 38
Table 4-3 Key Landowner and Community Issues and Comments 38
Table 4-4 Key Government Agency Environmental Assessment Requirements 41

Table 4-5	Key Government Agency and Infrastructure Provider Issues	43
Table 5-1	Director-General's Environmental Assessment Requirements – Strategic and Project Justification	49
Table 6-1	Director-General's Environmental Assessment Requirements – Project Alternatives	56
Table 6-2	Underpinning Principles	56
Table 6-3	Project Challenges	58
Table 6-4	Track Centres - Summary of Options	60
Table 6-5	Track Centre Option – Earthworks and Property Impacts	61
Table 7-1	Director-General's Environmental Assessment Requirements	65
Table 7-2	General Terminology	73
Table 7-3	Major Project Elements	75
Table 7-4	Major Construction Activities	82
Table 7-5	Summary of Largest Cut Configurations	86
Table 7-6	Summary of Largest Fill Configurations	86
Table 7-7	Excavation Methodology	88
Table 7-8	Potential Blasting Locations	89
Table 7-9	Fill and Track Formation Methodology	97
Table 7-10	General Material Movements	98
Table 7-11	Spoil Areas – Location	99
Table 7-12	Track Design Data	102
Table 7-13	Track Installation Construction Materials and Delivery Details	105
Table 7-14	Cross Drainage Structures	109
Table 7-15	Box Culverts Construction Materials and Delivery Details	113
Table 7-16	Reinforced Concrete Pipes Construction Materials and Delivery Details	114
Table 7-17	Proposed Bridge Works	115
Table 7-18	Rail Underbridges Construction Materials and Delivery Details	127
Table 7-19	Rail Overbridge Construction Materials and Delivery Details	129
Table 7-20	Proposed Lochinvar Station Modifications	131
Table 7-21	Proposed Greta Station Modifications	131
Table 7-22	Proposed Branxton Station Modifications	133

Table 7-23	Lochinvar Station Construction Materials and Delivery Details	134
Table 7-24	Branxton Station Construction Materials and Delivery Details	135
Table 7-25	Greta Station Construction Materials and Delivery Details	136
Table 7-26	Primary Construction Compound Locations	138
Table 7-27	Secondary Construction Compound Locations	139
Table 7-28	Site Access Locations	140
Table 7-29	Construction Plant and Equipment	142
Table 7-30	Indicative Construction Program	144
Table 7-31	Average Daily Rail Movements, 16 August 2009 – 15 September 2009	148
Table 7-32	Average Daily Existing and Future Coal / Freight Train Movements	148
Table 7-33	Existing and Future Coal/Freight Train Distribution	149
Table 8-1	Director-General's Environmental Assessment Requirements – Risk Assessment	153
Table 8-2	Environmental Risk Analysis Risk Level Definitions	157
Table 8-3	Environmental Risk Analysis	159
Table 9-1	Director-General's Environmental Assessment Requirements – Ecology	172
Table 9-2	Vegetation Communities	173
Table 10-1	Director-General's Environmental Assessment Requirements – Ecology	190
Table 10-2	Survey Sites for Targeted Fauna Surveys	191
Table 10-3	Threatened and Migratory Species Recorded During Field Surveys	193
Table 10-4	Hollow-Dependent Threatened Mammal Species	207
Table 11-1	Director-General's Environmental Assessment Requirements – Ecology	211
Table 12-1	Director-General's Environmental Assessment Requirements – Aboriginal Heritage	216
Table 13-1	Director-General's Environmental Assessment Requirements – Non-Indigenous Heritage	224
Table 13-2	NSW Heritage Assessment Criteria	225
Table 13-3	Statement of Heritage Significance	228
Table 13-4	Identified Heritage Items and Heritage Significance	229
Table 13-5	Potential Heritage Impact	235

Table 14-1	Director-General's Environmental Assessment Requirements – Land Use	240
Table 14-2	Summary of Proposed Property Acquisition	258
Table 14-3	Details of Dams Impacted by the Project	259
Table 15-1	Director-General's Environmental Assessment Requirements – Traffic and Access	262
Table 15-2	Streets Within the Study Area	264
Table 15-3	Existing Road Network Performance	265
Table 15-4	Key Intersection Performance Results	266
Table 15-5	Daily Train and Passenger Movements at Railway Stations	272
Table 15-6	Peak Hour Vehicle Trips at Construction Compounds	273
Table 15-7	Proposed Construction Compounds	274
Table 15-8	Construction Traffic Impact on Intersection Capacity	275
Table 15-9	Proposed Intersection Treatment Measures	281
Table 16-1	Director-General's Environmental Assessment Requirements – Air Quality	285
Table 16-2	Coal Wagon Dust Emission Rates	288
Table 16-3	Locomotive Emission Rates	289
Table 16-4	Predicted Peak Incremental Carbon Monoxide Concentration (mg/m3)	292
Table 16-5	Predicted Peak Incremental Nitrogen Dioxide Concentration (µg/m3)	292
Table 16-6	Predicted Peak Incremental Sulphur Dioxide Impacts (µg/m3)	293
Table 16-7	Predicted Peak Incremental PM_{10} Impacts (µg/m3) – Locomotive Exhaust Only	293
Table 16-8	Predicted Peak Incremental PM_{10} Impacts (µg/m3) - Locomotive Exhaust and Coal Train Dust	294
Table 16-9	Predicted Peak Incremental TSP impacts (µg/m3) – Locomotive Exhaust Plus Coal Train Dust	294
Table 16-10	Predicted Peak Incremental Dust Deposition (g/m^2/month) - Locomotive Exhaust and Coal Train Dust	294
Table 17-1	Director-General's Environmental Assessment Requirements – Noise and Vibration	298
Table 17-2	Noise Monitoring Locations	299
Table 17-3	ICNG Recommended Standard Hours for Construction Work	300

Table 17-4	ICNG Construction Noise Criteria at Residential Receivers, dB(A)	301
Table 17-5	Construction Noise Goals $L_{Aeq(15min)}$	301
Table 17-6	Airborne Rail Traffic Noise Trigger Levels for Residential Land Uses	303
Table 17-7	Acceptable Vibration Dose Values for Intermittent Vibration ($m/s^{1.75}$)	304
Table 17-8	Guideline Values for Vibration Velocity to be Used When Evaluating the Effects of Short-Term Vibration on Structures	304
Table 17-9	ANZECC (1990) Blasting Limits	305
Table 17-10	Noise Catchment Areas – Up Side	305
Table 17-11	Noise Catchment Areas – Down Side	307
Table 17-12	Summary of Noise Logging Results dB(A)	320
Table 17-13	Summary of Pass-by Noise Monitoring Results dB(A)	321
Table 17-14	Vibration Monitoring Locations	323
Table 17-15	Typical Construction Equipment	324
Table 17-16	50dB(A) Impact Distance for Specific Construction Activities	327
Table 17-17	Typical Vibration Levels – Construction Equipment	328
Table 17-18	Potential Blasting Locations	329
Table 17-19	Affected Receivers per Noise Catchment Areas – Up Side	337
Table 17-20	Affected Receivers per Noise Catchment Areas – Down Side	338
Table 17-21	Additional Mitigation Measures	357
Table 17-22	AMMM – Airborne Construction Noise	357
Table 17-23	AMMM – Ground Borne Construction Vibration	358
Table 17-24	Internal Noise Goals – Residential Buildings	361
Table 17-25	Potential Architectural Treatment Options	362
Table 18-1	Director-General's Environmental Assessment Requirements – Hydrology	364
Table 18-2	Waterway Crossing Classification Descriptions	365
Table 18-3	Major Waterway Catchments	367
Table 18-4	Summary of Waterway Crossings	367
Table 18-5	Location, Type and Size of Drainage Structures	381
Table 18-6	Major Waterway Geomorphic Conditions	385
Table 18-7	Contributing Catchment Land Uses and Potential Pollutants	390

Table 18-8	Downstream Boundary Controlled	391
Table 18-9	Existing 1% AEP Flood Level	392
Table 18-10	Probable Maximum Flood	392
Table 18-11	Potential Hydrologic Change	393
Table 19-1	Director-General's Environment Assessment Requirements – Topography, Soils and Geology	398
Table 19-2	Geological Stratigraphy	400
Table 19-3	Soil Landscape Unit Descriptions	402
Table 19-4	Director-General's Environmental Assessment Requirements – Contamination	409
Table 19-5	Potential Sources of Contamination	410
Table 19-6	Director-General's Environmental Assessment Requirements – Groundwater	414
Table 19-7	Director-General's Environmental Assessment Requirements – Social Impacts	422
Table 19-8	Summary of Impacts	430
Table 19-9	Director-General's Environmental Assessment Requirements – Waste	432
Table 20-1	Potential Cumulative Impacts and Project Response	437
Table 21-1	Draft Statement of Commitments	446
Table 21-2	CEMP Outline	473
Table 21-3	Key CEMP Management Objectives and Strategies	477
Table 22-1	Objects of the Environmental Planning and Assessment Act 1979	481

Figure Index

Figure 1.1	Regional Location	3
Figure 3.1	Existing Environment	27
Figure 5.1	Existing Track Configuration - Maitland to Minimbah	50
Figure 7.1	Project Location	68
Figure 7.2	Photomontage Showing Indicative Representation of the Rail Corridor with Third Track	73
Figure 7.3	Existing Services Locations	77
Figure 7.4	Typical Construction Impact Zone Cross-section	83
Figure 7.5	Typical Cross Section - Fill	84
Figure 7.6	Typical Cross Section – Cut	84
Figure 7.7	Potential Blasting Locations	91

Figure 7.8	Typical Track Formation Composition	100
Figure 7.9	Rail Corridor Areas Terminology	101
Figure 7.10	Maitland to Minimbah Third Track Configuration (Up Main)	103
Figure 7.11	Maitland to Minimbah Third Track Configuration (Down Main)	103
Figure 7.12	Maitland to Minimbah Track Layout Diagram	104
Figure 7.13	Typical Drainage Design	107
Figure 7.14	Typical Cross Drainage Structures	109
Figure 7.15	Existing Creek Underbridge at 209.174 kilometres (left) and Proposed Underbridge at 209.174 kilometres Design Schematic (right)	110
Figure 7.16	Sawyers Creek Realignment	112
Figure 7.17	Example of Underbridge	116
Figure 7.18	Example of Overbridge	116
Figure 7.19	Typical Precast Concrete Bridge Structure	117
Figure 7.20	Existing Stony Creek Brick Arch Culverts (Left) and Existing Wollombi Road Underbridge (Right)	117
Figure 7.21	Proposed Wollombi Road/ Stony Creek Underbridge Design Schematic	118
Figure 7.22	Existing Stock Crossing Underbridge	118
Figure 7.23	Existing Old North Road Overbridge	119
Figure 7.24	Existing Allandale Road Underbridge	119
Figure 7.25	Proposed Allandale Road Underbridge Design Schematic	120
Figure 7.26	Existing Unnamed Tributary of Anvil Creek Brick Arch Culverts (chainage 207.776 kilometres)	120
Figure 7.27	Proposed Underbridge at chainage 207.776 Design Schematic	121
Figure 7.28	Existing Creek Underbridge at chainage 209.989 kilometres	121
Figure 7.29	Proposed Underbridge at chainage 209.989 kilometres Design Schematic	122
Figure 7.30	Existing Sawyers Creek Underbridge	122
Figure 7.31	Proposed Sawyers Creek Underbridge Design Schematic	123
Figure 7.32	Existing Bridge Street Overbridge	123
Figure 7.33	Proposed Modified Bridge Street Overbridge Design Schematic	124
Figure 7.34	Existing Black Creek Underbridge	124

Figure 7.35	New Black Creek Underbridge Schematic: Elevation	125
Figure 7.36	New Black Creek Underbridge Schematic: Section	125
Figure 7.37	Existing Jump Creek Underbridge	126
Figure 7.38	Proposed Jump Up Creek Underbridge 3D Schematic	126
Figure 8.1	Overview of the Environmental Assessment Risk Analysis Process	155
Figure 8.2	Relationship between Risk and Project	157
Figure 9.1	Vegetation Mapping and Threatened Flora in the Investigation Area	175
Figure 10.1	Survey Effort and Threatened Species Locations	194
Figure 13.1	Allandale Area Location Plan	233
Figure 14.1	Property Impacts and Significant Areas	244
Figure 15.1	Local Road Network	267
Figure 17.1	Noise and Vibration Monitoring Locations and Noise Catchment Areas	308
Figure 17.2	Potential Blasting Locations	332
Figure 17.3	IGANRIP Noise Exceedance Areas (2012)	340
Figure 18.1	Waterway Crossings	369
Figure 19.1	View to the North from Wollombi Road.	428
Figure 19.2	View to the West from Old North Road, Allandale.	429
Figure 19.3	Photomontage Showing Indicative Representation of Third Track (Right Hand Side).	430

Appendices

A Director General's Requirements
B Stakeholder Consultation
C Applicable and Relevant State Environmental Plannng Policies
D Environmental Risk Assessment Report
E Flora and Aquatic Ecological Assessment
F Terrestrial Fauna Impact Assessment
G Aboriginal Heritage Impact Assessment
H Non-indigenous Heritage Study
I Proposed Land Acquisition
J Traffic Study
K Noise and Vibration Impact Assessment
L Surface Water Assessment

M Groundwater Study
N Preliminary Site Contamination Investigation
O Social Impact Assessment
P Landscape and Visual Impact
Q Greenhouse Gas
R Environmental Evaluation of Coal Dust Emissions
S Design Drawings
T Detailed Project Layout

Submission of Environmental Assessment

Prepared under the Environmental Planning and Assessment Act 1979, section 75H

Environmental Assessment prepared by:	
Name	Shaun Taylor
Qualifications	Bachelor of Applied Science (Environmental Assessment and Management) (Hons)
Address	Hunter 8 Alliance GHD Tower, Level 3 24 Honeysuckle Drive NEWCASTLE NSW 2300
In respect of:	
Project to which Part 3A applies	
Applicant name	Australian Rail Track Corporation
Applicant address	PO Box 10343 Gouger Street ADELAIDE SA 5000
Land to be developed	Corridor containing and adjacent to the Main Northern Railway between Minimbah (chainage 224.200 kilometres) and Telarah (chainage 194.500) in the Singleton, Cessnock and Maitland Local Government Areas, NSW
Proposed development	Seek Project Approval to construct the Maitland to Minimbah Third Track and associated works from Minimbah to Telarah.
Environmental Assessment	An environmental assessment is attached.
Certificate	I certify that I have prepared the contents of this document and to the best of my knowledge: ◗ It is in accordance with the requirements of Part 3A. ◗ It contains all available information that is relevant to the environmental assessment of the development to which it relates. ◗ The information contained in the document is neither false nor misleading.
Signature	
Verifier	David Chubb
Signature	
Date	26 May 2010

Glossary of Terms

Acoustic	Pertaining to the sense of organs of hearing, or to the science of sound.
Ambient	Surrounding or existing.
Batters	The side slopes of cuttings or on embankments.
Biological diversity	The maintenance of a full and diverse range of plant and animal species.
Bund	An impervious embankment of earth or a brick wall, which may form part or all of the perimeter of a compound that is provided to retain liquid.
Central drainage	Longitudinal earth drains between the new and existing tracks. The central track drain would allow stormwater runoff to be collected and transferred to the outer cesses by a series of pits and pipes.
Cess drain	A surface drain that is located at formation level at the side of tracks to remove water.
Chainage	Chainage is generally the location in kilometres of the position of a railway in relation to Sydney (NSW only) based on the 0.00 kilometres being located at the end of Central No. 1 Platform.
Coal path	A train path that is dedicated to the movement of coal haulage.
Concept design	Initial functional layout of a concept, such as for the proposed duplication, to provide a level of understanding to later establish detailed design parameters.
Consent	Approval to undertake a development received from the consent authority.
Construction Environmental Management Plan	A document setting out the management, control and monitoring measures to be implemented during construction of a development, to avoid or minimise the potential environmental impacts identified during an environmental impact assessment process.
Construction impact zone	The area which would be affected by construction works as part of the Project. The construction impact zone incorporates the Project's extent of works, proposed site access, construction compound locations and spoil locations.
Cost-benefit analysis	An economic assessment designed to identify and quantify the benefits and costs associated with a project.
Cross drainage	Cross drainage structures allow catchment runoff from outside the rail corridor to flow through the rail corridor.
Crossover	Railway infrastructure which provides a train the ability to cross between two adjacent tracks.
Culvert	A structure that totally encloses a drain under a road or railway.
Cumulative impact	The sum on the environment resulting from the successive effects of several different impacts.
Curtilage	The area immediately adjacent to a dwelling, house, building or object which forms part of its enclosure.

Cut	An excavation for constructing below the natural ground level.
Cut and fill balance	Difference between earthwork cut and fill volumes.
Detailed design stage	The stage at which the project design is detailed on the basis of an approved concept design.
Director-General's Environmental Assessment Requirements	Requirements for an environmental assessment issued by the Director-General of the NSW Department of Planning in accordance with the Environment Planning and Assessment Act 1979.
Dispersivity	Potential for soil to break down into fine particles in water.
Down direction	The direction a train travels when proceeding away from Sydney.
Down Main	In a situation with more than one rail track in the rail corridor, the Down Main is the primary (main) rail line that trains usually traverse when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney.
Down side	In a situation with more than one rail track in the rail corridor, the Down side is the side of the track on which trains travel when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney.
Duplication	Construction of an additional track adjacent to an existing single track.
Earthworks	Re-shaping of the natural ground level.
Embankment	A structure constructed from fill that raises the ground level above existing ground levels.
Emission	The release of material into the surroundings (for example, gas, noise, water).
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle.
Facing crossover	A crossover that allows a train to continue in a forward direction by travelling through the curved leg of the turnout.
Fauna	The animals of a given region or period, taken collectively.
Flora	Plants of a particular region that make up the vegetation of a site.
Fill	Earth used to construct an embankment.
Geotechnical	A discipline of engineering associated with studying the ground (subsurface) condition and its suitability for the proposed work.
Gradient	The degree of ascent or descent with a uniform slope.
Greenhouse gases	Gases that accumulate within the earth's atmosphere (eg primarily carbon dioxide and methane) and contribute to global climatic change / global warming (ie the 'greenhouse effect').
Groundwater	Subsurface water stored in pores of soil or rocks.

Headways	The headway is the closest spacing between the front of the two following trains, so that the second train can safely maintain the same speed as the first.
Hydrology	The study of rainfall and surface water run-off processes.
Hunter 8 Alliance	Hunter 8 Alliance, which has been formed to deliver a new third track and ancillary infrastructure between Maitland and Minimbah.
Intergenerational equity	That the present generation should ensure that the healthy diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
Investigation area	The investigation area is the area assessed throughout the Environmental Assessment and comprises the construction impact zone and additional areas as shown in Figure 7.1.
Key threatening process	A process specified in Schedule 3 of the Threatened Species Conservation Act 1995 that adversely affects threatened species, populations or ecological communities, or could cause those that are not threatened to become so.
Level crossing	A crossing provided at ground level across the railway corridor.
Mitigation	Reduction in severity.
Option	A concept design alternative developed for consideration.
Overbridge	A bridges where a road or pedestrian footway is situated over the railway line.
Particulates	Dust and other fine particles.
Plant	Construction machinery, vehicles or equipment needed to carry out mechanical or construction activities.
Precautionary principle	If there are threats of serious or irreversible damage, lack of full scientific uncertainty should not be used as a reason for postponing measures to prevent environmental damage.
Proponent	Australian Rail Track Corporation (ARTC).
Rail corridor	The area of land dedicated to the ARTC between Maitland and Minimbah.
Rail formation	The sub-grade or earthworks beneath the ballast on which the rail track sits.
Rail track	The infrastructure on which a train travels. It includes two rails, sleepers, fastenings to secure the rails to the sleepers, and ballast around and under the sleepers.
Receiver	A noise modelling term used to describe a map reference point where noise is predicted. A sensitive receiver would be a home, work place, church, school or other place where people spend time.
Regenerated noise	Also referred to as “structure-borne” noise or “ground-borne” noise which results from ground-borne vibration, for example, from construction activities and may be transmitted into building structures, causing vibration of floor slabs and other heavy structures, and hence radiating noise into internal spaces.
Ruling grade	The steepest gradient on the railway track through a section of ascending track.

Scats	Animal droppings.
Sediment	Material of varying sizes that has been or is being moved from its site of origin by the action of wind, water or gravity.
Shadow effect	The combined safety clearance zones in front of and behind a fast passenger train. Other trains are excluded from this zone.
Site compound	Area enclosing construction machinery, materials and site offices usually adjacent to construction sites.
Slewing (slew)	Moving existing track to a new location to connect to new track or to change the existing track's horizontal geometry..
Spoil	Excess of rock and / or earth material resulting from excavation activities.
Sub-grade	A layer of rock or earth levelled and graded for a foundation underneath a road, pavement or railway.
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1, 1A and 2 of the Threatened Species Conservation Act 1995.
Toe of fill batters	The base or bottom of a fill batter or embankment.
Trailing crossover	A crossover that requires a train to travel in a reverse direction to travel through the curved leg of a turnout.
Train paths	A train path is a dedicated route between two locations, which is often scheduled.
Turnout	A rail track component that connects two railway tracks. The turnout comprises a length of straight track and a section of curved track that joins the straight track. The curved track includes a moveable section of track. The moveable section is adjusted to allow a train to travel from the curved track to the straight track.
Underbridge	A bridge where a road, pedestrian footway or waterway crossing is situated under the railway line.
Up direction	The direction a train travels when proceeding towards Sydney.
Up Main	In a situation with more than one rail track in the rail corridor, the Up Main is the primary (main) rail line that trains usually traverse when they are heading toward Sydney and is usually positioned on the left when facing towards Sydney.
Up Relief	Secondary rail line that runs parallel with the main line(s) that trains usually traverse when they are heading toward Sydney and is usually positioned on the left of the Up Main line when facing towards Sydney. The Up Relief usually provides a passing facility enabling trains to pass those traversing or stationary on the main line thus giving relief to the main line operations.
Up side	In a situation with more than one rail track in the rail corridor, the Up side is the side of the track on which trains travel when they are heading towards Sydney and is usually positioned on the left when facing towards Sydney.

List of Abbreviations

ABS	Australian Bureau of Statistics.
AEP	Annual exceedence probability.
AHD	Australian Height Datum.
AMMM	Additional Mitigation Measures Matrices.
ANZECC	Australian and New Zealand Environment Conservation Council.
ARTC	Australian Rail Track Corporation.
AS	Australian Standard.
ASS	Acid Sulfate Soils.
AUSTROADS	The association of Australian and New Zealand road transport and traffic authorities.
BS	British Standard.
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes.
CEMP	Construction Environmental Management Plan.
CL Act	NSW *Crown Lands Act* 1989.
CLM Act	NSW *Contaminated Land Management Act* 1997.
CMA	Catchment Management Authority.
CNVMP	Construction Noise and Vibration Management Plan.
CO	Carbon monoxide – a colourless, odourless, poisonous gas which reduces the oxygen carrying capacity of blood.
CO_2	Carbon dioxide.
CO_2-e	Carbon dioxide equivalent.
CSMP	Contaminated Soil Management Plan.
dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Decibels (A-weighted) – a unit of sound measurement which has its frequency characteristics modified by a filter (A-weighted) so that it more closely approximates the frequency response of the human ear.
dB(lin)	Unit used to measure linear sound pressure levels.
DEC	NSW Department of Environment and Conservation.
DECC	NSW Department of Environment and Climate Change (as of 27 July 2009 titled DECCW).

DECCW	NSW Department of Environment, Climate Change and Water (formally DECC prior to 27 July 2009).
DEH	Commonwealth Department of Environment and Heritage.
DEWHA	Commonwealth Department of Environment, Water, Heritage and the Arts.
DGRs	Director General's Requirements.
DIPNR	NSW Department of Infrastructure, Planning and Natural Resources.
DoP	NSW Department of Planning.
DPI	NSW Department of Primary Industries.
DWE	NSW Department of Water and Energy.
EEC	Endangered ecological community.
EPA	NSW Environment Protection Authority.
EP&A Act	NSW *Environmental Planning & Assessment Act* 1979.
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999.
EPI	Environmental Planning Instrument.
EPL	Environment protection licence.
ERA	Environmental Risk Assessment.
ESCP	Erosion and Sediment Control Plan.
ESD	Ecologically sustainable development.
FM Act	NSW *Fisheries Management Act* 1994.
GDE	Groundwater dependant ecosystem.
GHD	GHD Pty Ltd.
H	Horizontal.
Ha	Hectare.
HEC-RAS	A 1-dimensional depth averaged model developed by the US Army Corp of Engineers for hydraulic assessment.
HIL F	Health-Investigation Level for commercial / industrial exposure settings.
HVNCSA	Hunter Valley and North Coast Signalling Alliance.
HWC	Hunter Water Corporation.
Hz	Hertz.
I & I	Industry and Investment NSW.
ICNG	Interim Construction Noise Guidelines.
IGANRIP	*Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects.*

ILC	Indigenous Liaison Committee.
km	Kilometre.
km/h	Kilometres per hour.
LA Act	NSW *Land Acquisition (Just Terms Compensation) Act* 1991.
L_{Aeq}	The average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period.
$L_{Aeq(15min)}$	Equivalent sound pressure level: the steady sound level that, over a specified 15 minutes, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{Aeq(9hr)}$	The L_{Aeq} noise level for the period 22:00 to 7:00 hours.
$L_{Aeq(15hr)}$	The L_{Aeq} noise level for the period 7:00 to 22:00 hours.
L_{Amax}	The maximum noise maximum noise level registered during train passby with the sound level meter set to fast response.
LALC	Local Aboriginal Land Council.
LEP	Local environmental plan.
LGA	Local government area.
LHCCREMS	Lower Hunter and Central Coast Regional Environmental Management Strategy.
LHRS	Lower Hunter Regional Strategy 2006 – 2031.
LOS	Level of Service – A qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers.
LVIA	Landscape and Visual Impact Assessment.
m	Metre.
m^2	Square metre.
m^3	Cubic metre.
mm	Millimetre.
mm/s	Millimetres per second.
µm	Micrometres.
m/s	Metres per second.
mtpa	Million tonnes per annum.
NCA	Noise catchment areas.
NES	National environmental significance.

NES matters	Matters of national environmental significance, which are referred to in Part 3 Division 1 of the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999.
No.	Number.
NO	Nitrous oxide.
NPI	National Pollutant Inventory.
NPW Act	NSW *National Parks and Wildlife Act* 1974.
NPWS	NSW National Parks and Wildlife Service.
NR	Natural Resource.
NSW	New South Wales.
NV Act	NSW *Native Vegetation Act* 2003.
NVBIS	Noise, Vibration and Blasting Impact Statements.
NVIA	Noise and Vibration Impact Assessment.
NW Act	NSW *Noxious Weeds Act* 1993.
OCP	Organochlorine pesticides.
OOHW	Out-of-hours work.
OPP	Organophosphate pesticides.
PAHs	Polycyclic Aromatic Hydrocarbons.
PASS	Potential Acid Sulfate Soil.
PCB	Polychlorinated biphenyls.
PEA Act	NSW *Protection of the Environment Administration Act* 1991.
pH	A measure of the acidity or basicity of a solution.
PMF	Probable maximum flood.
PM_{10}	Particulate matter of 10 microns or smaller.
POEO Act	NSW *Protection of the Environment Operations Act* 1997.
ppm	Parts per million.
PPV	Peak particle velocity.
PRM	Probabilistic Rational Method - a standard method for peak flow estimation for small to medium sized waterway catchments.
QR	Queensland Rail.
RARC	Rapid Appraisal of Riparian Condition.
RBL	Rating background level.

REP	Regional environmental plan.
RF Act	NSW *Rural Fires Act* 1997.
RIC	Rail Infrastructure Corporation.
RTA	NSW Roads and Traffic Authority.
SEPP	State environmental planning policy.
SFMP	Spoil and Fill Management Plan.
SIA	Social Impact Assessment.
SIDRA	Traffic modelling software.
SoC	Statement of Commitments.
SPL	Sound pressure level.
SWL	Sound power level.
SWMP	Soil and Water Management Plan.
TCLP	Toxicity Characteristic Leaching Procedure.
TMP	Traffic management plan.
TPH	Total petroleum hydrocarbons.
TSC Act	NSW *Threatened Species Conservation Act* 1995.
TSP	Total suspended particulates.
V	Vertical.
VDV	Vibration dose value.
WARR Act	NSW *Waste Avoidance and Resource Recovery Act* 2001.
WM Act	NSW *Water Management Act* 2000.
XP-RAFTS	A rainfall-runoff model designed for Australian catchments that uses non-linear runoff routing to develop hydrographs from either actual or design storm events utilising Intensity-Frequency-Duration data together with storm temporal patterns.
2H:1V	Refers to the level of gradient (for two horizontal units, the slope moves one vertical unit).

Executive Summary

What is proposed?

The Hunter 8 Alliance, on behalf of the Australian Rail Track Corporation (ARTC), is proposing to construct a third track adjacent to the existing Main Northern Railway between Farley and Minimbah in the Hunter Valley, NSW. The Project would involve the construction of approximately 30 kilometres of new rail track as well as construction and / or modification of major infrastructure along the Main Northern Railway.

Major elements of the Project would include track, turnouts and junctions, major earthworks, drainage, minor structures, new bridges, bridge modifications, station modifications and widening of the rail corridor through property acquisition. A summary of the major elements of the Project is outlined in the following table.

Project Elements	
Earthworks	Major cut and fill earthworks along the route. Other minor earthworks.
Track	Approximately 30 kilometres of new track including turnouts and junctions. Relocation of turnouts from Minimbah and Branxton to Belford. Upgrade of maintenance siding turnouts at Branxton. Track reconditioning of existing Up Main at Greta and Branxton Stations and of the Branxton crossovers.
Drainage	Central and cess track drainage. Amendments to 53 culverts for cross drainage. Re-alignment of Sawyers Creek. Other drainage works around new structures.
Bridges	A new rail underbridge at Stony Creek and Wollombi Road, Farley. Closure of the stock crossing at Farley. Demolition of the existing rail overbridge at Old North Road, Allandale. A new rail underbridge at Allandale Road, Allandale. A new rail underbridge for an unnamed tributary of Anvil Creek (chainage 207.776 kilometres). Demolition and replacement of the existing rail underbridge at an unnamed tributary of Anvil Creek, Greta (chainage 209.989 kilometres). A new rail underbridge at Sawyers Creek, Greta. Modification of the existing rail overbridge at Bridge Street, Branxton. A new rail underbridge at Black Creek, Belford. A new rail underbridge at Jump Up Creek, Belford.

Project Elements	
Station Modifications	Modifications to Lochinvar Railway Station. Modifications to Greta Railway Station. Modifications to Branxton Railway Station.

A full description of the Project is included in **Chapter 7**.

Why is it needed?

The purpose of the Project is to increase rail capacity and reliability between the Hunter Valley and the Port of Newcastle. In addition to providing increased track capacity, the third track aims to improve operational performance along the route. These improved efficiencies would be created through:

- Reduced impacts on rail traffic due to track maintenance activities.
- Reduced loss of freight train paths due to shadow path effects from passenger services.
- Reduced loss of available train paths due to train breakdowns.

The need for the Project is further described in **Chapter 1**.

Location of the Project

The Project consists of the construction of a third track adjacent to the existing two lines of the Main Northern Railway between Maitland and Minimbah, within the Hunter Valley, NSW.

The Project commences in Farley approximately two kilometres west of Maitland Station at chainage (the location in kilometres of the position of a railway in relation to Sydney (NSW only) based on the 0.00 kilometres being located at the end of Central No. 1 Platform) 194.500 kilometres and continues through the local government areas of Maitland, Cessnock and Singleton for approximately 30 kilometres, concluding at Minimbah at chainage 224.200 kilometres.

The Project would pass through three existing railway stations along the Main Northern Railway at Lochinvar, Greta and Branxton.

What are the main benefits of the Project?

The Project was identified in the Prime Minister's media release in December 2008 as one of the key infrastructure projects to support the local and Australian economy. The Project would achieve this objective through:

- Creation of up to 650 full time jobs during the construction phase.
- Indirect job creation and job security.
- Facilitation of future and protection of existing coal mine industry jobs in NSW.
- Benefits to Australian export income through improved transportation of coal.

The Project would provide strategic and ongoing economic benefits to the region through the expansion in capacity of the rail freight transport system and a reduced loss of revenue for the region from delays in the freight transportation network and reduced rail maintenance costs.

The third track would also serve to reduce the impact of maintenance on the throughput of the port unloading facilities, as it would allow two tracks to remain open at all times. In doing so it delivers benefits from a "whole-of-chain" perspective that are not immediately identifiable as track capacity benefits.

The modification of stations as part of the Project would improve the accessibility and functionality of these stations.

What are the main adverse impacts of the Project?

An Environmental Risk Analysis was undertaken for the Project which provides a framework for identifying and analysing potential environmental impacts associated with the Project. The main adverse impacts that have been identified through the Environmental Risk Analysis process are:

- Impacts of noise and vibration due to construction activities.
- Air quality impacts due to construction activities.

- Local water availability for dust suppression.
- Potential disturbance of Aboriginal Heritage to the region.
- Potential disturbance to or loss of Non-Indigenous Heritage items.
- Impacts to affected properties including access, severance, business viability and property infrastructure.

Environmental Impacts and Mitigation Measures

Investigations have been undertaken during the preparation of the environmental assessment to assess potential environmental impacts. These included specialist assessments of potential environmental impacts on terrestrial flora, terrestrial fauna, aquatic ecology, Aboriginal heritage, non-indigenous heritage, traffic and access, noise and vibration, surface water, contaminated soils, groundwater, greenhouse gas emissions, social impacts, land use and visual. A summary of the key findings of the environmental assessment and proposed mitigation measures follows.

Terrestrial Flora

Eight distinct vegetation communities are present in the investigation area. These are Lower Hunter Spotted Gum Ironbark Forest, Forest Red Gum Open Forest, Swamp Oak Riparian Forest, Grey Box Spotted Gum Ironbark Forest, Freshwater Wetland, Hakea Scrub, Plantation and Cleared with Scattered Trees. Lower Hunter Spotted Gum Ironbark Forest, Forest Red Gum Open Forest, Swamp Oak Riparian Forest and Freshwater Wetland are listed as endangered ecological communities under the *Threatened Species Conservation Act* 1995. Grey Box Spotted Gum Ironbark Forest is listed as a preliminary endangered ecological community under the *Threatened Species Conservation Act* 1995.

One threatened plant, Slaty Red Gum (*Eucalyptus glaucina*), listed as a vulnerable species under the *Threatened Species Conservation Act* 1995 and *Environment Protection and Biodiversity Conservation Act* 1999 was recorded in the investigation area. One Rare or Threatened Australian Plant, Mountain Grevillea (*Grevillea montana*), was also identified within the investigation area. No other threatened terrestrial flora is considered likely to occur within the investigation area.

Vegetation clearing would remove approximately 23.3 hectares of Hunter Lowland Redgum endangered ecological community, 13.2 hectares of Lower Hunter Spotted Gum-Ironbark Forest endangered ecological community, 14.9 hectares of Swamp Oak Floodplain Forest endangered ecological community, 0.6 hectares of Freshwater Wetlands endangered ecological community, 12.7 hectares of Central Hunter Ironbark-Spotted Gum-Grey Box Forest preliminary endangered ecological community, and 2.7 hectares and 50 scattered individual Slaty Red Gum.

The management of adverse impacts arising from the Project has been addressed according to the hierarchy of avoidance; mitigation and offsetting of adverse impacts, consistent with the approach outlined in the *Part 3A Draft Guidelines for Threatened Species Assessment* (DEC and DPI 2005). A range of mitigation measures, including pre-clearance surveys, weed management and revegetation plans have been designed to minimise impacts of the Project. A Compensatory Habitat Strategy would be developed in consultation with Department of Environment, Climate Change and Water that would contribute to the long term conservation of endangered ecological communities and Slaty Red Gum by setting aside known habitat within the locality of the Project.

The Project is considered unlikely to have a significant impact on threatened species, populations, endangered ecological communities or their habitat listed under the *Threatened Species Conservation Act* 1995 and/or *Environment Protection and Biodiversity Conservation Act* 1999 provided adequate areas of offsetting are developed as part of the Compensatory Habitat Strategy.

Terrestrial Fauna

Six threatened species on the *Threatened Species Conservation Act* 1995 (squirrel glider, grey-crowned babbler, eastern freetail-bat, eastern bent-wing bat, little bent-wing bat and large-footed myotis) and four migratory species listed on the *Environment Protection and Biodiversity Conservation Act* 1999 (Latham's snipe, rainbow bee-eater, rufous fantail and wanderer butterfly) were identified in the investigation area during field surveys. Potential habitat for a further 32 threatened species on the *Threatened Species Conservation Act* 1995 and 12 threatened and / or migratory species on the *Environment Protection and Biodiversity Conservation Act* 1999 was identified within the investigation area.

Assessments under the EP&A Act and EPBC Act found that the Project would be unlikely to significantly impact on any threatened and/or migratory fauna species listed on the TSC Act and/or EPBC Act.

A range of mitigation measures were identified that would further reduce the likely level of impact on fauna species and their habitats. These include establishment of runoff control measures, development of a weed management strategy, the use of local plant species in rehabilitation areas and development of a protocol to prevent the introduction or spread of root-rot fungus.

The adoption of the recommended mitigation measures and the development of a Compensatory Habitat Strategy would see the Project meet the 'maintain' level of the 'improve or maintain' goal of a Part 3A EP&A Act impact assessment.

Aquatic Ecology

Most creeks within the investigation area have been rated to be in poor to average condition by the Rapid Appraisal of Riparian Condition assessment (Jansen *et al*. 2005), due to the narrow width of riparian vegetation, fragmented nature of native vegetation in the local area, high level of weeds in the groundcover, and lack of fauna habitat features. Several small freshwater wetlands occur within the investigation area, as well as a large freshwater wetland associated with Stony Creek near Wollombi Road, also rated as poor in the Rapid Appraisal of Riparian Condition assessment. There are numerous small and large farm dams within the investigation area, which are typically characterised by little or no native riparian vegetation.

Database searches indicate that no threatened aquatic species listed under the *Threatened Species Conservation Act* 1995, *Fisheries Management Act* 1994 or *Environment Protection and Biodiversity Conservation Act* 1999 have been previously recorded within the investigation area. Additionally, based on species distribution ranges and habitat requirements, no threatened aquatic species, populations and endangered ecological communities listed under the *Fisheries Management Act* 1994, *Threatened Species Conservation Act* 1995 or *Environment Protection and Biodiversity Conservation Act* 1999 are likely to occur in the investigation area.

With the exception of the Sawyers Creek realignment, no major trenching or instream pylons installations for any creeks are anticipated. The Project would involve clearing and / or filling small areas of freshwater wetland and riparian vegetation along the edge of the existing rail line, including small areas of Swamp Oak Riparian Forest, macrophyte beds, native reeds and sedges.

Fish passage would not be impacted as a result of the Project. The existing culverts under the railway would be extended or augmented and would be designed with consideration to Fairfull and Witheridge (2003) for fish friendly crossings, resulting in similar conditions as per the existing environment. The Project is considered unlikely to significantly alter the timing, duration or velocity of flows to or from wetlands and creeks that intersect the investigation area. Impacts on aquatic processes, species and habitat are considered unlikely.

With an exception of an area at Wollombi Road, the Project is not anticipated to impact on availability, depth, quality or flow of groundwater. As such, construction impacts on groundwater dependent ecosystems are considered unlikely. At Wollombi Road localised and temporary lowering of the groundwater would occur during construction. Operational impacts on groundwater dependent ecosystems are considered unlikely.

Aboriginal Heritage

Consultation and involvement of the Aboriginal community was undertaken as per the requirements of the Department of Environment, Climate Change and Water policy entitled *Interim Community Consultation Requirements for Applicants*. The Aboriginal Heritage Impact Assessment found that of the recorded 96 sites within the investigation area, 65 Aboriginal heritage sites would be impacted by the Project. These are 56 sites of low significance, eight sites of low to moderate significance and one site of high significance. The remaining sites were located outside of the construction impact zone.

The Assessment also concluded that there are areas of lower ground disturbance within the construction impact zone that have a moderate to high potential for subsurface deposits of artefacts to occur. However, in the majority of the construction impact zone, there is a low to very low density of artefacts and a low potential for shallow sub-surface deposits

Provisions relating to Aboriginal heritage would be included in an Aboriginal Heritage Management Plan (AAMP) for the Project, which would be a component of the Construction Environmental Management Plan. These provisions would be formulated in consultation with the registered Aboriginal stakeholders and Department of Environment, Climate Change and Water, and specify the policies and actions required to manage the potential impacts of the Project on Aboriginal heritage should Project Approval be granted. The primary elements of the AHMP include a program of salvage, curation of any collected heritage evidence in an appropriate manner, Aboriginal heritage training for construction staff, avoiding or minimising impacts to the high significance site, conducting localised hand excavation and mechanical scapes in the areas specified in the Aboriginal Heritage Impact Assessment

Non-Indigenous Heritage

The majority of non-Indigenous heritage sites are located within the existing rail corridor and consisted of various rail infrastructure items. Many items could be dated to the original construction of the Great Northern Railway circa 1860 and most of these items displayed some degree of repair, modification and/or extension carried out over subsequent years to the present day. These collective railway heritage items, with the exception of two railway station precincts, were assessed as locally significant, some of which were considered rare within the locality. Branxton Railway Station and Greta Railway Station have been subject to previous significance assessments and as a result are listed on the State Heritage Register as items significant to the State. A further two heritage sites were identified adjacent to the Project corridor, Clifton Homestead and the site of the former Allandale Wine Cellars/Penfolds Winery.

The Project route passes through the Allandale Area, which is a natural heritage site listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 and on the Register of the National Estate.

In general, the construction and / or modifications of major infrastructure along with major earthworks and the construction of new access roads would result in varying degrees of obstruction, relocation, modification, damage and / or destruction to either the whole of a heritage resource or to components of a heritage resource.

Where this is likely to occur, the resource would be archivally recorded prior to the commencement of any Project works. These works would be monitored by a suitably qualified archaeologist and an archival record would be completed for each resource.

For the State significant railway stations at Greta and Branxton, mitigation measures would include the salvage and reinstatement of a representative length of the original platform into the new platform alignments.

The materials removed during earthworks in the Allandale Area would be made available for further assessment of the site and gather important fossil specimens for scientific and educational purposes. This material would also be made available for exhibition at appropriate locations.

Land Use

The existing environment adjacent to the Project consists primarily of rural and rural residential land uses. Some residential development and limited industrial development is located in the vicinity of the Project, particularly at the eastern end of the Project.

The primary land use impact of the Project is associated with property acquisition. Property acquisition would mainly occur in a narrow strip adjacent to the existing rail corridor on both the Up and Down sides of the existing corridor. 131 parcels of land would require strip acquisition immediately adjacent to the existing rail corridor, 12 properties would be partially acquired and two properties would be completely acquired. The negotiated acquisition of the affected areas of the properties is the desired outcome. However, where negotiation with affected landowners is not successful, affected areas would be acquired through compulsory acquisition.

There are eight proposals for urban development to occur adjacent to the rail corridor that have either been adopted by the relevant local Council or are proposed developments. The Project has the potential to impact these development proposals.

The majority of these proposed developments are at an early planning stage and would take into consideration the strip of land proposed for acquisition and any likely impact of the proposed rail development, and plan accordingly. However, the Project would impact three developments for which applications have already been submitted to Council, by encroaching into the developments.

The Project's design has been undertaken with the aim of incorporating management measures into design elements so as to minimise the amount of land to be acquired. Where required, land would be acquired for the construction of the works and mutually agreed compensation made for any loss of productive agricultural land or facilities.

Detailed management measure to reduce land use impacts on individual properties and land users would be developed in consultation with the individual landowners concerned during the detailed design and property acquisition negotiations. Access requirements for the construction phase of the Project would be discussed with individual landowners prior to construction.

Traffic and Access

Traffic volumes generated by the movement of construction personnel and by materials delivery would vary depending on the construction timetable. Site compounds would be located adjacent to the rail corridor, with gated primary compounds incorporating car parking areas, administration buildings and construction equipment storage facilities.

Additional vehicles would be using public roads during the construction of a third track, adjacent to the existing Main Northern Railway, between Maitland and Minimbah. These vehicles would impact on the level of service provided with intersections of collector roads with the New England Highway. Some of these intersections are already operating unsatisfactorily and the addition of construction vehicles further decreases the level of service.

Traffic management measures to be implemented at intersections during the construction period would be discussed with NSW Roads and Traffic Authority and may include permanent or temporary traffic signals, temporary line marking to provide median storage space for staged crossings, left-in left-out only restriction for construction vehicles and reduced speed limits on the approaches to intersections where appropriate.

A Construction Traffic Management Plan would be developed and implemented to manage construction traffic.

Air Quality

The types of emissions to air during the construction phase of the Project would primarily consist of dust and exhaust emissions. It is considered that the dominant sources of dust emissions during the construction works would be during activities that cause large mechanical disturbances during their operations, such as operations of a bulldozer, grader or scraper. This has generally been the case with construction of the Minimbah Bank Third Track Project.

The primary source of air emissions during the operation phase of the Project is fugitive dust (dust derived from a mixture of diffuse sources) raised by the motion of the trains / wagons over unconsolidated surfaces and coal dust emissions from uncovered coal in wagons. A secondary source of air emissions includes train exhaust emissions from diesel locomotive engines.

A range of mitigation measures would be implemented during the construction phase, from watering of and covering exposed soils and surfaces, vegetation retention and revegetation, dust monitoring, and ongoing consultation with the local community. These would be implemented in accordance with an Air Quality Management Plan. Recommended standard mitigation measures for emissions during the operation of the Project include covering railway verges. The Pollution Studies and Reduction Program for reduction of coal dust loads from locomotive loads currently under development by ARTC (as required by its Environment Protection Licence) would include additional strategies to mitigate operational air quality impacts.

Noise and Vibration

The magnitude of off-site noise and vibration impacts associated with construction would be dependent upon a number of factors, including the intensity and location of construction activities, type of equipment used, existing local noise sources, intervening terrain and the prevailing weather conditions. In addition, construction machinery would likely move about the study area, variously altering the directivity of the noise source with respect to individual receivers. Receivers along the Project route are located at a variety of distances from the works area, including within 50 metres from the rail corridor. It is anticipated that construction noise and vibration would exceed the construction noise goals in a number of instances.

As a result, construction noise and vibration impacts need to be managed within a comprehensive Construction Noise and Vibration Management Plan for the Project. This would include recommended construction hours, standard construction noise and vibration mitigation measures, requirements for the preparation of construction noise and vibration impact statements for specific activities, management of noise and vibration exceedances, community consultation and feedback.

Operational rail noise modelling has been conducted based on the current state of the design and knowledge of operational scenarios. This modelling outlines the extent of receivers for which noise mitigation may be required in each identified noise catchment area. There is potential for human comfort goals to be exceeded for dwellings located within approximately 40 metres of the rail line once the third rail track is in operation.

Noise and vibration mitigation options for the Project have been reviewed with regards to the findings of the assessment, including noise barriers, architectural treatment and rail vibration control. An Operation Noise Management Plan for the Project would be implemented for the management of operational noise. A noise barrier would be constructed between chainages 194.340 and 194.880 kilometres to attenuate the urban residences at Telarah. Noise monitoring would be undertaken at appropriate locations where the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* (IGANRIP) is predicted to be triggered in 2012 and 2022. If monitoring confirms that IGANRIP is triggered, all reasonable and feasible noise attenuation options would be examined.

The noise and vibration impacts associated with the Project can be managed and controlled during construction and operation with implementation of appropriate mitigation measures.

Surface Water

The key components of the Project that would potentially impact surface water include re-alignment of Sawyers Creek, amendments to 53 culverts for cross drainage, central and cess track drainage and new rail underbridges at a number of locations.

The risk assessment undertaken for surface water identified a number of potential impacts on flooding / hydrology, surface drainage, water quality, waterway conditions, wetlands and drainage areas that may result from the Project. These include potential decline in water quality, potential increase in existing flood levels at major waterways, potential increase in scour at culvert outlets, and potential blockages to low flows at locations such as culverts and causeways.

To minimise the effect of these potential impacts, a number of standard mitigation measures are proposed. These mitigation measures would be adopted during the detail design phase and be incorporated into the Project as both permanent and construction controls. These are design protection measures to minimise the potential for scour and maximise stability of waterways and earthworks, design of causeways and culvert extensions to maintain base flows to the downstream environment and nomination of erosion and sedimentation controls, including a response plan and monitoring, within the Environmental Management Plan.

A Spoil and Fill Management Plan would be prepared and implemented to minimise potential impacts on water quality during construction of the Project. This plan would incorporate the design and installation of erosion and sediment controls in accordance with *Managing Urban Stormwater, Soils and Construction Volume 2D Main road construction* (DECC 2008). The adoption of the proposed standard and additional mitigation measures would result in the Project having a minimal impact on surface drainage, water quality, flooding/hydrology and the condition of existing waterways.

Landscape and Visual

The majority of landscape and visual impacts of the Project would be a result of activities carried out in the construction phase. These activities include the clearance of vegetation which currently adds to the landscape character of an area, the presence of construction machinery and activities in an otherwise rural landscape and the construction of earthworks batters which, until vegetated, would be a visually obvious element in the landscape.

Some impacts would occur in the operations phase of the Project. In some locations, vegetation clearance during the construction phase would result in views of freight and commuter trains to residences that currently do not have such views. In other locations, earthworks batters would be located closer to residences than they currently are.

The landscape and visual impacts of the Project are assessed as being of moderate significance. Due to the nature of the Project there would be a permanent impact on the visual landscape and amenity of some locations along the Project alignment.

Mitigation measures to minimise these issues include avoiding loss of damage to vegetation wherever possible, the minimisation of light spillage during construction and the early involvement of landscape architects to ensure an optimal landscape strategy can be developed.

Greenhouse Gas Emissions

A greenhouse gas assessment was undertaken to estimate the construction related emissions associated with on-site fuel consumption, electricity imported to the Project site, energy used for the transportation of major construction materials to site and waste from site, and the disposal of waste and wastewater.

Greenhouse gas emissions associated with these emission sources were approximately 18,000 t CO_2-e for the construction period. On-site fuel consumption in plant, vehicles and generators accounted for 99% of these emissions.

Implementation of energy saving and energy efficiency options, and the investigation of possible use of biodiesel from sustainable feedstocks may reduce greenhouse gas emissions associated with the consumption of fuel during construction activities.

Groundwater

Deep groundwater aquifers are likely in the permian-aged bedrock (including sandstone, siltstone, conglomerate and coal measures). These aquifers are typically low to moderate permeability with fresh to brackish/saline groundwater. Groundwater levels are relatively shallow in the vicinity of the creeks, within around one to three metres of ground surface, and likely to provide base flow to surface water courses, provide inflow to Wentworth Swamp and potentially provide a source of water to some terrestrial vegetation. Regional groundwater flow is likely to be towards the Hunter River, to the north and north east whilst local shallow groundwater flow in both alluvial deposits and bedrock is likely to follow the fall in topography.

The potential groundwater impacts identified for construction include localised water logging where pre-construction groundwater levels are relatively close to the ground surface, localised temporary reduction in shallow groundwater levels in the vicinity of Stony Creek at the intersection with Wollombi Road during temporary dewatering, and localised degradation of groundwater quality beneath or down gradient of the Project alignment if any accidental leaks or spills occur.

The potential groundwater impacts identified for the operational phase are for the localised degradation of groundwater quality from the inappropriate application of additional herbicides within the rail corridor.

Based on the current design of the Project and current hydrogeological understanding, the potential impacts are not considered to be significant. Licensed groundwater bores are unlikely to be impacted during construction of the Project or from operational use and no significant impact on the supply of groundwater to Groundwater Dependant Ecosystems is anticipated.

The measures proposed to monitor and mitigate the potential impacts include obtaining baseline groundwater level and quality monitoring data prior to the start of construction, conducting regular groundwater monitoring during the construction phase and provision of appropriate containment facilities for storage areas.

Contaminated Soil

Based on the historical review and site inspection the most likely sources of contamination within the investigation area were considered to be associated with the agricultural activities, imported fill and the rail line. Soil samples from 55 test pit locations and three surface samples were taken within the rail corridor and surrounding grazing land to assess potential contamination issues. Concentrations of heavy metals, Organochlorine Pesticides, Polynuclear Aromatic Hydrocarbons, Total Petroleum Hydrocarbons, Benzene, Toluene, Ethylbenzene, and Xylene, were reported below the Health-Investigation Level, or threshold concentration, for commercial/industrial exposure settings for all individual samples analysed.

Several samples exceeded the Ecological Investigation Level for some heavy metals. Samples exceeding the Ecological Investigation Levels may present an ecological risk, but are not considered to restrict construction activities. These exceedences would be considered when determining potential re-use of excavated material along the route, particularly with respect to contamination of adjacent areas and waterways, but given the concentrations found, are unlikely to present a risk of significant impacts.

Based on the investigations undertaken, soils excavated from the agricultural properties and rail corridor are considered suitable for on-site use, with regards to potential contamination risk to human health and the environment. The indicative waste classification based on the results to date indicates that soils would generally be classified as General Solid Waste.

A Spoil and Fill Management Plan would include measures for the management of identified and possible contaminated materials, manage waste in accordance with relevant legislation, and implementation of an Asbestos Management Plan and Acid Sulfate Soil Management Plan if required.

Social Impacts

The nature and scale of the Project's construction and operational activities is likely to give rise to impacts on the local community, including direct property impacts such as land acquisitions, noise, property damage, changes to property infrastructure, reduced access to private property and reduced security. Potential community impacts include reduced road safety, reduced access, and construction employment opportunities.

The key direct property impacts anticipated during the Project's operational period include noise, vibration, drainage, property devaluation, reduced viability of development plans and reduced access to private property. The impact on the broader community brought about by the Project's operation would likely be less pronounced and result from indirect change processes.

Mitigation and management measures suggested for each of the social impacts identified range from the provision of sufficient information to enable stakeholders to understand the likely nature, extent and duration of the social impacts, to the implementation of attenuation measures to screening sensitive receptors. These suggested measures are recommended to be incorporated in detailed construction planning and ongoing management of the Project.

The severity of the potential social impacts that have been identified is likely to be limited as the Project is fundamentally an upgrade of existing infrastructure. In general, adverse social impacts are likely to be linked to individual / household / business level. At this level, there are a greater number of adverse social impacts likely to occur during the Project's construction. However, the direct property impacts can be adequately compensated and / or managed.

While there is also likely to be some adverse impacts experienced by the broader community, namely during the Project's construction, these impacts are able to be minimised and managed and would be offset by the community benefit created by the Project.

Cumulative Impact

A number of existing and proposed projects and activities could have a cumulative impact with construction and operation of the Project. These include existing vehicular traffic on the New England Highway and other roads, the proposed Hunter Expressway and works on feeder roads, proposed residential and industrial developments, and the proposed Pacific National Provisioning Facility at Greta. There are also other projects being undertaken by the Hunter 8 Alliance, including the Minimbah Bank Third Track Project and the rail overpasses at Station Lane Lochinvar and Hermitage Road Belford, and the bridge replacement at Nelson Street Greta.

The contribution of the Project to the potential cumulative impacts would be mitigated through the implementation of the Construction Environmental Management Plan and supporting sub-plans.

How will the adverse impacts be managed?

The route options development and preferred route selection processes have been undertaken with the aim of avoiding or minimising potential negative impacts. The design process has further refined the preferred route, and incorporated environmental management measures with the aim of removing or reducing potential negative impacts.

The Environmental Assessment identifies proposed measures to minimise, manage and mitigate the remaining impacts of the construction and operation of the Project. These impacts and the proposed management measures, and the processes to implement and monitor these measures, are discussed in **Part C**. A draft Statement of Commitments, which lists the proposed environmental outcomes and actions to be achieved, is provided in **Chapter 21**.

Commonwealth Approval

In addition to the approval of the NSW Minister for Planning unde Part 3A of the *Environmental Planning and Assessment Act 1979*, the Commonwealth Department for the Environment, Water, Heritage and the Arts (DEWHA) has advised the Project would be assessed through an accredited assessment process.

Once the NSW Minister for Planning has assessed the Project, the Commonwealth Minister for the Environment, Water, Heritage and the Arts will decide whether to approve the action with or without conditions, or not approve the action.

How can I comment on the Project and the Environmental Assessment?

The NSW Department of Planning will make the Environmental Assessment public for a minimum period of 30 days. During this period the Environmental Assessment will be available for viewing at, Maitland, Cessnock and Singleton Councils, the NSW Department of Planning Office (Sydney) and other locations. A Project Information Line will be available throughout the exhibition period on 1800 216 317. Copies of the Environmental Assessment will be available on the Hunter 8 Alliance website at http://www.hunter8alliance.com.au/ (click on the Stage 2: Maitland to Minimbah link) and on the NSW Department of Planning website at http://www.planning.nsw.gov.au/.

Any person may make a written submission to the Director-General of the NSW Department of Planning during the exhibition period. Submissions should be made to:

Director, Infrastructure Projects

Department of Planning

GPO Box 39

Sydney NSW 2001

Fax: (02) 9228 635

Part A
Introduction and Context

1. Introduction

1.1 Overview

On 5 September 2004, the Australian Rail Track Corporation (ARTC) commenced a 60 year lease of the interstate and Hunter Valley Rail Network in New South Wales (NSW).

The Hunter Valley Rail Network extends from the Port of Newcastle to Ulan and Narrabri in the west. It is used by passenger services, freight, wheat and coal services. The majority of trains carry coal from mines located across the Hunter Valley to either Carrington (Port Waratah) or Kooragang Island at the Port of Newcastle for loading onto ships for export.

Due to the forecast increase in coal throughput at the Port of Newcastle to 190 million tonnes per annum by 2012, a number of rail infrastructure improvements to the Hunter Valley Rail Network have been proposed by ARTC. One of the key improvement projects included in the ARTC ten-year strategic plan is a proposed third track adjacent to the existing Main Northern Railway between Maitland and Whittingham, known as the Maitland to Whittingham Third Track Project. The Maitland to Whittingham Third Track Project was announced as part of the Government's Nation Building package in November 2008.

The Maitland to Whittingham Third Track Project is divided into two stages. Stage 1 consists of the construction of the third track between Minimbah and Whittingham. Project Approval for this project was granted by the Minister of Planning on 26 May 2009 and construction commenced in July 2009.

Stage 2 consists of the construction of the third track between Maitland and Minimbah. Stage 2 is the subject of this Environmental Assessment and is known as the Maitland to Minimbah Third Track Project (referred to as 'the Project').

1.2 Key Features of the Project

The Project would involve the construction of a third track adjacent to the existing Main Northern Railway as well as construction and / or modification of major infrastructure along the Main Northern Railway. The major elements of the Project include:

- Approximately 30 kilometres of new track including turnouts.
- Major cut and fill earthworks along the route and other minor earthworks.
- Drainage works including amendments to culverts for cross drainage, central and cess track drainage and the re-alignment of a creek.
- Demolition of one existing rail overbridge and modification of one existing rail overbridge.
- Construction of eight new rail underbridges and demolition of one existing rail underbridge.
- Modification of three existing railway stations.
- Widening of the rail corridor through property acquisition.

1.3 Location and Setting of the Project

Locations along rail lines are noted by the term chainage. The chainage at a location is the distance of that point in relation to Central Station in Sydney (NSW only) based on 0.000 kilometres being located at the end of Central No. 1 Platform. To provide an accurate location description, chainage is used throughout this Environmental Assessment.

The proposed third track would commence in Farley approximately two kilometres west of Maitland Station at chainage 194.500 kilometres and would run adjacent to the Main Northern Railway for approximately 30 kilometres concluding at Minimbah at chainage 224.200 kilometres (refer to Figure 1.1).

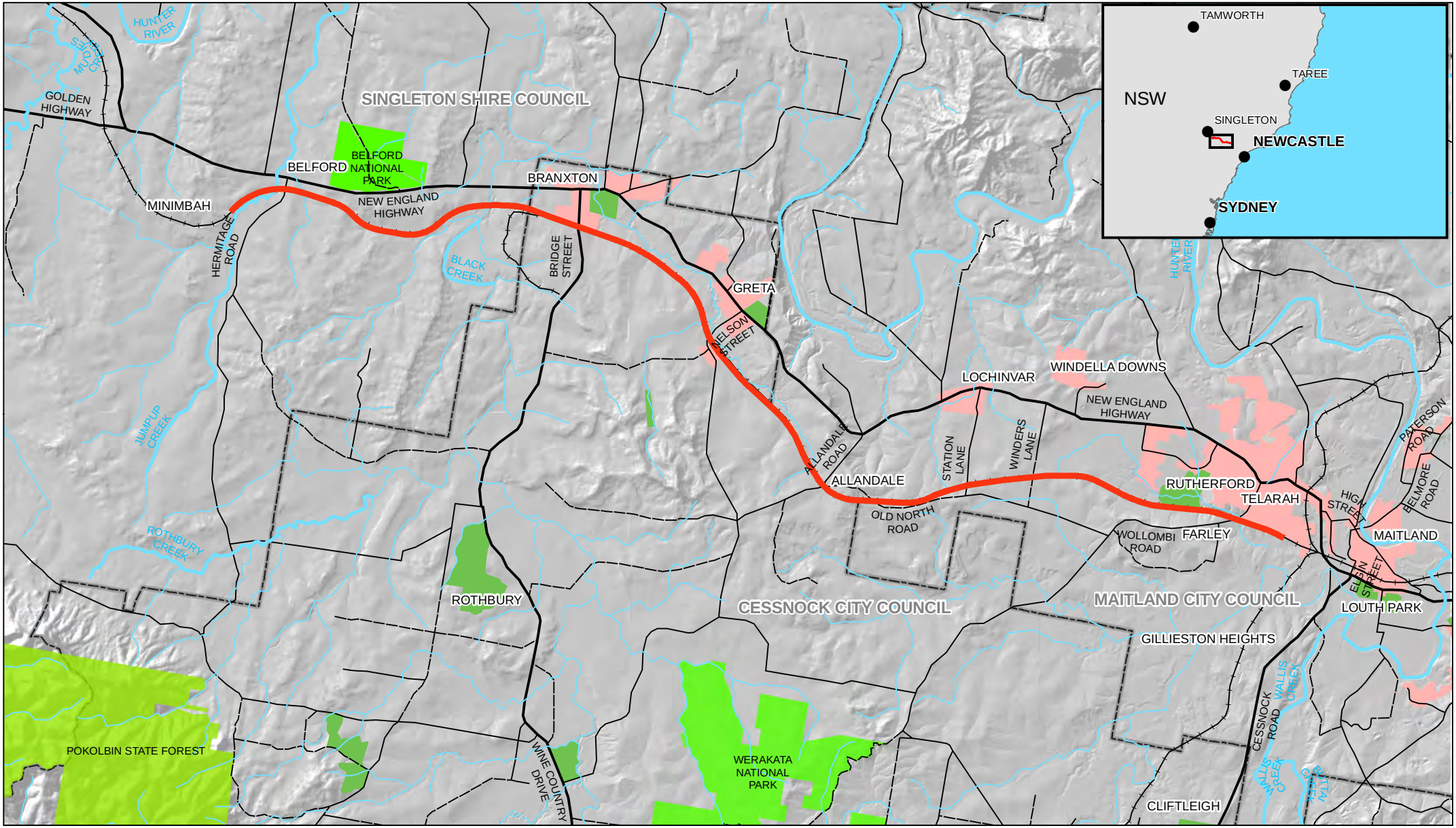
The Project would be located within the Cessnock, Maitland and Singleton local government areas.

The regional topography of the area surrounding the Project comprises primarily of low-lying areas of valleys and alluvial floodplains, following gently undulating hills of slopes typically between one and six degrees. A number of creeks and drainage lines run through the Project and drain into the Hunter River to the north, including Black, Sawyers, Stony, Anvil and Jump Up creeks.

The existing major transport infrastructure within the area surrounding the Project consists of the Main Northern Railway and the New England Highway. The New England Highway crosses the Project to the west of Maitland and then runs parallel or in close proximity to the Project to the north of the Main Northern Railway. Other public and private roads cross the Project, including Wollombi Road, Old North Road, Allandale Road, Nelson Street, Bridge Street and Hermitage Road.

The Project would pass three existing railway stations along the Main Northern Railway at Lochinvar, Greta and Branxton.

Land uses adjacent and surrounding the existing Main Northern Railway comprise a mixture of residential, rural residential, industrial and agriculture comprising predominantly viticulture and grazing land. Four urbanised areas at Maitland, Lochinvar, Greta and Branxton exist between Maitland and Minimbah.



1:125,000 (at A4)

0 600 1,200 2,400 3,600 4,800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Project Location
- Railway
- Watercourse
- Highway
- Unsealed
- Main Road
- Minor Road
- Recreation Areas
- State Forest
- National Park
- Built Up Area
- LGA

Maitland To Minimbah Third Track Environmental Assessment

Job Number	22-14471
Revision	A
Date	May 2010

Regional Location

Figure 1.1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Regional_Plan_20091203.mxd

Data Source: GeoScience Australia: 250k Topo Data - Series 3. Created by: msmiljkovski, tmorton, fmackay

1.4 Purpose and Benefits of the Project

The purpose of the Project is to increase rail reliability and future capacity between the Hunter Valley and the Port of Newcastle. In addition to providing increased track capacity, the Project aims to improve operational performance along the route. These improved efficiencies would be created through:

- Reduced impacts on rail traffic due to track maintenance activities.
- Reduced loss of freight train paths due to shadow effects from passenger services.
- Reduced loss of available train paths due to train breakdowns.

The Project would also bring benefits to the local and broader community by generating up to 650 full time jobs during construction, creating opportunities for local and regional goods and service providers, and providing greater security for existing coal industry jobs.

The construction and upgrade of stations as part of the Project would improve the accessibility and functionality of these stations.

1.5 The Proponent

ARTC was created by the Commonwealth and State Governments in 1998 to provide a single body responsible for the National Interstate Rail Network.

ARTC is a Commonwealth Government corporation and currently has responsibility for the management of over 10,000 route kilometres of standard gauge interstate rail track in South Australia, Victoria, Western Australia and NSW. In NSW this includes the Hunter Valley Rail Network as well as other regional rail links.

ARTC has the authority to sell track access to train operators over the full length of the rail lines under its management.

1.6 Hunter 8 Alliance

The Hunter 8 Alliance was formed between ARTC, John Holland Pty Ltd and GHD Pty Ltd to design and construct the Maitland to Whittingham Third Track Project.

The Hunter 8 Alliance, on behalf of ARTC, is proposing to construct the third track adjacent to the existing Main Northern Railway between Maitland and Minimbah.

The Hunter 8 Alliance is responsible for design and construction for the Project, including planning approvals, environmental management and community engagement.

1.7 Guide to Approval Requirements and Environmental Assessment

1.7.1 Summary of Approval Requirements

The proposed Maitland to Minimbah Third Track Project is a project to which Part 3A of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) applies. The Project is consistent with the classification of rail and related transport facilities listed in Schedule 1 clause 23 of *State Environmental Planning Policy (Major Development)* 2005.

The Minister for Planning is the approval authority for the Project, and an environmental assessment (this document) is required to support the application for Project Approval in accordance with the requirements of the EP&A Act.

Further information on the assessment requirements for the Project is provided in **Chapter 2**.

1.7.2 Purpose and Scope of this Environmental Assessment

The Environmental Assessment supports an application for project approval from the Minister for Planning under Part 3A of the EP&A Act. It has been prepared in accordance with the EP&A Act and addresses the Director-General's Environmental Assessment Requirements for the Project (refer to Section 2.6.1). The Environmental Assessment provides:

- Background information, including information on the development of the Project, need for the Project, objectives of the Project and the alternatives considered.
- A description of the Project.
- An assessment of the potential environmental impacts of the Project.
- The Hunter 8 Alliance's commitments to minimise and manage potential environmental and community impacts.

1.7.3 Contents of this Environmental Assessment

The Environmental Assessment is structured as follows:

Volume 1 Environmental Assessment

Part A – Introduction and Context

This part includes:

- An introduction to the Environmental Assessment (**Chapter 1**).
- Information on the assessment requirements under relevant legislation and environmental planning instruments (**Chapter 2**).
- A description of the location and setting of the Project (**Chapter 3**).
- A summary of the consultation that occurred during preparation of the Environmental Assessment (**Chapter 4**).

Part B – The Project

This part includes:

- Details on the need for the Project and the objectives and benefits of the Project (**Chapter 5**).
- Information on the alternatives that were considered as part of the development of the Project and site selection process (**Chapter 6**).
- A description of the Project (**Chapter 7**).

Part C – Environmental Assessment

This part includes:

- A description of the existing environmental features of the area potentially affected by the Project, a general environmental risk analysis and an assessment of potential environmental impacts of the Project based on the project description in Part B, and mitigation measures for minimising potential environmental impacts (**Chapters 8 - 20**).

Part D – Environmental Management and Conclusion

This part includes:

- A Draft Statement of Commitments made by the proponent in relation to detailed design, construction and operation of the proposal and an outline of the Construction Environmental Management Plan which would be prepared to manage potential impacts during construction (**Chapter 21**).
- The project justification and conclusion to the EA (**Chapter 22**).

Appendices

The appendices to the Environmental Assessment supplement the main document.

Technical Reports

Appendices A to R contain the specialist technical assessments/background reports which have been prepared to assess the potential impacts of the Project in accordance with the Director-General's Environmental Assessment Requirements. These specialist reports are based on the description of the Project as set out in Part B of the Environmental Assessment. Appendices A to R also contain other supporting documentation such as the Director General's Requirements, correspondence with stakeholders and a Draft Statement of Commitments.

Appendices A to R are:

- Appendix A – Director General's Requirements.
- Appendix B – Stakeholder Consultation.
- Appendix C – Applicable and Relevant State Environmental Planning Policies.
- Appendix D – Environmental Risk Assessment Report.
- Appendix E – Flora and Aquatic Ecological Assessment.
- Appendix F – Terrestrial Fauna Impact Assessment.
- Appendix G – Aboriginal Heritage Impact Assessment.
- Appendix H – Non-indigenous Heritage Study.
- Appendix I – Proposed Land Acquisition.
- Appendix J – Traffic Study.
- Appendix K – Noise and Vibration Impact Assessment.
- Appendix L – Surface Water Assessment.
- Appendix M – Groundwater Study.

- Appendix N – Preliminary Site Contamination Investigation.
- Appendix O – Social Impact Assessment.
- Appendix P – Landscape and Visual Impact.
- Appendix Q – Greenhouse Gas.
- Appendix R – Environmental Evaluation of Coal Dust Emissions, QR 2008.

Appendices S to T – Separate Bound Copy

Appendices S and T contain design drawings for the Project, along with a series of 21 detailed figures showing the layout of the key features of the Project.

Appendices S and T are:

- Appendix S – Design Drawings.
- Appendix T – Detailed Project Layout.

2. Planning Framework and Statutory Requirements

2.1 Introduction

There are two key pieces of legislation relevant to the Project: the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) and the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act). The application of these Acts as well as other relevant legislation and planning instruments is described in the following sections.

2.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas and species, populations and communities, and heritage items.

Under the EPBC Act, the approval of the Commonwealth Minister for the Environment, Water, Heritage and the Arts is required for the following controlled actions:

- An action which has, would have or is likely to have a significant impact on "matters of National Environmental Significance" (NES matters). The NES matters include:
  - The World Heritage values of a declared World Heritage property.
  - The National Heritage values of a listed National Heritage place.
  - The ecological character of a declared Ramsar wetland.
  - Listed threatened species and ecological communities.
  - Listed migratory species.
  - The Commonwealth marine environment.
  - Nuclear actions.
- An action by the Commonwealth or a Commonwealth agency which has, would have or is likely to have a significant impact on the environment.
- An action on Commonwealth land which has, would have or is likely to have a significant impact on the environment.
- An action which has, would have or is likely to have a significant impact on the environment on Commonwealth land, no matter where it is to be carried out.

Under subsection 68(1) of the EPBC Act, "A person proposing to take an action that the person thinks may be or is a controlled action must refer the proposal to the Minister for the Minister's decision whether or not the action is a controlled action."

A search to determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur within the study area was undertaken on 9 November 2009 using the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) Protected Matters Search Tool. Results of the search indicate that the following are likely to occur within 10 kilometres of the Project alignment:

- One threatened ecological community.
- 21 threatened species.
- 14 migratory species.
- Six Commonwealth lands.
- 54 places on the Register of the National Estate.
- 12 listed marine species.

In addition to these matters, the ARTC (the proponent) is a Commonwealth agency and the rail corridor is classified as Commonwealth land, as it is leased by a Commonwealth agency as defined by the EPBC Act. It should be noted that on 14 November 2009 the *Environment Protection and Biodiversity Conservation Regulation* 2000 was amended to exclude the ARTC as a Commonwealth agency under the EPBC Act. However, correspondence from DEWHA dated 17 November 2009 advised that any ARTC project that received a controlled action decision prior to the amendment will be treated as a Commonwealth agency. Therefore for the purpose of the Project the ARTC is to be considered by DEWHA as a Commonwealth agency.

The Project was referred to the Minister for the Environment, Water, Heritage and the Arts under Section 68 of the EPBC Act. On 18 June 2009 the Minister declared that the Project is a controlled action as it is being undertaken by a Commonwealth agency and is likely to have a significant impact on the environment and matters of national environmental significance, for the following reasons:

- The Project would involve clearing vegetation which could provide habitat for listed threatened species and ecological communities along the alignment.
- Potential significant impacts to heritage items within and adjacent to the corridor.
- Potential to have noise and vibration impacts on proximate properties through construction and operation of the new track.
- Disturbance of soil and potential for significant erosion in watercourses.

Pursuant to Section 87 of the EPBC Act, due to the Project being a controlled action, DEWHA is required to determine the assessment for the Project. In July 2009 DEWHA advised that the Project requirements would be assessed through an accredited assessment process.

2.2.1 EPBC Accredited Assessment Process

Under the EPBC accredited assessment process a controlled action can be assessed using a state or territory assessment process.

DEWHA advised in correspondence dated 29 July 2009 that the Project would be assessed through an accredited assessment process. DEWHA is satisfied that the Director General's Environmental Assessment Requirements issued by Department of Planning for the Project addresses the issues that DEWHA required for assessment. Therefore, assessment under Part 3A of the EP&A Act is the applicable accredited assessment process (refer to Section 2.3).

Once the NSW Minister for Planning has assessed the Project under Part 3A of the EP&A Act, the Commonwealth Minister for the Environment, Heritage and the Arts will decide whether to approve the action with or without conditions, or not approve the action. The proposed decision will be provided to the Hunter 8 Alliance and the ARTC for comment prior to the final decision being made. Finally, a copy of the approval or notice of the refusal will be provided to the Hunter 8 Alliance and the ARTC, and will also be published on the Government Notices Gazette and the DEWHA website.

2.3 NSW Environmental Planning and Assessment Act 1979

The EP&A Act contains the core legislation relating to planning and development activities in NSW and provides the statutory framework under which development proposals are assessed. The EP&A Act is the principal law overseeing the assessment and determination of development proposals and all development in NSW is assessed in accordance with the provisions of the EP&A Act.

The EP&A Act contains three parts relevant to the environmental assessment and determination of development proposals:

- Part 3A provides for the control of major infrastructure and other projects that require approval from the Minister for Planning.
- Part 4 provides for the control of development that requires development consent from a consent authority, which is usually the local Council but may be the Minister for Planning in limited circumstances.
- Part 5 provides for the control of activities that do not require development consent and, therefore, do not fall under Part 3A or Part 4.

Part 3A is applicable to the Project.

2.3.1 Application of Part 3A of the EP&A Act

Part 3A of the EP&A Act establishes an assessment and approval regime for development that is declared to be a Part 3A project by either a State environmental planning policy (SEPP) or Ministerial Order. Section 75B(1) of the EP&A Act states:

> *"This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:*
>
> *(a) by a State environmental planning policy, or*
>
> *(b) by order of the Minister published in the Gazette (including by an order that amends such a policy)."*

Major projects to which Part 3A applies are identified in *State Environmental Planning Policy (Major Development) 2005*, as well as in declarations made by the Minister for Planning. The Project is for a heavy railway line associated with mining that has a capital investment value of more than $30 million and is therefore a project to which Part 3A would apply under clause 23 of the *State Environmental Planning Policy (Major Development) 2005*.

According to section 75D of the EP&A Act, the Minister for Planning is the approval authority for Part 3A projects:

> *"(1) A person is not to carry out development that is a project to which this Part applies unless the Minister has approved of the carrying out of the project under this Part.*
>
> *(2) The person is to comply with any conditions to which such an approval is subject."*

In accordance with clause 75B of the EP&A Act, Part 3A of the Act applies to the Project. The Minister for Planning is the approval authority and an environmental assessment is required to support the application for project approval.

2.3.2 Application of other Provisions of the EP&A Act

Environmental Planning Instruments

Environmental planning instruments are legal documents that are prepared under the EP&A Act to regulate land use and development and consist of State environmental planning policies (SEPPs) and local environmental plans (LEPs). Regional environmental plans were formerly part of the hierarchy of environmental planning instruments, however these are now deemed to be SEPPs.

Pursuant to section 75R(3) of the EP&A Act, only SEPPs apply to an 'approved project' under Part 3A. Section 75A defines 'approved project' *as "a project to the extent that it is approved by the Minister under this Part, but does not include a project for which only approval for a concept plan has been given"*. As such, only SEPPs would apply if the Minister grants project approval to carry out the Project under Part 3A.

Nonetheless, under section 75J(3), "In deciding whether or not to approve the carrying out of a project, the Minister may (but is not required to) take into account the provisions of any environmental planning instrument that would not (because of section 75R) apply to the project if approved".

Relevant SEPPs are considered in Section 2.4.1 and local environmental plans are considered in Section 2.4.2.

Section 75U(1) of the EP&A Act specifies certain authorisations which are not required for an 'approved project' under Part 3A, namely:

> *"(a) the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act,*
>
> *(b) a permit under section 201, 205 or 219 of the Fisheries Management Act 1994,*
>
> *(c) an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977,*

(d) *a permit under section 87 or a consent under section 90 of the National Parks and Wildlife Act 1974,*

(e) *an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation,*

(f) *a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948,*

(g) *a bush fire safety authority under section 100B of the Rural Fires Act 1997,*

(h) *a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000."*

Consequently, the abovementioned authorisations would not be required if the Minister grants project approval to carry out the Project under Part 3A.

Under section 75V(1) of the EP&A Act, the following authorisations cannot be refused if necessary for the carrying out of an 'approved project' and are to be substantially consistent with an approval to carry out the Project given under Part 3A:

"(a) an aquaculture permit under section 144 of the Fisheries Management Act 1994,

(b) an approval under section 15 of the Mine Subsidence Compensation Act 1961,

(c) a mining lease under the Mining Act 1992,

(d) a production lease under the Petroleum (Onshore) Act 1991,

(e) an environment protection licence under Chapter 3 of the Protection of the Environment Operations Act 1997 (for any of the purposes referred to in section 43 of that Act),

(f) a consent under section 138 of the Roads Act 1993,

(g) a licence under the Pipelines Act 1967."

Relevant other Acts are considered in Section 2.5.

2.4 Environmental Planning Instruments

2.4.1 State Environmental Planning Policies

The following SEPPs, as made under the EP&A Act, are applicable to the Project. These are listed and considered for relevance to the Project in Appendix C. The SEPPs considered relevant to the Project are discussed in detail below.

State Environmental Planning Policy (Major Development) 2005

Major projects to which Part 3A applies are identified in SEPP *(Major Development)* 2005, as well as in declarations made by the Minister for Planning.

Clause 6 of SEPP (Major Development) 2005 states:

> *"(1) Development that, in the opinion of the Minister, is development of a kind:*
>
> *(a) described in Schedule 1 or 2, or*
>
> *(b) described in Schedule 3 as a project to which Part 3A of the Act applies,*
>
> *is declared to be a project to which Part 3A of the Act applies."*

Clause 23 of Schedule 1 of the SEPP states that the following development is a major project:

> *"(1) Development that has a capital investment value of more than $30 million for the purpose of:*
>
> *(a) heavy railway lines associated with mining, extractive industries or other industry, or*
>
> *(b) railway freight facilities or inter-modal terminals"*

The Project has a capital investment value of more than $30 million and is for a heavy railway line associated with mining. As such, the Project has been declared to be a major project under clause 6 of the EP&A Act by the Director-General of the Department of Planning, under delegation from the Minister for Planning, and is to be assessed under Part 3A of the EP&A Act.

State Environmental Planning Policy (Infrastructure) 2007

The SEPP (Infrastructure) 2007 commenced in January 2008. The aim of SEPP (Infrastructure) 2007 is to facilitate the effective delivery of infrastructure across NSW. Clause 79 of SEPP (Infrastructure) 2007 states that:

"Development permitted without consent—rail infrastructure facilities generally

(1) Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land."

Therefore, pursuant to Clause 79 of the SEPP (Infrastructure), the Project is permissible.

State Environmental Planning Policy No. 44 – Koala Habitat Protection

SEPP 44 aims to *"encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline."*

Singleton and Maitland LGAs are listed on Schedule 1 of SEPP 44 and therefore the Project is subject to SEPP 44 assessment. The results of this assessment are outlined in Chapter 10. A resident population of koalas was not identified on the investigation area and as such the investigation area is unlikely to form 'core koala habitat'. Therefore, no further assessment under SEPP 44 is required.

State Environmental Planning Policy No 55—Remediation of Land

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. Contaminated land is discussed in Section 19.2. The principles of this SEPP would be considered when treating contaminated lands for the Project. No assessment under SEPP 55 is required for the Project.

State Environmental Planning Policy (Rural Lands) 2008

SEPP (Rural Lands) aims to facilitate the orderly and economic use and development of rural lands for rural and related purposes. Part 2 of SEPP (Rural Lands) identifies rural planning principles to be considered. The Project route passes through the following rural zones:

- 1 (a) Rural pursuant to the Singleton Local Environmental Plan1996.
- Zone No 1 (a) (Rural "A" Zone) pursuant to the Cessnock Local Environmental Plan 1989.
- Zone 1 (b) Secondary Rural Land pursuant to Maitland Local Environmental Plan 1993.

The rural planning principles contained within SEPP (Rural Lands) encourage the protection and promotion of opportunities for productive and sustainable economic activities in rural areas. They also identify that in planning for rural lands, the social, economic and environmental interests of the community are to be balanced.

Land use impacts are discussed in Chapter 14. The Project would result in the loss of some land that is zoned rural. However, it is unlikely that land acquisition as a result of the Project, being minimal strip acquisition, would compromise the existing economic integrity of current rural land use activities. The Project would result in an outcome whereby the social, economic and environmental interests are balanced, as discussed throughout this report.

Hunter Regional Environmental Plan 1989 (Heritage)

As at 1 July 2009, the *Hunter Regional Environmental Plan 1989 (Heritage)* is taken to be a deemed SEPP. The SEPP applies to heritage items and conservation areas within the Cessnock LGA and states:

> *'The Council shall not grant consent to an application to carry out development on land in the vicinity of a heritage item unless it has made an assessment of the effect the carrying out of that development will have on the heritage significance of the item and its setting.'*

An assessment of the heritage items in the vicinity of the Project is provided in Chapter 13.

2.4.2 Local Environmental Plans

The Proposal falls within three Local Government Areas (LGAs): Singleton Shire Council, Cessnock City Council, and Maitland City Council and is covered by the *Singleton Local Environmental Plan 1996*, the *Cessnock Local Environmental Plan 1989* and the *Maitland Local Environmental Plan 1993* respectively.

Singleton Local Environmental Plan 1996

The Singleton Local Environmental Plan 1996 is the planning instrument prepared by Council and approved by the Minister of Planning and provides the statutory provisions for managing land use and development. The Project passes through the following zone within Singleton LGA:

- Zone 1 (a) (Rural Zone).

As outlined in Section 2.4, SEPP (Infrastructure) allows the ARTC as a public authority to carry out work on any land without consent from council.

Singleton Council has prepared a new Draft LEP based on the Standard Instrument and this is currently on public exhibition.

Cessnock Local Environmental Plan 1989

The Cessnock Local Environmental Plan 1989 is the planning instrument prepared by Council and approved by the Minister of Planning. It provides the statutory provisions for managing land use and development within Cessnock LGA. It is this document which defines the relevant land use zones. The Project passes through the following zones within Cessnock LGA:

- Zone No 5 (b) (Special Uses (Railways) Zone).
- Zone No 1 (a) (Rural "A" Zone).
- Zone No 1 (c) (Rural–Residential/Rural (Small Holdings) Zone).

As outlined in Section 2.4, SEPP (Infrastructure) allows the ARTC as a public authority to carry out work on any land without consent from council.

Cessnock Council currently has their Draft Local Environmental Plan 2009, prepared in accordance with the Standard Instrument, on public exhibition.

Maitland Local Environmental Plan 1993

The Maitland Local Environmental Plan 1993 is the legal document prepared by Council and approved by the Minister of Planning and provides the statutory provisions for managing land use and development. It is this document which defines the relevant land use zones. The Project passes through the following zones within Maitland LGA:

- Zone 1 (b) Secondary Rural Land.
- Zone 5 (b) Special Uses Railways.
- Zone 4 (a) General Industrial.
- Zone 6 (b) Private Recreation.
- Zone 4 (b) Light Industrial.

As outlined in Section 2.4, SEPP (Infrastructure) allows the ARTC as a public authority to carry out work on any land without consent from council.

Maitland City Council is currently carrying out extensive investigations associated with the preparation of their Local Environmental Plan 2011.

2.5 Other NSW Legislation

Table 2-1 provides a summary of other State legislation relevant to the Project.

Table 2-1 Summary of Other Relevant State Legislation

Legislation	Key Requirements	Relevance to the Project
Contaminated Land Management Act 1997 (CLM Act)	Section 60 of the CLM Act requires landowners to report any contamination that represents a significant risk of harm to human health or the environment to the Department of Environment, Climate Change and Water.	Chapter 19 includes an assessment of the presence of contamination posing a significant risk of harm.
Crown Lands Act 1989 (CL Act)	Governs the use of Crown land.	Crown Land properties are affected by the Project. All are administered by the NSW Department of Lands, Crown Lands Division. The Hunter 8 Alliance is negotiating with the Crown Lands Division regarding strip acquisition for the sections of the Project on Crown Land.
Fisheries Management Act 1994 (FM Act)	Under the FM Act, approval is required from the Industry and Investment NSW (Fisheries), for activities involving dredging and reclamation (section 201), blockage of fish passage (section 219) and harming of certain marine vegetation in a protected area (section 205).	Pursuant to section 75U of the EP&A Act, permits under section 201, 205 or 219 of the FM Act are not required for an 'approved project' under Part 3A.
	A licence is required under section 220ZW of the FM Act for activities likely to harm or damage threatened species, populations or ecological communities.	An examination of threatened species, populations and ecological communities distribution ranges and habitat requirements that are listed on the FM Act (refer to Chapter 9) indicate that none are likely to occur within the vicinity of the Project. Therefore, the provisions of the FM Act do not apply and no further assessment is required.
Heritage Act 1977 (Heritage Act)	A consent is required under Part 4 of the Heritage Act for development which alters, moves or damages any part of a listed heritage item.	Pursuant to section 75U of the EP&A Act, an approval under Part 4 of the Heritage Act is not required for an approved Part 3A project. An assessment of heritage items within the vicinity of the Project is provided in Chapter 13.

Legislation	Key Requirements	Relevance to the Project
	An excavation permit is required under section 139 of the Heritage Act to 'damage, despoil, move or alter' a relic.	Pursuant to section 75U of the EP&A Act, an excavation permit under section 139 of the Heritage Act is not required for an approved Part 3A project. An assessment of heritage items within the vicinity of the Project is provided in Chapter 13.
Land Acquisition (Just Terms Compensation) Act 1991 (LA Act)	To give appropriate compensation to owners for land affected by an authority.	The process of acquisition and compensation is administered under the LA Act. However, Rail Infrastructure Corporation's rights to acquire are under the *Transport Administration Act 1988.* Strip or whole properties may be acquired by agreement or by compulsory process under the Act, with appropriate compensation where relevant.
National Parks and Wildlife Act 1974 (NPW Act)	Under section 87 of the NPW Act, a permit is required to disturb or move an Aboriginal object.	Pursuant to section 75U of the EP&A Act, a permit under section 87 of the NPW Act is not required for an approved Part 3A project. Chapter 12 provides an assessment of the Project's impact on Aboriginal heritage and the potential for disturbance of known Aboriginal heritage sites.
	Under section 90 of the NPW Act, a consent is required to destroy, deface or damage an Aboriginal object or Aboriginal place.	Pursuant to section 75U of the EP&A Act, a consent under section 90 of the NPW Act is not required for an approved Part 3A project. Chapter 12 provides an assessment of the Project's impact on Aboriginal heritage.
	Under Part 4 of the NPW Act, the Minister may enter a conservation agreement with a landowner.	None of the lands affected by the Project are known to be covered by a conservation agreement or by a plan of management adopted under the NPW Act for the conservation area to which the agreement relates.
Native Vegetation Act 2003 (NV Act)	Under section 12 of the NV Act, a development consent or an authorisation under a property vegetation plan is required for the clearing of native vegetation.	Pursuant to Section 75U of the EP&A Act, an authorisation under section 12 of the NV Act is not required for an approved Part 3A project.

Legislation	Key Requirements	Relevance to the Project
Noxious Weeds Act 1993 (NW Act)	Noxious weeds are to be managed in a way to restrict their dispersal and establishment.	Eleven of the species recorded in the study area are declared Noxious Weeds in the Singleton, Cessnock and Maitland LGAs, pursuant to the NW Act. These noxious weeds should be disposed of and managed in accordance with assigned control categories under the NW Act.
Protection of the Environment Operations Act 1997 (POEO Act)	Under section 48 of the POEO Act, an environment protection licence relating to air, water and noise pollution and waste management is required for development should it be identified as a scheduled activity in Schedule 1.	The Project is an activity listed within Schedule 1. Under section 75V of the EP&A Act, an environment protection licence for the Project cannot be refused and is to be substantially consistent with any approval given under Part 3A of the EP&A Act.
Roads Act 1993 (Roads Act)	Section 138 of the Roads Act requires that a person obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of a work in, on or over a public road, or the digging up or disturbance of the surface of a public road. If the applicant is a public authority, the roads authority must consult with the applicant before deciding whether or not to grant consent or concurrence.	The Project would result in the modification, realignment or replacement of a number of classified roads. These include; Railway Parade, Wentworth Street, Lismore Street, Wollombi Road, Allandale Road, Old North Road, Nelson Street and Pothana Lane. Under section 75V of the EP&A Act, a section 138 consent for the Project cannot be refused and is to be substantially consistent with any approval given under Part 3A of the EP&A Act.
Rural Fires Act 1997 (RF Act)	The RF Act manages bushfire within the State and regulates development in bushfire prone areas.	The Project is not for subdivision and is not a special fire protection purpose. Approval is not required under the RF Act.
Threatened Species Conservation Act 1995 (TSC Act)	The TSC Act requires any threatened plant or animal species, populations or ecological communities associated with a proposed development to be identified and that acceptable recovery and management strategies are implemented when a likely significant impact would occur.	Several threatened populations, and a large number of Endangered Ecological Communities (EEC) have the potential to occur in the locality. An assessment of the impacts on these species and the proposed management measures are provided in Chapters 10 and 11.

Legislation	Key Requirements	Relevance to the Project
Waste Avoidance and Resource Recovery Act 2001 (WARR Act)	This Act establishes a hierarchy of waste management (avoid, recover, dispose) encouraging efficient use of resources and minimising waste.	Waste materials generated during construction and operation of the Project would be managed in accordance with the principles of the waste management hierarchy referred to in the WARR Act.
Water Management Act 2000 (WM Act)	Under section 56 of the WM Act, an access licence is required for water extraction.	Should surface or groundwater be required for construction of the Project, ARTC would need to obtain an access licence for water extraction.
	Section 89 of the WM Act relates to water use approvals, which confer a right on their holder to use water for a particular purpose at a particular location.	Pursuant to section 75U of the EP&A Act, a water use approval is not required for an approved Part 3A project.
	Section 91 relates to activity approvals and provides that certain types of development and activities that are carried out in or near a river, lake or estuary are "controlled activities" and require an activity approval. Section 91 also provides that aquifer interference activities require an aquifer interference approval, which is an activity approval.	Pursuant to section 75U of the EP&A Act, activity approvals are not required for an approved Part 3A project.
Wilderness Act 1987 (Wilderness Act)	Section 111(3) of the Wilderness Act requires a determining authority to consider the effects of a proposed activity on wilderness areas.	No wilderness areas were identified within the vicinity of the Project. Therefore, the Wilderness Act does not apply.

2.6 The Application Process

2.6.1 Assessment Requirements

Planning Focus Meeting

For some projects, the Department of Planning convenes a Planning Focus Meeting with relevant government authorities. The meeting provides a forum for participants to obtain information on the Project, and discuss key issues and potential environmental impacts. Following the meeting, the Department of Planning seeks written comments from agencies on issues that should be addressed in the Environmental Assessment.

A Planning Focus Meeting was convened by the Department of Planning on 14 May 2009. The meeting was attended by representatives from the following government organisations:

- Department of Planning.
- Department of Environment, Climate Change and Water.
- Roads and Traffic Authority.

- Maitland City Council.
- Singleton Council.

As part of the planning focus meeting a site visit was undertaken with various locations along the Project route visited, including Hermitage Road, Branxton Station, Greta Station, Centurian Bridge and Lochinvar Station.

Director-General's Environmental Assessment Requirements

Under clause 75F of the EP&A Act, the Director-General is required to prepare and issue the Hunter 8 Alliance with requirements for undertaking the environmental assessment. These identify issues to be addressed in the environmental assessment and the level of assessment required.

The Director General's Environmental Assessment Requirements for the proposal were issued on 29 May 2009. These requirements were prepared following submission by the Hunter 8 Alliance of the project application and preliminary environmental assessment to the Department of Planning. A copy of the Director General's Environmental Assessment Requirements is included in Appendix A. The matters raised by the Director-General for consideration are outlined in Table 2-2 together with the chapter of this report that addresses the matter. More detail on each of the requirements is provided in the corresponding chapter.

Table 2-2 Director-General's Environmental Assessment Requirements

Issue Category	Requirement	Where Addressed in Environmental Assessment
General requirements	Executive summary	Executive summary
	Detailed description	Chapter 7
	Assessment of the key issues	Chapters 5, 7 and 9 to 18
	Draft Statement of Commitments	Chapter 21
	Certification	Certification page
Key issues	Strategic justification	Chapter 5
	Project justification	Chapter 5
	General construction impacts	Chapter 7
	Ecology	Chapters 9, 10 and 11
	Heritage	Chapters 12 and 13
	Land use and access	Chapters 14 and 15
	Operational air, noise and vibration	Chapters 16 and 17
	Hydrology	Chapter 18

Issue Category	Requirement	Where Addressed in Environmental Assessment
Environmental risk analysis		Chapter 8
Consultation		Chapter 4

The following agencies were requested by the Department of Planning to provide input into the Director General's Requirements:

- Department of Environment, Climate Change and Water.
- Department of Water and Energy (now part of Department of Environment, Climate Change and Water).
- Department of Planning Heritage Branch.
- Industry and Investment NSW.
- Roads and Traffic Authority.
- Singleton Council.
- Cessnock City Council.
- Maitland City Council.

The following agencies provided input into the Director General's Requirements:

- Department of Environment, Climate Change and Water.
- Department of Water and Energy (now part of Department of Environment, Climate Change and Water).
- Department of Planning Heritage Branch.
- Industry and Investment NSW.
- Roads and Traffic Authority.

The written comments received are discussed in Chapter 4.

Exhibition

If the Environmental Assessment is considered to meet the Director General's Requirements, the Department of Planning would place the Environmental Assessment on public exhibition for at least 30 days. During the exhibition period, submissions would be invited from relevant agencies and members of the public.

The Department of Planning may provide the Hunter 8 Alliance with a copy of any submissions or a summary of the issues raised in the submissions. The Hunter 8 Alliance may be asked to respond to the issues and may modify the Project and the draft Statement of Commitments to issues raised in the submission.

If the Project or draft Statement of Commitments is modified in response to issues raised, a Preferred Project Report would be prepared to describe the scope of the revised project. The Director-General would make this report public.

Assessment and Determination

Following the exhibition period, the Department of Planning would, on behalf of the Minister for Planning, review the Environmental Assessment, submissions received and any preferred project report. Once the Department of Planning has completed its assessment, an Assessment Report would be prepared for the Director-General, which may include recommended conditions of approval.

The recommended conditions would refer to the draft Statement of Commitments and may modify them and / or add additional provisions.

The Assessment Report would then be submitted to the Minister for Planning for determination. The Minister may refuse the Project, or approve it with any conditions considered appropriate.

The Minister's determination and the Director-General's Environmental Assessment Report would be published on the Department of Planning's web site immediately following determination.

Landowners Consent

Pursuant to Clause 8F (1d) of the *Environmental Planning and Assessment Regulation* 2000 (the Regulation), certain applications for approval under Part 3A of the EP&A Act do not require the consent of the landowner, including linear infrastructure projects. The Hunter 8 Alliance is however required to give notice of the application. In the case of this Project (as it is a linear infrastructure project) notice is required in a newspaper circulating in the locality prior to the commencement of the exhibition period.

The notice required by clause 8F of the Regulation was placed by the Hunter 8 Alliance in The Herald, Maitland Mercury, Singleton Argus and Cessnock Advertiser on 5 February 2010. A copy of the notification is provided in Appendix B.

2.7 Summary of Approval Requirements

A summary of approvals required to be obtained before works can commence on the Project is included in Table 2-3.

Table 2-3 Summary of Approval Requirements

Act	Administering Agency / Approval Authority	Approval
Environment Protection and Biodiversity Conservation Act 1999	Commonwealth Department of Environment, Water, Heritage and the Arts.	Controlled Action Approval.
Environmental Planning and Assessment Act 1979	NSW Department of Planning.	Part 3A Project Approval.

Act	Administering Agency / Approval Authority	Approval
Protection of the Environment Operations Act 1997	NSW Department of Environment, Climate Change and Water.	Variation to EPL 3142 or Project-specific EPL.
Roads Act 1993	Maitland, Cessnock, and Singleton Councils.	Section 138 consent.
Water Management Act 2000	NSW Office of Water.	Section 56 Access Licence.

2.8 Conclusion

The Project would be assessed under Part 3A of the EP&A Act as a Major Project and follow the Part 3A Project Approval process.

The Director-General of the Department of Planning identified a number of key and general assessment requirements to be addressed in this Environmental Assessment. These issues are considered in detail in Chapters 8 to 19.

The relevant Director General's Requirements are listed in the introduction to each of the following sections and identifies where addressed within that section.

A comprehensive set of environmental management measures would be implemented which aim to minimise potential impacts during construction and operation of the Project. Additionally, these measures would enable the Project to be carried out in accordance with all environmental requirements. The requirement to implement these measures is specified in the draft Statement of Commitments.

3. Location and Setting

3.1 Regional Setting

The Project commences in the suburb of Farley within the Maitland local government area (LGA), approximately 35 kilometres north-west of the Newcastle city centre. The Project continues in a west-north-westerly direction along the alignment of the Main Northern Railway for approximately 30 kilometres, through the Maitland, Cessnock and Singleton LGAs, concluding in Minimbah in the Singleton LGA (refer to Figure 1.1, Chapter 1).

Key features of the surrounding region are described below.

3.1.1 Key Regional Features

Transport Infrastructure

The existing regional transport infrastructure within the area surrounding the Project consists of the Main Northern Railway and the New England Highway.

The Project would run parallel and in close proximity to the existing Main Northern Railway. The Main Northern Railway starts from Sydney and extends north to the Queensland border, at the town of Wallangarra just beyond Armidale. The section of the railway between Sydney and Maitland forms part of the main northern trunk line and carries a variety of freight and passenger trains. Beyond Maitland the railway is predominantly used for freight, in particular coal from the Hunter Valley coalfields. Nonetheless, passenger trains do continue to Armidale.

The New England Highway runs generally parallel to the Project on the northern side of the Main Northern Railway. The Highway ranges from approximately 2.4 kilometres north of the Project in the Lochinvar area to approximately 220 metres north of the Project at Belford (refer to Figure 1.1, Chapter 1). The Highway crosses the Main Northern Railway approximately 1.1 kilometres east of the eastern extent of the Project. Several public and/or private roads cross the Project. These are discussed in more detail in Section 3.2.

Topography

The regional topography of the area surrounding the Project generally comprises low lying hills, valleys and alluvial plains. The hills are typically gently undulating, with slopes between one and six degrees. The topography generally rises along the Project route from alluvial plains associated with the Hunter Valley near Maitland to the ridge between Allandale and Greta. The Main Northern Railway is either cut into or filled above the natural topography to provide an acceptable gradient.

Water Features

The Project is located in the Hunter catchment. The Hunter catchment is the largest coastal catchment in NSW, covering approximately 22,000 square kilometres (DECCW, 2009a).

The Hunter River flows in a south-westerly direction from Glenbawn Dam in the north of the catchment to meet the Goulburn River near Denman. From Denman it flows in a south-easterly direction through Singleton and Maitland to the north of the Project before entering the Pacific Ocean at Newcastle (Hunter-Central Rivers CMA, 2009).

All creeks and rivers within the Hunter catchment are tributaries of the Hunter River. The Project crosses a large number of creeks and drainage lines. These are described in more detail in Section 3.2.

The eastern extent of the Project runs along the northern edge of Wentworth Swamp.

Protected Areas

Belford National Park is located in close proximity to the western extent of the Project, approximately 360 metres north of the existing Main Northern Railway at Belford. Belford National Park covers an area of 294 hectares.

Werakata National Park is located approximately five kilometres south of the Project at its nearest point. The National Park is situated to the north, east and south of Cessnock and covers an area of 3337 hectares.

There are no other protected areas, such as national parks, nature reserves, State conservation areas or regional parks, in the vicinity of the Project.

3.2 Project Location

Locations along rail lines are noted by the term chainage. The chainage at a location is the distance of that point in relation to Central Station in Sydney (NSW only) based on 0.000 kilometres being located at the end of Central No. 1 Platform. To provide an accurate location description, chainage is used throughout this Environmental Assessment.

In describing rail lines the following terms are used:

- **Up Main:** Primary (main) rail line that trains usually traverse when they are heading toward Sydney and is usually positioned on the left when facing towards Sydney.
- **Down Main:** Primary (main) rail line that trains usually traverse when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney.
- **Up Relief Main:** Secondary rail line that runs parallel with the main line(s) that trains usually traverse when they are heading toward Sydney and is usually positioned on the left of the Up Main line when facing towards Sydney. The Up Relief Main usually provides a passing facility enabling trains to pass those traversing or stationary on the main line thus giving relief to the main line operations.

The Project would commence in Farley approximately two kilometres west of Maitland Station at approximate chainage 194.500 kilometres and would run adjacent to the Main Northern Railway for approximately 30 kilometres concluding at Minimbah at approximate chainage 224.200 kilometres (refer to Figure 1.1, Chapter 1).

The proposed third track would be predominantly located on the Up side of the Main Northern Railway. Approximately four kilometres of track, from chainages 210.176 kilometres to 211.716 kilometres (Greta) and 214.064 kilometres to 216.360 kilometres (Branxton), would be located on the Down side.

The local setting along the Project route is described below and shown in Figure 3.1.

3.3 Local Setting

The main features and land uses in the vicinity of the Project are:

- Transport infrastructure.
- Waterways.
- Rural/rural residential development.
- Residential development.
- Industrial development.

3.3.1 Transport Infrastructure

Roads

A number of roads exist along the 30 kilometre Project route, including Wollombi Road, Old North Road, Station Lane, Allandale Road, Nelson Street, Bridge Street and Hermitage Road.

The existing road crossings along the Main Northern Railway consist of four overbridges, two underbridges and three level crossings at the time of submission of the Environmental Assessment (refer to Figure 3.1). ARTC is currently proposing to replace the level crossings at Station Lane and Hermitage Road with overbridges.

Railway Stations

The Project passes three railway stations along the Main Northern Railway at Lochinvar, Greta and Branxton (refer to Figure 3.1). Lochinvar Railway Station is located off Station Lane approximately 1.7 kilometres to the south of the village of Lochinvar at chainage 202.610 kilometres. Greta Railway Station is located off Nelson Street approximately 260 metres to the west of the built up area of Greta at approximate chainage 210.820 kilometres. Branxton Railway Station is located off Station Street in the southwest of the urban area of Branxton at approximate chainage 215.570 kilometres.

3.3.2 Waterways

Six named creeks and 53 other waterways cross the Main Northern Railway. All waterways generally flow to the north into the Hunter River. The named creeks are Stony, Lochinvar, Anvil, Sawyers, Black and Jump Up Creeks.

Waterways currently run beneath the Main Northern Railway via underbridges or culverts. There are six underbridges and 53 culverts (refer to Figure 3.1). Further details of both waterways and drainage structures are provided in Chapter 18.

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Existing Underbridge
- Existing Overbridge
- Existing Culvert
- Rail Centreline
- Built up Areas
- Railway Station
- Hunter Expressway
- Project Area
- Level Crossings
- Watercourse Area
- Watercourse

Maitland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Existing Environment

Figure 3.1a

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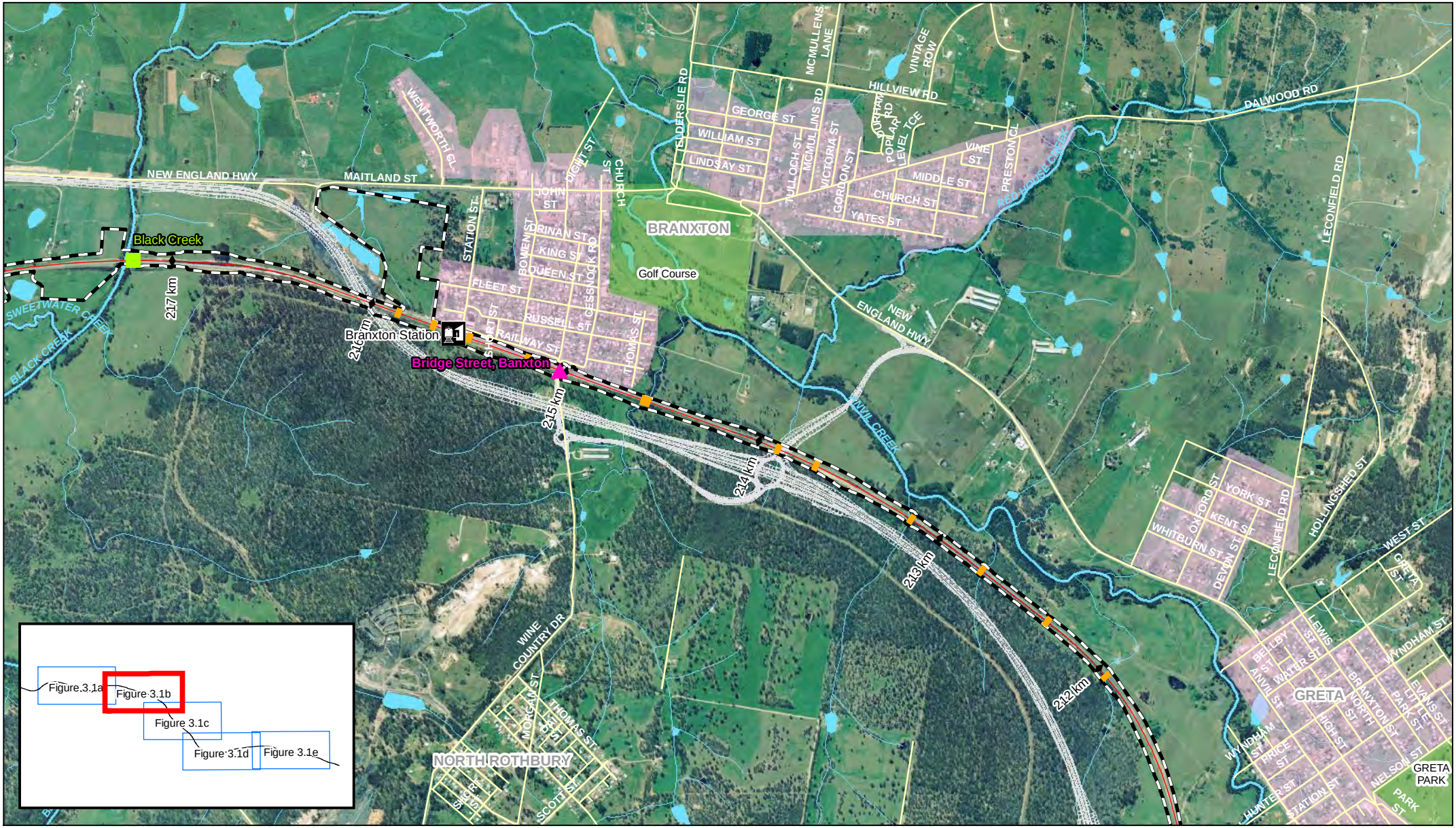
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com.au W www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay



1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Existing Underbridge
- Existing Overbridge
- Existing Culvert
- Rail Centreline
- Built up Areas
- Railway Station
- Hunter Expressway
- Project Area
- Level Crossings
- Watercourse Area
- Watercourse

Maitland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

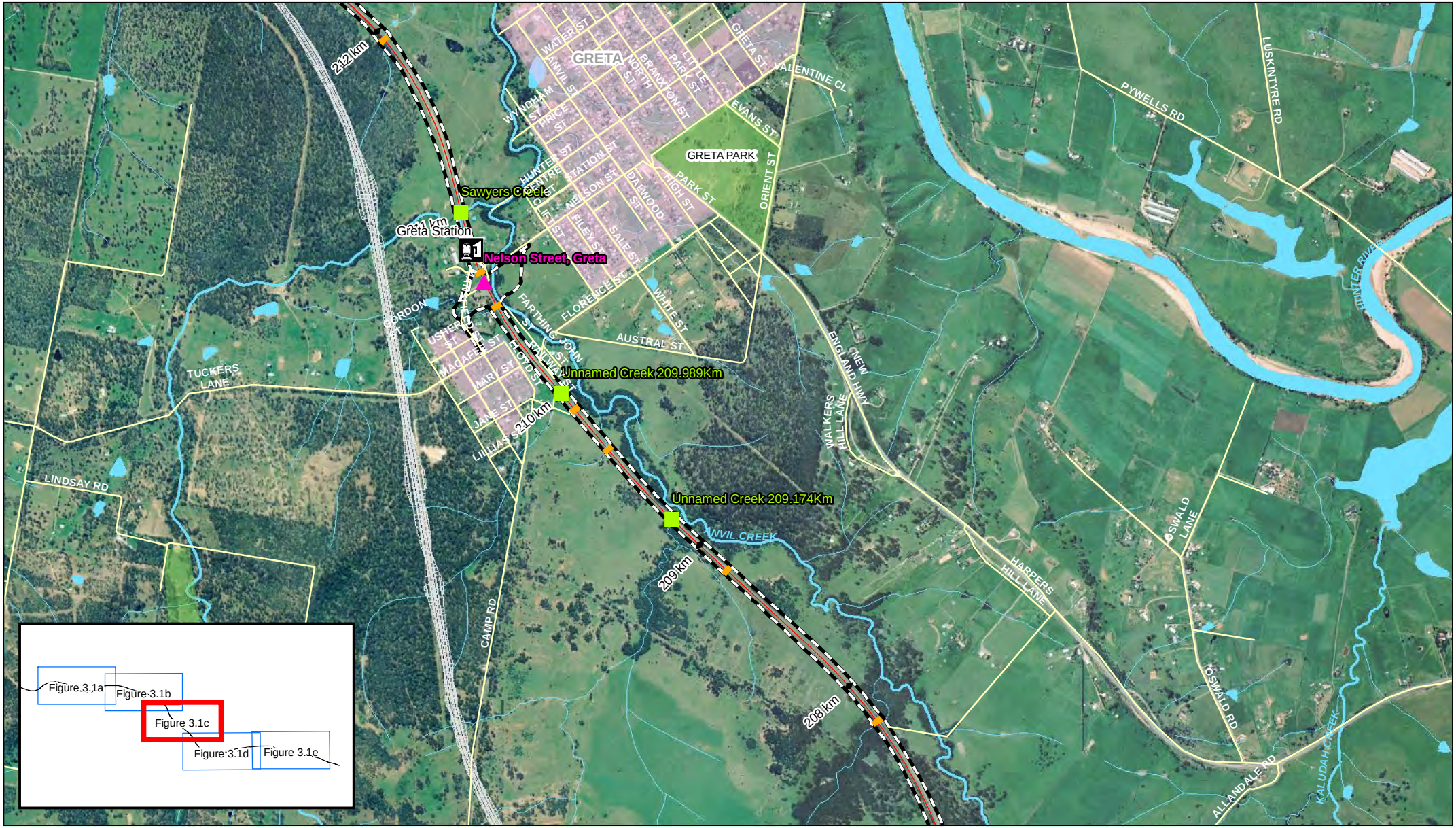
Existing Environment

Figure 3.1b

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Existing_Environment_20100524.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com.au W www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Existing Underbridge
- Existing Overbridge
- Existing Culvert
- Rail Centreline
- Built up Areas
- Railway Station
- Hunter Expressway
- Project Area
- Level Crossings
- Watercourse Area
- Watercourse

Maitland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Existing Environment

Figure 3.1c

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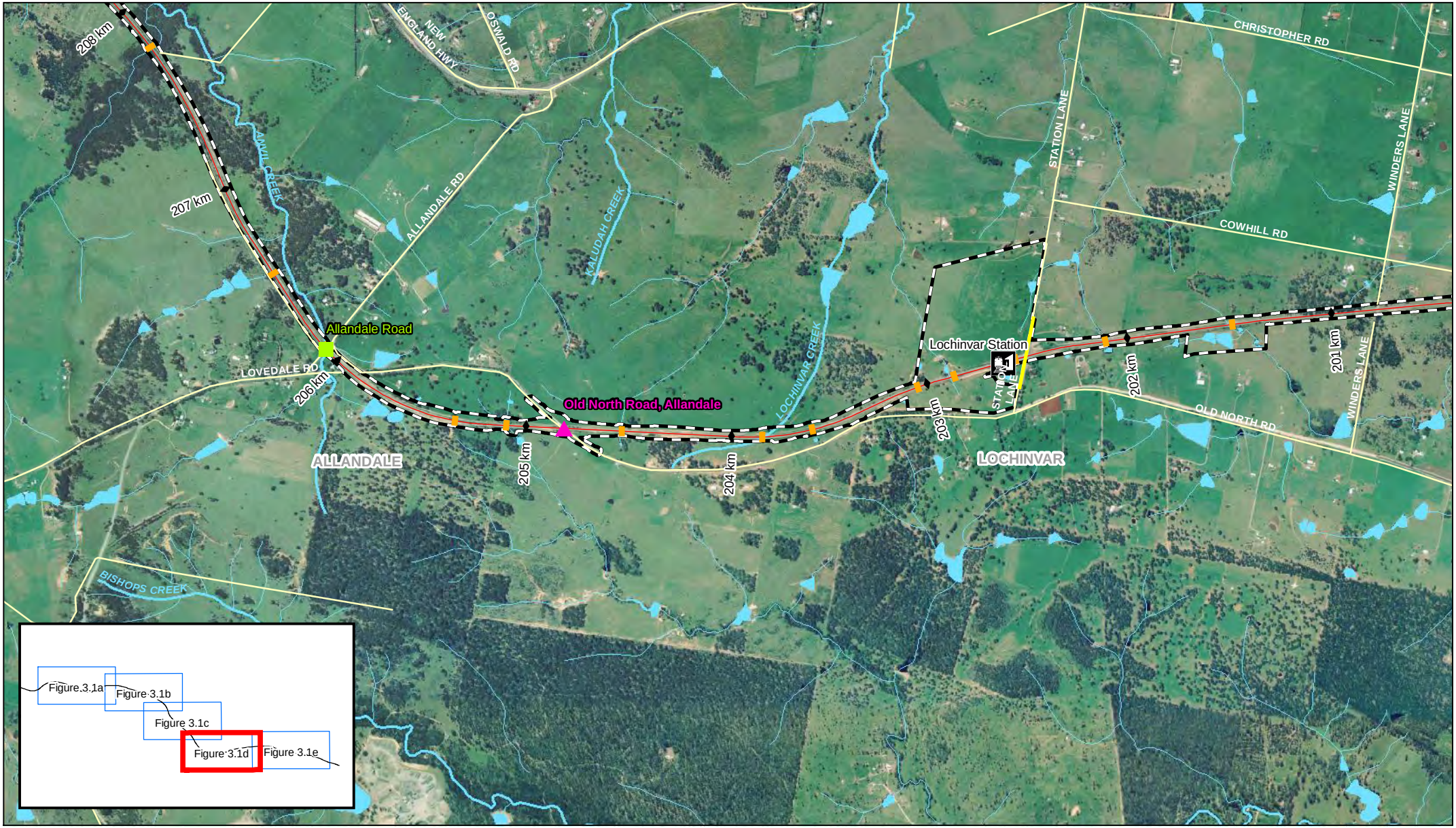
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay



1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Existing Underbridge
- Existing Overbridge
- Existing Culvert
- Rail Centreline
- Built up Areas
- Railway Station
- Hunter Expressway
- Project Area
- Level Crossings
- Watercourse Area
- Watercourse

Maitland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Existing Environment

Figure 3.1d

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com.au W www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Existing Underbridge
- Existing Overbridge
- Existing Culvert
- Rail Centreline
- Built up Areas
- Railway Station
- Hunter Expressway
- Project Area
- Level Crossings
- Watercourse Area
- Watercourse

Maitland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Existing Environment

Figure 3.1e

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Existing_Environment_20100524.mxd
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com.au W www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

3.3.3 Rural / Rural Residential Development

The majority of the Project traverses a modified rural landscape which is predominantly used for cattle grazing. Small scale viticulture is also present in the vicinity of the Project, mainly within the Cessnock and Singleton LGAs. A large number of the rural properties contain farm dams. Rural residential development is also scattered along most of the Project route, particularly at the western end of the Project in Belford.

Other rural land located adjacent to the Project includes Wentworth Swamp adjacent to the eastern end of the Project and various areas of woodland. Woodland areas are most prevalent to the south of the Project between Greta and Branxton.

3.3.4 Residential Development

The Project commences immediately south of a built up urban area to the west of Maitland. This urban area consists predominantly of residential development and includes the suburbs of Farley, Rutherford and Telarah.

The Project also runs along the southern boundary of the built up residential area of Branxton. Residential areas at Greta are located in close proximity to the Project on both the Up and Down sides.

There are also proposals and investigation areas for residential development located adjacent to the Project. These include mixed use developments at Heritage Green and Anvil Creek and the Farley and Lochinvar Investigation Areas. Further details are provided in Section 14.2.

3.3.5 Industrial Development

The eastern end of the Project adjoins a small area of industrial development associated with the urban area to the west of Maitland. There are also a number of small light industrial sites scattered along the Project route, including at Branxton and Belford.

In addition, there is both an approved industrial development and an industrial investigation area located adjacent to the Project at Rutherford (refer to Section 14.2).

4. Consultation

4.1 Introduction

The Director-General's Environment Assessment Requirements identify consultation as a key issue for the Environmental Assessment and require consultation to be undertaken and documented in the Environmental Assessment.

This chapter details the consultation activities undertaken for the Project. Table 4-1 outlines the Director-General's Environmental Assessment Requirements relating to consultation and where they have been addressed.

Table 4-1 Director General's Environmental Assessment Requirements – Consultation

Director General's Environmental Assessment Requirements	Where Addressed
"The Environmental Assessment must demonstrate that an appropriate and justified level of consultation with relevant stakeholders occurred during the preparation of the Environmental Assessment including (but not limited to):	Chapter 4
◗ *Department of Planning (Heritage Branch and Hunter Regional Office);*	Section 2.6 and 4.3
◗ *State authorities including the Department of Environment and Climate Change, the Department of Water and Energy and the Department of Primary Industries;*	Section 4.3
◗ *The Commonwealth Department of Environment, Water, Heritage and the Arts;*	Section 4.3
◗ *Service and infrastructure providers including the NSW Roads and Traffic Authority, RailCorp and Rail Infrastructure Corporation;*	Section 4.3
◗ *Specialist interest groups including Local Aboriginal Land Councils;*	Section 4.2
◗ *Singleton Shire, Cessnock and Maitland Councils;*	Section 4.3
◗ *The public, including adjoining and affected landowners and businesses.*	Section 4.2
The Environmental Assessment must describe the consultation process undertaken and identify the issues raised (including where these have been addressed in the document)."	Chapter 4

4.2 Community Consultation

4.2.1 Objectives

The objectives of the community consultation undertaken for the Project were:

- To provide information about the Project and the planning process to landowners potentially affected by the Project and to other key stakeholder groups, including the wider community.
- To provide stakeholders with the opportunity to express their views about the Project.
- To identify potential design and environmental management issues and consider suggestions.

4.2.2 Consultation Activities

Consultation activities commenced in March 2009 at the start of the concept design and environmental assessment process. This involved providing stakeholders with information, as well as providing opportunities for stakeholders to raise any issues and concerns. Key stakeholders targeted included:

- Landowners with properties directly affected by the Project or within close proximity to the Project.
- Singleton, Maitland City and Cessnock City Councils.
- State and federal government agencies.
- The Aboriginal community.
- The broader community.

Contact and Feedback Mechanisms

The following communication methods were available throughout the concept design development and environmental assessment to provide the community with a range of ways to contact the Project team, gain access to information and provide comment.

Information line:	1800 216 317
ARTC Project Line	1800 182 543
Email:	communityinput@hunter8.com.au
Website:	www.hunter8alliance.com.au
Reply paid post address	Reply Paid 5403 Hunter Region Mail Centre NSW 2310
Fax number	02 4979 9988

Information about the Project has been and will continue to be uploaded onto the Project website to ensure ready access to information about the Project.

Contact and Issues Database

The Hunter 8 Alliance established a contact database in May 2009 to manage contacts made and issues raised by stakeholders. The issues raised are identified in Section 4.2.3.

The database is able to hold information received during the environmental assessment process including community contact details, issues raised and actions taken. Data is received via ARTC and the Project team, feedback forms, information sessions and meetings, email, fax, mail and phone.

Fact Sheet

A fact sheet entitled 'Hunter 8 Alliance Project Maitland to Whittingham Third Track Fact Sheet May 2009' was prepared to inform landowners about the Project. The fact sheet is included in Appendix B. The fact sheet was distributed to potentially affected landowners at a face-to-face meeting or sent to them following a telephone conversation. A copy of the fact sheet was also uploaded to the Project web site.

The fact sheet provided information on the following:

- The reasons for the Project.
- The proposed design.
- The environmental assessment and construction program.
- The proposed works.
- The findings of the Preliminary Environmental Assessment.
- The areas of investigation in the detailed Environmental Assessment.
- Information on the property acquisition process.
- Contact details to allow feedback or to request further information.

Community Newsletters

A community newsletter entitled 'Hunter 8 Alliance Project Stage 2 Maitland to Minimbah Third Track Community Newsletter #1 May 2009' was prepared to inform the wider community about the Project. Following this, a second Community Newsletter was produced, entitled 'Hunter 8 Alliance Maitland to Whittingham Third Track Community Newsletter #2 October 2009'. A third community newsletter entitled 'Hunter 8 Alliance Maitland to Whittingham Third Track Community Newsletter #3' was issued in February 2010. Copies of these newsletters are provided in Appendix B.

The newsletters contained information about the reasons for the Project, the proposed environmental assessment and construction program, the proposed works, the findings of the Preliminary Environmental Assessment, and the areas of investigation in the detailed Environmental Assessment. Contact details were also provided.

Both newsletters were mailed to those on the contact database. Copies of the newsletters were also uploaded to the Project web site and made available at the following locations:

- Static information displays (described below).
- Community drop in sessions (described below).

The Hunter 8 Alliance Communications Team plans to continue these newsletters on a quarterly basis throughout the ongoing design, assessment and construction phases of the Project.

Meetings with Landowners

Potentially affected landowners and landowners in close proximity to the Project were sent a letter to make them aware of the Project. Individual landowners were then contacted to arrange meetings to discuss the Project and its likely impacts on their properties. Where required, access agreements were taken to landholder meetings to document their consent for the Hunter 8 Alliance to enter their properties for various investigations.

Landowners included private owners, Singleton, Maitland and Cessnock Councils and State government agencies, including NSW Roads and Traffic Authority (RTA) and the Hunter Water Corporation (HWC).

In the first phase of meetings, 62 meetings with landowners took place with a further four telephone contacts. The purpose of the meetings/contacts was to:

- Introduce the Project.
- Provide information on the likely third track alignment and other changes.
- Provide information on where and how the Project may impact on their properties.
- Discuss access issues (where relevant).
- Identify any environmental issues of concern.
- Provide information on the property acquisition process.

The landowner meetings provided an opportunity to capture information and landowner issues at an early stage of the Project.

Several further meetings have been undertaken with affected landowners to discuss land acquisition and restoration issues as required. These meetings have been ongoing since May 2009.

Community Drop In Sessions

Community drop in sessions were held at Greta Arts and Sports Community Hall on 12 October 2009 and Maitland Library on 14 October 2009.

Details of the drop in sessions were provided in Community Newsletter #2 and advertised in the local media. Advertisements were placed in the Newcastle Herald on 3 and 10 October 2009, the Singleton Argus and Maitland Mercury on 9 October 2009, and the Hunter Valley News on 30 September 2009 and 7 October 2009.

An additional community drop in day was held at the Maitland Markets on Sunday 7 March 2010.

The drop in sessions were held to allow interested parties to ask questions about the Project and raise any concerns.

Static Information Displays

Static information displays were erected at Singleton Shire Council and Maitland City Council offices from 27 October to 19 November 2009 and at Warkworth Village Oval on the Mount Thorley Warkworth Family and Neighbour Day on 24 October 2009.

The static information displays were erected to allow members of the community to find out information about the Project. The displays included information on the Project and the environmental assessment process, as well as details of the Project's website and contact details.

Copies of the community newsletters along with Hunter 8 Alliance Community Consultation Team details were also made available at Maitland Library and Singleton Visitor Information Centre from 27 October 2009.

Aboriginal Community Consultation

The Project is located within the areas of interest of the Mindaribba and Wanaruah Local Aboriginal Land Councils (LALC) and within an area of interest to a number of other Aboriginal persons and organisations.

The local Aboriginal community was consulted and involved throughout the preparation of the Environmental Assessment as part of the Aboriginal Heritage Impact Assessment (refer to Chapter 12). This consultation was undertaken in accordance with the requirements of the Department of Environment, Climate Change and Water (DECCW) policy *Interim Community Consultation Requirements for Applicants*.

The consultation process involved:

- Placing a media advertisement in the local press requesting that Aboriginal persons/ organisations interested in the Project register their interest in writing.
- Providing detailed information about the Aboriginal Heritage Impact Assessment, including proposed methodology, to the interested Aboriginal persons / organisations.
- Inclusion of comments received from registered Aboriginal persons / organisations in the final assessment methodology.
- Field inspection with the registered Aboriginal stakeholders.
- Providing the draft Aboriginal Heritage Impact Assessment report to registered Aboriginal stakeholders and inviting comments.
- Establishing an Indigenous Liaison Committee as a mechanism for Aboriginal stakeholders to raise issues and grievances, promote Aboriginal issues and to allow for potential on-going employment for Indigenous people on the Project.
- Creating an understanding of Indigenous issues for Hunter 8 Alliance staff by facilitating Indigenous cultural awareness training.
- Preparation of a final Aboriginal Heritage Impact Assessment report incorporating Aboriginal stakeholder input.

Further details on the outcomes of this consultation are included in **Chapter 12**.

4.2.3 Results of Community Consultation

Contacts Made Through the Contact Mechanisms

A small number of contacts were received from the wider community about the Project through the 1800 number and email process during the concept design and environmental assessment phase. The majority of contacts made through these mechanisms have been received from affected landowners wanting information on land acquisition issues and following up on their concerns on the track design and its potential impact on their land. Methods and numbers of contacts received are outlined in Table 4-2.

Table 4-2 Summary of Community Contacts

Method of Contact	Number of Contacts
Project hotline	80
Project email	28
Landowner meeting	146
Community drop in sessions	74
Letters submitted	12
Facsimiles submitted	4

Landholder and Community Issues

Key issues raised throughout the community consultation process are summarised below in Table 4-3. These issues are cross-referenced to where they are addressed in the Environmental Assessment.

Table 4-3 Key Landowner and Community Issues and Comments

Topic	Issues	Where Addressed
ARTC's track record in community consultation	Issues raised about ARTC's commitment and responsiveness to the needs of the local community. Lack of consultation on decisions made in the past, in relation to capital and maintenance activities.	Section 4.2
Noise / vibration	Noise mitigation for houses or services located close to the existing track that will be closer to the proposed third track.	Section 17.6
	Increased number of trains.	Section 17.5
	Noise attenuation at specific points along track needs investigation.	Section 17.6
	Interference with television reception.	Section 19.5
	Construction or extension of existing noise barriers.	Section 17.6

Topic	Issues	Where Addressed
Property access	Main and alternate property access during flooding for properties reliant on structures likely to be affected by flood waters. (Note: There are no properties along the Project route which rely on structures likely to be affected by flood waters for access)	N/A
	Contractors expected to follow all reasonable guidelines that residents give them on entering their properties, such as roads to use, and gates to open and close.	Section 7.19
Property and land acquisition	Landowners with specific services on land impacted by the Project require the services to be relocated, such as dams and drainage pipes. (Note: Details of the relocation or removal of farm dams would be part of the detail design for the Project)	N/A
	Effect of the Project on future value and land usage of specific properties.	Sections 14.3 and 19.5
	Mitigation for noise and light from trains.	Sections 17.6 and 19.5
	Maintaining fences and gate closures whilst construction is undertaken on acquired land.	Section 7.19
	Potential impacts on land of interest to prospective buyers.	Section 14.3 and 19.5
Aboriginal heritage	Aim to investigate all items or places of Aboriginal heritage.	Chapter 12
ARTC access tracks	Potential of vandals accessing private property via these tracks.	Section 19.5
Flooding	Increased flooding as a result of third track design and new rail structures.	Sections 18.3 and 18.4
	Current flooding is largely due to location and design of current track, design of culverts and poor track maintenance.	Section 18.2
Utilities	Impact of the Project on existing utilities in location of the alignment.	Chapter 7
	Construction activity impacts on utilities.	Chapter 7
Flora and Fauna	Aim to identify and reduce impact on all flora and fauna.	Chapters 9, 10 and 11
	Clearing of vegetation along proposed third track and access tracks.	Chapter 9
Dust	Impact of dust on households due to increased traffic on unsealed roads.	Sections 16.3, 16.4 and 19.5

Topic	Issues	Where Addressed
	Increased coal dust.	Sections 16.3, 16.4 and 19.5
	Earthworks / stockpiles dust.	Sections 16.3, 16.4 and 19.5
Business disruption	Business disruptions due to increased heavy vehicle traffic and road closures.	Section 19.5
Conduct of contractors	Impact of contractors on property, mainly fencing and rubbish.	Section 19.5
Culverts, bridges, creek diversions	Project construction impacts on stream length, existing stream gradient, flow velocity and vegetation.	Sections 18.3 and 18.4
Safety	Residents' safety during construction period.	Sections 7.19 and 15.4
	Heavy machinery traffic on Winders Lane.	Section 15.5

Aboriginal Community Issues

Extensive consultation with the Aboriginal community has been undertaken throughout the preparation of the Environmental Assessment as part of the Aboriginal Heritage Impact Assessment. Further details on the issues raised by the Aboriginal community (including copies of correspondence) are provided in Appendix G.

The key issues identified through the Aboriginal consultation were as follows:

- Identified Aboriginal sites that are to be disturbed during construction works are appropriately managed or salvaged.
- Identified Aboriginal sites that are to be left undisturbed but are in close proximity to construction works are appropriately managed.
- Aboriginal stakeholders continue to be involved and consulted throughout construction works.

4.2.4 Next Steps for Community Consultation

The Community Consultation team will be organising additional static displays and drop in sessions to maintain a high level of information distribution and communication about the Project. Further newsletters and fact sheets will also be produced and distributed, the web site will be continually updated, and notices will continue to be published in the local media, particularly regarding any expected traffic disruptions.

A Near Neighbour Strategy has also been developed to continue communication particularly leading up to the construction phase. A near neighbour for the purposes of the strategy, is a resident or landholder whose land borders a directly affected landholder, or whose property is within 500 metres of the existing rail line between Maitland and Minimbah. Others in the vicinity may also be added to the list of near neighbours, depending upon how they may be affected by the Project.

It is anticipated that near neighbours would include:

- Residents close to Hermitage Road, Standon Drive, Pothana Drive, Station Lane, Allandale Road / Old North Road and Wollombi Road.
- Maitland residential area (including schools, churches and sporting facilities).
- Telarah residential area.
- Rutherford residential area.
- Greta residential area.
- Scattered rural residential properties.
- Proposed new residential areas – Huntlee (near Branxton) and Heritage Green at Rutherford.

The above consultation activities will continue throughout the Environmental Assessment exhibition period and construction phase of the Project.

4.3 Statutory Consultation

Several government agencies were consulted as part of the Planning Focus Meeting for the Project and by the Department of Planning during preparation of the Director-General's Environmental Assessment Requirements (refer to Section 2.6.1).

Table 4-4 summarises the Environmental Assessment Requirements submitted to the Department of Planning by government agencies and details where the requirements are addressed in the Environmental Assessment. All submissions were considered by the Department of Planning in the development of the Director-General's Environmental Assessment Requirements. These are discussed in Section 2.6.1 and referenced throughout this Environmental Assessment.

Table 4-4 Key Government Agency Environmental Assessment Requirements

Issues Raised	Where Addressed
Department of Planning Heritage Branch	
Impact on identified local and state significant heritage throughout the rail corridor, in particular State Heritage Listed items. Environmental Assessment to include a detailed Heritage Impact Assessment.	Chapter 13
Department of Environment, Climate Change and Water	
Increased noise and vibration and overpressure impacts on sensitive receivers due to construction of the Project and increased rail capacity along the Main Northern Railway as a result of the Project. Environmental Assessment to include a comprehensive noise assessment in accordance with relevant guidelines.	Chapter 17
Potential impacts on threatened species and their habitats. Environmental Assessment to include an assessment of the potential impacts on threatened species, populations, endangered communities and their habitats in accordance with relevant guidelines.	Chapters 9 to 11

Issues Raised	Where Addressed
Potential impacts on Aboriginal cultural heritage. Environmental Assessment to include an assessment of all identified sites and details of consultation with Aboriginal community in accordance with relevant guidelines.	Chapter 12 and Section 4.2
Potential impacts on ground and surface water quality during project construction and potential flooding impacts. Environmental Assessment to include an assessment of impacts on ground and surface water (including a water management plan, site water balance, pollution control works and flood modelling) in accordance with relevant guidelines.	Chapter 18 and Section 19.3
Disposal of wastes generated by the Project, in particular Virgin Excavated Natural Material, and storage of fuel and chemicals. Environmental Assessment to include a waste management strategy in accordance with relevant guidelines.	Section 19.7
Greenhouse gas emissions.	Section 19.4
Office of Water (formerly Department of Water and Energy)	
Impacts on surface water, watercourses and associated riparian vegetation.	Sections 18.3, 9.3 and 11.3
Impacts on groundwater including Groundwater Dependent Ecosystems.	Sections 11.3 and 19.3
Impacts on basic landholder's rights and licensed water users.	Section 14.3
Environmental Assessment to include assessment of the above in accordance with relevant guidelines, State policies and any applicable water sharing plan.	Chapters 9,11 and 18 and Section 19.3
Environmental Assessment to include details of bores, farm dams and other water management structures and appropriate license must be obtained.	Sections 14.3 and 19.1
Department of Industry and Investment (formerly Department of Primary Industries)	
Interference with water flows and fish passage.	Sections 11.3 and 18.3
Potential need to redirect or divert waterways for construction and associated impacts on receiving waterways.	Sections 7.13 and 18.3
Roads and Traffic Authority	
Potential road traffic noise impacts on adjoining residential areas during night-time construction operations due to truck movements.	Section 17.5
Impacts on the regional and state road network including pedestrian, cyclist and public transport facilities.	Section 15.5
Impacts on property access.	Section 15.5
Environmental Assessment to include a comprehensive Traffic Impact Study, including traffic counts and SIDRA modelling, in accordance with relevant guidelines.	Chapter 15
Traffic Management Plan to be prepared and provided to RTA and Council.	Section 15.6

Issues Raised	Where Addressed
Commonwealth Department of Environment, Water, Heritage and the Arts	
Project is a controlled action and will be assessed through accredited assessment.	Sections 2.4 and 2.5

Subsequent consultation has been undertaken by the Hunter 8 Alliance with various government agencies in the form of meetings, correspondence (emails and letters) and phone discussions. Correspondence received from government agencies, along with minutes of meetings with government agencies (including the Planning Focus Meeting), are provided in Appendix B. Table 4-5 lists the consulted agencies, the key issues raised and where these issues are addressed in the Environmental Assessment.

In addition, the Department of Environment, Climate Change and Water (DECCW) was consulted as part of the Aboriginal community consultation process described in Section 4.2.2, requesting details of the relevant Aboriginal stakeholders to invite to be involved in the Aboriginal heritage impact assessment.

Table 4-5 Key Government Agency and Infrastructure Provider Issues

Issues Raised	Where Addressed
Department of Environment, Climate Change and Water – Environment Protection and Regulation Group	
Clarification of Environmental Assessment Requirements for Air Quality Impact Assessment, Noise and Vibration Impact Assessment and Greenhouse Gas Emissions Assessment.	Chapters 16 and 17, and Section 19.4
Department of Environment, Climate Change and Water – Biobanking Team	
Initial discussions on offsetting strategy, including DECCW nomination of potential properties, and the combination of the offsetting strategy for the Project with that for the Minimbah Bank Third Track Project.	Section 9.4
Department of Environment, Climate Change and Water – Office of Water	
Maintain stream length, slope and power for creek realignments and revegetate following construction.	Section 18.4
Show how creek flows will be managed during construction of creek realignments.	Sections 7.13 and 18.4
Causeway crossings for access tracks to cater for base flows with higher flows to go over causeway and to be located on straight sections of creeks.	Sections 18.3 and 18.4
Department of Industry and Investment (formerly Department of Primary Industries)	
Any ‘fresh’ fossiliferous horizon exposed by the Project in the nationally listed Allandale Area is to be removed and placed on display elsewhere, such as I&I offices, museums, universities and in the vicinity of the cutting.	Section 13.4
Maintain or increase existing waterway opening areas for culverts and bridges.	Section 18.4

Issues Raised	Where Addressed
Provide scour protection consistent with the RTA 2000 year life requirements and embedded below the invert for culverts and bridges. (Note: Scour protection would not be to RTA requirements as the Project is for rail infrastructure).	Section 18.4
Review Fisheries roadway crossing guidelines.	Chapter 18.4
Ensure downstream culvert extensions do not result in a nick point.	Section 18.4
Ensure culvert extensions do not increase flow velocities.	Section 18.4
Maintain existing stream length, gradient and channel profile for creek realignments.	Section 11.3
Reinstate riparian vegetation and suitable habitats, such as slow flow areas, following creek realignments.	Sections 11.3
Department of Planning Heritage Branch	
No issues raised at the Planning Focus Meeting	Noted
Review of Heritage Branch Heritage Database for details on State Heritage Register sites	Chapter 13
Department of Planning Hunter Regional Office	
No issues raised at the Planning Focus Meeting	Noted
Review of Department of Planning strategies for the Hunter Region: - Lower Hunter Regional Strategy. - Associated local government planning and settlement strategies.	Chapter 14
Roads and Traffic Authority	
Cumulative impacts of the Project and extension of F3.	Chapter 20
Access to roads for haulage.	Sections 15.3 and 7.19
RailCorp / Rail Infrastructure Corporation	
Station modifications to satisfy requirements of Disability Discrimination Act.	Section 7.15
New platforms to accommodate trains of two car length (approximately 60 metres).	Section 7.15
New platforms to meet relevant standards with regards to platform widths and safety zones.	Section 7.15
Heritage buildings to be preserved.	Sections 7.15 and 13.4
Singleton Shire Council	
Vegetation clearing.	Chapters 9 and 11
Noise impacts.	Section 17.5

Issues Raised	Where Addressed
Impacts on future residential development.	Sections 14.3 and 19.5
Cessnock City Council	
Flooding problems at Allandale Road underbridge with flood levels of 1.8 metres recorded. (Note: The Project does not include any works on the existing Allandale Road underbridge, or impacts or amendments to the road profile of Allandale Road)	N/A
Blockage of flush drains at Allandale Road underbridge. (Note: The Project does not include any works on the existing Allandale Road underbridge, or impacts or amendments to the road profile of Allandale Road)	N/A
Road clearance at Allandale Road underbridge. (Note: The Project does not include any works on the existing Allandale Road underbridge, or impacts or amendments to the road profile of Allandale Road)	N/A
Maitland City Council	
Noise and vibration impacts.	Section 17.5
Impacts on flood plain.	Section 18.3
Impacts on approved residential development north of Rutherford.	Section 14.3
Consistency with Lochinvar strategy and plans for Lochinvar Station Precinct.	Section 14.3
Consistency with Council's urban settlement strategy and future settlement in the area of Wollombi Road.	Section 14.3
Impacts on surrounding residences and passenger trains during construction.	Sections 7.19, 14.3, 15.5, 16.3, 17.5, 19.5 and 19.6

Part B
The Project

5. Strategic and Project Justification

The Director-General's Environmental Assessment Requirements identify a strategic justification to be a key issue for the Environmental Assessment. Table 5-1 outlines the Director-General's Environmental Assessment Requirements relating to strategic justification and where they have been addressed.

Table 5-1 Director-General's Environmental Assessment Requirements – Strategic and Project Justification

Director-General's Environmental Assessment Requirements	Where Addressed
Describe the strategic need, justification and objectives for the project, including its consistency with the aims and objectives of relevant State policies and publications, such as the State Plan and Lower Hunter Regional Strategy	Section 5.1
Identify alternatives to the preferred project considered (including the alignment), and justify the project taking into consideration the objects of the *Environmental Planning and Assessment Act 1979.*	Section 5.2

5.1 Strategic Justification

5.1.1 Strategic Need for the Project

The majority of export coal shipped through the Port of Newcastle is transported by rail for shipping from either Carrington (Port Waratah) or Kooragang Island. Most of this coal comes from mines in the Hunter Valley is conveyed to the ports on the Main Northern Railway.

Export coal volumes are currently constrained by port capacity. This situation is due to change in the first quarter of 2010 with the commissioning of a third coal loading terminal on Kooragang Island. The current rail configuration between Maitland and Minimbah provides sufficient theoretical capacity to last until port capacity expands, at which time the track becomes capacity constrained. Unloading facilities at the port need to receive a constant flow of trains. During maintenance of the current line, train movements are restricted, affecting capacity of coal at the port unloading facilities.

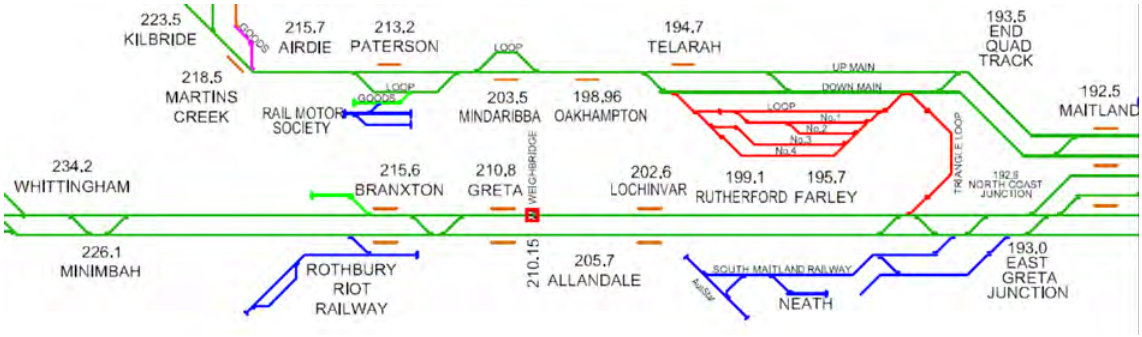
The Main Northern Railway has limited capacity to increase its efficiency as trains are currently required to maintain headways in excess of 10 minutes. Headways are defined as the closest spacing between the fronts of two following trains to ensure the second train can safely maintain the same speed as the first.

At present, export coal capacity of the Hunter Valley rail network averages around 95 million tones per annum. Current industry forecasts indicate demand on the Hunter Valley rail network will increase to 190 million tones per annum by 2012. After 2010 or 2011 minimum headways south of Whittingham Junction will need to be reduced to eight minutes to accommodate the forecast coal demand.

Existing Rail Infrastructure

There are four existing tracks between the Port of Newcastle and Maitland Junction. These consist of the Up and Down Main North and the Up and Down Coal Mains. North of Maitland, two existing tracks form a junction between the Main Northern Railway and North Coast Railway.

Current operations along the corridor consist of a mixture of general freight, passenger and coal services. Figure 5.1 shows existing track configuration from Maitland to Minimbah.



Legend:			
	ARTC Lease Network – Main Corridor / Stations		Asset Management Storage
	Multi-user Sidings		RailCorp / Station
	Surplus to Operational Req. – Lease / Closure		Private Sidings

Source: ARTC, 2008 http://www.artc.com.au/library/ARTCS3060214_NSW_HV.pdf?20080812

Figure 5.1 Existing Track Configuration - Maitland to Minimbah

The original railway line into the Hunter Valley began as a single line, which now forms the existing Down Main alignment. This line was later duplicated to provide what is now the existing Up Main alignment. Although the track and formation along the lines has since been upgraded, some of the existing formation is in its original condition.

Limitations to Existing Infrastructure

The section of track between Minimbah and Maitland is built on a relatively poor quality embankment formation. There is a strong prospect that with the forecast increase in traffic volume this formation will require a significant increase in maintenance frequency and intensity (ARTC 2009). The frequent need for on-track maintenance results in loss of capacity for coal trains and disruptions to CityRail passenger services. These maintenance delays are expected to increase as coal tonnages increase, creating more delays and causing greater loss in capacity in the movement of coal and other freight.

5.1.2 Strategic Response

The ARTC has released Hunter Valley Infrastructure Enhancement Strategies annually since early 2005. These strategies set out how the ARTC plan to approach demand for coal transport from the Hunter Valley. The fundamental approach of the ARTC in developing its Strategies has been to increase rail corridor capacity to levels sufficient to meet anticipated demand for export and domestic coal transport.

The ARTC's most recent strategy *2009-2018 Hunter Valley Capacity Strategy Consultation Document* (ARTC 2009) (the ARTC Strategy) requires a capacity increase in excess of 200 million tones per annum by 2012 on the Main Northern Railway, to meet export and domestic coal transport needs.

The strategy identifies constraints to the coal network's capacity in the Hunter Valley, options and courses of action. Operational delays and performance are the focus of the report.

Two main options were identified to address capacity constraints:

- Bi-directional signalling and crossing loops (which have been constructed).
- Construction of a third track between Minimbah and Whittingham (known as Stage 1, currently under construction) and between Maitland and Minimbah (known as Stage 2, the subject of this Environmental Assessment).

Implementation of bi-directional signalling and crossing loops provided a slight increase in capacity and greater flexibility for train movements, reducing downtime during maintenance. However, significant improvements in performance in the long-term, requires construction of a third track.

Headways on Allandale Bank (located at approximate chainage 206.000 to 211.000 kilometres) were previously 10 minutes but were reduced to eight minutes in conjunction with the Minimbah-Maitland bi-directional signalling project. At this headway, capacity will not become constrained until 2015. The capacity constraint in 2015 could be avoided by the provision of a third track.

To deliver this additional capacity, one of the key improvement projects included in the 2009-2018 Strategy is the proposed third track between Maitland and Minimbah.

The Project is also part of the Maitland to Whittingham Third Track Project, which was announced by Prime Minister Kevin Rudd in November 2008 as part of the Federal Government's Nation Building package. The Nation Building package was introduced as a response to the global recession, to support jobs and invest in future long term economic growth.

As part of the $1.2 billion Nation Building package, the Maitland to Whittingham Third Track Project would increase the capacity of the rail system to meet projected demand for domestic and export coal.

5.1.3 Consistency with State Policies and Publications

NSW State Plan

The NSW *State Plan, A New Direction for NSW* (the State Plan) contains a set of goals that the NSW government will work towards, and identifies priorities for Government action that would help achieve these goals. The Project would assist in achieving a key vision for NSW identified within the State Plan through strengthening the NSW economy and facilitating a safe and reliable freight transport system. The Project would increase freight carrying capacity along the Project route thereby facilitating the efficient rail transportation of coal to the Port of Newcastle.

The Project seeks to contribute towards the following priorities of the State Plan:

- Growing prosperity across NSW:
  - Priority P1 Increased business investment.
  - Priority P2 Maintain and invest in infrastructure.
  - Priority P6 Increased business investment in rural and regional NSW.

The Project is consistent with the objectives of the State Plan, in particular its commitment to maintaining and investing in infrastructure across the State including railways and strengthening the NSW economy. Furthermore, the Project would result in an outcome that assists the NSW State Government in achieving its listed priorities as summarised below.

Priority P1 Increased Business Investment

The State Plan recognises the importance of supporting large and small business. The Project would result in a significant investment in rail infrastructure to support NSW's growing economy, in particular the coal industry.

Additionally, the construction phase of the Project would create opportunity for local businesses to supply services, labour and goods, which would strengthen the local economy.

Priority P2 Maintain and Invest in Infrastructure

The State Plan recognises that every business and person in NSW relies on State Government infrastructure to be provided at the right place and at the right time. The Project would contribute to the delivery of this commitment.

The export efficiency of the coal industry is currently compromised, mainly due to sections of rail infrastructure that cannot cater for future demand. The current constraint of the Hunter Valley coal carrying system (from mine to ship) is the Port of Newcastle's ability to load the quantity of coal transported by rail onto export vessels. In early 2010, the new coal loader at the Port of Newcastle was commissioned. This places increasing pressure on the rail network not to constrain the coal delivery system. The ARTC is therefore implementing a strategy of line improvements endeavouring to keep the rail system capacity in line with industry demands.

The Project would result in significant investment to rail infrastructure, and would permit an increase to coal carrying efficiency to supplement the operation of the new coal loader at the Port of Newcastle.

Priority P6 Increased business investment in rural and regional NSW

The State Plan recognises that strong rural and regional economies are critical to achieving the overall prosperity of NSW. The Project would strengthen the coal industry in the Hunter Valley, Narrabri, Ulan and the Gunnedah Basin by permitting increased efficiency in coal carrying capacity.

The Lower Hunter Regional Strategy

The NSW Government's *Lower Hunter Regional Strategy 2006-2031* (LHRS) is a planning document which complements and informs other relevant State planning instruments. Its purpose is to ensure that adequate land is available and appropriately located to sustainably accommodate the projected housing and employment needs, and associated support services and infrastructure, over the next 25 years. The LHRS works with the Government's Regional Conservation Plan to ensure that the future growth of the Lower Hunter makes a positive contribution to the protection of sensitive environments and biodiversity.

The Project complies with the directions in the Strategy through the provision of employment during construction of the Project as well as long-term economic and employment benefits through the improved efficiency in transportation of coal and other commodities and through the upgrade of transport facilities and the rail network.

5.2 Objectives of the Project

The objective of the Project is to increase rail capacity and reliability between the Hunter Valley and the Port of Newcastle. In addition to providing increased track capacity, the Project aims to improve operational performance along the route. These improved efficiencies would be created through reduced impacts on coal traffic due to track maintenance activities, reduced loss of train paths due to shadow path effects from passenger services and the reduced loss of available train paths due to train breakdowns.

The objectives of the Project are outlined below. These objectives have been developed to achieve the coal carrying capacity requirement between Maitland and Minimbah and hence improve rail capacity, reliability and operational performance between the Hunter Valley and the Port of Newcastle.

5.2.1 Core Objectives

The core objectives of the Project are to:

- Provide network capacity ahead of coal industry demand.
- Minimise maintenance impacts on the operation of the network.
- Reduce headway for loaded coal trains to eight minutes between Maitland and Whittingham.
- Increase line capacity to 200 million tonnes per annum.
- Have the reduced headway and increased line capacity in place by January 2012.
- Ensure compatibility with the outcomes for the Minimbah Bank Third Track (Stage 1) works.
- Locate the third track on the Up side to maximise capacity and minimise maintenance.
- Have no impact on mainline operations.

5.2.2 Non-Core Objectives

The Project is required to address the existing and predicted Minimbah Bank track and associated coal carrying capacity requirements.

The non-core objectives of the Project are to:

- Maximise operational benefits beyond the core objectives within the constraints of the operational requirements.
- Minimise impacts to existing operations during construction.
- Minimise the quantity of property acquisition and property severance required.
- Minimise capital expenditure.
- Minimise life cycle maintenance costs.
- Minimise signalling and communications complexity.
- Provide operational contingencies to manage maintenance impacts.
- Have regard to the Principles of Ecologically Sustainable Development (as outlined in the ARTC's Environmental Impact Assessment Code of Practice).

5.3 Alternatives to the Project

The Hunter 8 Alliance (which includes the ARTC) considered alternatives to increase system capacity other than building a third rail track, as well as a range of track design alternatives.

The two alternatives to the Project are discussed below. Alternatives to the alignment of the track and associated infrastructure are discussed in Chapter 6.

5.3.1 Other Supply Chain Alternatives

Road transport is used for short distance haulage, and is an effective method when the mine site is located near ports, or far away from the rail head. Rail is the most effective means of long distance transport in Australia, especially for export coal. Transportation of coal by road would not be viable for the following reasons:

- Existing road infrastructure could not cope with large increases in haulage of coal, both in terms of traffic impacts and road surface condition.
- Substantial noise impacts of 24 hour transportation by road on residents located adjacent to transport routes.
- Cost effectiveness, as road transport would require more employees, vehicles and fuel costs and slower distribution rates make road transport over long distances unviable.
- Greenhouse impacts through greater fuel consumption and hence emissions.

5.3.2 The 'Do Nothing' Alternative

This alternative would maintain the existing two bi-directional tracks, limiting capacity of the lines creating severe service disruptions and increased rail wear. As 95% of coal trains in the Hunter Valley negotiate this section of track, this alternative has significant impacts to the current and future line capacity.

The current constraint of the Hunter Valley coal carrying system (from mine to ship) is the Port of Newcastle's ability to load the quantity of coal transported by rail onto export vessels. In 2010, the new coal loader at Port of Newcastle has been commissioned meaning, therefore, the constraint on the coal carrying system would become the rail network; specifically, the delays caused by the Maitland to Minimbah track on loaded coal trains.

The do nothing alternative would not meet the objectives of the ARTC Strategy to satisfy the forecasted demand. The only viable means to achieve this objective is to expand the capacity of the Main Northern Railway through construction of the third track.

5.4 Benefits of the Project

The Project would provide strategic and ongoing economic benefits to the region in the form of an expansion to the capacity of the freight and coal transport system and a reduced loss of revenue for the region from delays in the rail transportation network and reduced rail maintenance costs. The Project would also allow for an increase in passenger train services along the Main Northern Railway.

The third track would also serve to further reduce the impact of maintenance on the throughput of the port unloading facilities, as it would allow two tracks to remain open at all times. In doing so it potentially delivers benefits from a "whole-of-chain" perspective that are not immediately identifiable as track capacity benefits (ARTC 2009).

The Project was identified in the Prime Minister's media release in December 2008 as one of the key infrastructure projects to support the local and Australian economy. It is envisaged that the Project could achieve this objective through the following:

- Creation of up to 650 full time jobs during the construction phase.
- Indirect job creation and job security.
- Facilitation of future and protection of existing coal mine industry jobs in NSW.
- Benefits to Australian export income through improved transportation of coal (GHD 2009).

6. Alternatives Considered

As presented in Chapter 5, it is not possible to achieve the forecast capacity and meet necessary future demand for increased freight haulage between the Hunter Valley and Newcastle Port without the addition of a third track to the Hunter Valley Rail Network. There is no other alternative transport mode available that can achieve this objective. Thus the Project must contain a third track to meet the core objective of achieving the forecast rail capacity.

This chapter details the alternative Project elements considered in the design development as required by the Director-General's Environmental Assessment Requirements (Table 6-1). Alternative options for elements within the Project were considered under the non-core objectives (Section 5.2.2). In particular elements considered for further option development and refinement were track location, signalling, the track centre (offset from the existing track), and associated road upgrades, bridge structures and stations. A number of detailed option selection assessments were undertaken in order to generate the design presented in **Chapter 7**. This section outlines the alternative options considered.

Table 6-1 Director-General's Environmental Assessment Requirements – Project Alternatives

Director-General's Environment Assessment Requirements	Where Addressed
Project Justification – identify alternatives to the preferred project considered (including the alignment), and justify the project taking into consideration the objects of the *Environmental Planning and Assessment Act 1979.*	**Chapter 6**

6.1 Framework for Option Selection

The Hunter 8 design team delivered, in consultation with ARTC and key stakeholders, underpinning principles (Table 6-2) and challenges (Table 6-3) to the Project. These principles were used to develop suitable alternatives.

Table 6-2 Underpinning Principles

Consideration	Aspect	Principle
Design	Track Centres	To provide a safe working environment for maintenance post-construction.
	Ruling Grade	The existing ruling grade has been maintained however there may be some opportunity for grade relief during detailed design.
	Maintenance access track width	Provide a safe work environment.
	Surface drainage	Convey surface runoff through an open channel drainage system wherever practical.
	Signaling layout	To provide most effective signal layout.

Consideration	Aspect	Principle
	Structures	To provide structures that cater for current rolling stock and allow flexibility in track configuration.
	Safety	Provide a safe working environment for operation of the Project, as well as during construction.
	Constructability	Project is able to be constructed within the given physical and time based constraints.
	Operation	Minimise ongoing maintenance requirements
Environment	Property impacts	Minimise vegetation clearing of threatened and endangered species and communities. Minimise the impacts on heritage items (buildings and artefacts).
	Community	Minimise the extent of works thereby minimizing the impacts on property (temporary lease, acquisition, construction impacts on properties and livelihoods). Reinstate riparian vegetation in impacted waterways. Minimise the impact to residences in close proximity and noise-sensitive receivers. Assess the socio-economic impacts and maximize the benefits. Minimise physical interaction between the community and the rail network. Maintain the existing level of service for public roads.
	Construction	Minimise the impacts on flora, fauna, soil, noise, vibration, air quality, visual, water quality, heritage and waste impacts. Minimise the extent of earthworks and drainage works. Rehabilitate disturbed areas.
	Operation	Minimised ongoing maintenance requirements. Monitor revegetated areas. Monitor noise, vibration, air quality, water quality and waste.
Cost		Minimise the costs associated with the preferred option while satisfying, wherever reasonable, the requirements of each of the aspects above.

Table 6-3 Project Challenges

Constraint	Issue
Existing Infrastructure	There are a number of existing pieces of infrastructure located within the corridor. These include structures, services and earthworks formations. Minimising impact to these structures is desirable to reduce impact to the overall environment. The development of the Feasibility design identified a number of key locations where interaction with services was considered critical. More detailed investigations were therefore undertaken to improve the accuracy of existing service locations within the Project extents. These revised locations have been incorporated into the preferred option development.
Track Location	Optimisation of the track capacity and locating the track on the Up side would provide greater benefits both for coal transport and reduced maintenance. The track location was restricted to be adjacent to existing infrastructure to minimise disturbance to the community and prevent further fragmentation of the environment.

6.1.1 Design Objectives

Design objectives were identified to assist the refinement of options that comply with the overall project objects. These objectives were generated to assist in the enhancement of options and include:

- Meet the performance and functional needs of ARTC during development, design, construction and commissioning.
- Comply with ARTC Network Rules and Procedures.
- Develop a design that provides network capacity ahead of coal industry demand.
- Minimise ongoing maintenance requirements.
- Minimise the impact to railway operations during development, design, construction and commissioning.
- Delivery of a safe, high quality and sustainable solution.
- Challenge the current ARTC design standards to achieve a safer, higher quality and more sustainable solution.
- Minimise the impact on the local environment.
- Minimise the impact on the local community.
- Maintain good public relations.
- Satisfy the requirements of the Hunter Valley and North Coast Signaling Alliance operational and signaling design.
- Deliver cost effective solutions for the ARTC.
- Interface with other projects within the rail corridor.

In addition to this, each option identified, where practical, considered the interface with other works within the vicinity of the Project works. These works include:

- Minimbah Bank Third Track Project (Stage 1).
- Pacific National Provisioning Facility (potentially located on the Down Side between Greta and Branxton).
- Proposed remodeling of Maitland Junction.
- New road bridges over the rail line at Hermitage Road, Nelson Street and Station Lane.

6.2 Options

6.2.1 Signaling Options

Signaling options were investigated to determine the maximum allowable freight movement on the overall Project network. The options included signaling works with some civil works in order to maximize the capacity of the network. The preferred signaling option is detailed in Chapter 7, and is supported by a signaling investigation undertaken by Ove Arup & Partners (2009). This option considers all the constraints, principles and design objectives in Section 6.1, meets the required capacity of the network (**Chapter 5**) and maximises capacity of the network while also minimising construction costs.

6.2.2 Track Centres

As presented in Table 6-4, the track is predominantly to be located on the Up side of the existing track due to its ability to provide a better overall network solution. However, a Down side option was also considered. The offset of the third track must also be achieved under the principles and design objectives. A summary of the advantages of varying the track centres is provided in Table 6-4.

Table 6-4 Track Centres - Summary of Options

	Description	Advantages	Disadvantages
Option 1	Track predominantly on Up side with 4.5 metre track centres from future slewed Up main	Meets alignment constraints of new formation on Up side for majority of project.	Future slewing of centre track.
Option 2	Track predominantly on Up side with 8 metre track centres from future slewed Up main.	Minor increase in safety for construction of track (note that earthworks still required up to existing formation). Improved safety for maintenance during operations.	Increased extent of works, encroachment into properties and impact on local environment. Potential requirement for drainage between tracks. Increased earthworks volumes (although no increase in earthworks balance) Track geometry issues at crossovers. Future slewing of centre track.
Option 3	Track on Down side for full length with 4.5 metre track centres and future slewed Up main.	Reduced earthworks volumes.	Potential adverse impact on existing heritage items. Doesn't meet alignment constraint of new formation on Up side. Requires reconditioning of existing Up Main. Increased ongoing maintenance requirements.
Option 4	Track predominantly on Up side with 4.5 metre track centres from existing up main and future slewed Down main.	Future slewing of Down Main. Less earthworks than all options (except Option 3).	More earthworks required during future slewing of Down Main to accommodate access track.
Option 5	Track predominantly on Up side with 4.5 metre track centres from future slewed Up main and access track widened to 6.5 metres from track centre to edge of formation.	Provides improved access. Can be incorporated into any of the other options. Improved safety.	Increased earthworks volumes. Increased extent of works, encroachment into properties and impact on local environment.

In addition to the track centres, each option, depending on its location on the Up or Down side would require different earthworks. These are summarised in Table 6-5.

Table 6-5 Track Centre Option – Earthworks and Property Impacts

	Option 1	Option 2	Option 3	Option 4	Option 5
Balance (m^3) (spoil material)	503,000	492,000	249,000	442,000	546,000
Land Parcels (No.)	135	136	128	131	133
Affected Land Parcel Area (Hectares)	35.41	39.83	35.65	34.22	38.82

Due to the factors to be considered to determine the best solution, a workshop was held with key rail Stakeholders. At this workshop it was concluded that wider track centres would satisfy one of the design objectives of delivery of a safe, high quality and sustainable solution. Therefore options 1, 3, 4 and 5 were discounted due to their small track centres. Additionally the underpinning principle of reduced maintenance and the alignment constraint of the third track on the Up side were not met by Option 3. This resulted in a preferred option of Option 2.

6.2.3 Road Upgrades

Wollombi Road and Allandale Road

The alignment of the third track requires the construction of new underbridges at Wollombi Road and Allandale Road. In order to achieve the underlying principle of maintaining the existing level of service for public roads, there is a requirement to maintain existing sight distances and vertical clearances. The configuration of the proposed underbridges at these locations was addressed within the Structural investigations (Hunter 8 Alliance 2009a).

6.2.4 Bridges and Structures

The Project includes construction or alteration of a number of structures including bridges, culverts and stations. Options were generated by the Alliance in order to assess viable alternatives and provide a structure that meets the design considerations as well as consider other environmental and social impacts.

Of the bridge structures associated with the third track, there are seven underbridges and one stock underpass, modifications to one overbridge and demolition of two existing underbridges. For details refer to **Chapter 7**.

The parameters considered in the development of options for these structures are:

- Track centres at bridges and stations.
- 7.1 metre vertical clearance for new overbridges.
- Structural integrity / capacity of the existing bridge.

The structures considered for option assessment include:

- Brick arch culverts and Wollombi Road underbridge, chainage 195.555 kilometres.
- Stock Crossing adjacent to Wollombi Road, chainage 195.666 kilometres.
- Allandale Road Underbridge, chainage 206.069 kilometres.

- Anvil Creek un-named tributary underbridge, chainage 207.776 kilometres.
- Anvil Creek un-named tributary underbridge, chainage 209.174 kilometres.
- Anvil Creek un-named tributary underbridge, chainage 209.989 kilometres.
- Sawyers Creek Underbridge, chainage 211.010 kilometres.
- Bridge Street Overbridge, chainage 215.018 kilometres.
- Black Creek Underbridge, chainage 217.175 kilometres.
- Rix's Road Grade Separation, chainage 218.160 kilometres.
- Jump Up Creek Underbridge, chainage 222.848 kilometres.

6.2.5 Stations

Within the extent of the Project there are three stations including:

- Lochinvar Station.
- Greta Station (heritage listed).
- Branxton Station (heritage listed).

During the preliminary investigations and design team option workshops, consideration was given to both the ARTC and RailCorp requirements for stations. The key criteria considered in the option workshops included:

- All stations:
  - New platform length to match existing platform length.
  - Maintain existing platforms.
  - Construct new platform to service new third track.
  - Disabled access lifts would not be provided as part of this Project however sufficient space would allocated for future installations.
- Lochinvar Station:
  - Station access would not be required on the north side of the third track.
  - Signaling structures can be relocated to suit the Project alignment.
  - Construction of a footbridge would be required to cater for the Project.
- Greta Station:
  - Station access would be required on both sides of the station.
  - Extension of the existing footbridge would be required to cater for the Project.
- Branxton Station:
  - Station access would not be required on the south side of the proposed siding.

The options developed were presented at the stakeholder workshops and the assumptions refined to more closely align with the RailCorp design requirements. The key requirements that were considered in the development of preferred options for the stations, as presented in the Feasibility Report (Hunter 8 Alliance 2009a), included:

- Access to the station is required from both sides of line.

- Mobility access is required to all stations.
- Allow for up to 500 passengers utilizing the stations each weekday.
- Platform length for country stations is 210 metres.
- Minimise impacts to Heritage structures (buildings and heritage siding).

6.2.6 Preferred Project Option

From the combined Stakeholder, design team workshops and in consultation with ARTC a preferred option was identified. This option was then refined against wider project objectives, reviewed with key stakeholders and captured within the feasibility report (Hunter 8 Alliance 2009a).

A number of individual reports were then prepared and included the refined preferred option that occurred as part of the option selection process. These reports were attached to the Hunter 8 Project Feasibility Report (Hunter 8 Alliance 2009a) and included:

- Track, Earthworks and Drainage Feasibility Report.
- Geotechnical Desk Top Study.
- Roads Feasibility Report.
- Structures Feasibility Report.
- Survey Feasibility Report.
- Property Feasibility Report.
- Services Feasibility Report.
- Track Centre Options – Maintenance Review and Minutes to Evaluation Workshop – Track Centres and Access Road Width.
- Signaling Report.

Additional refinement was required subsequent to the submission of the Feasibility Report and has been presented within a number of value engineering reports. These reports have been prepared as a collaborative process between all aspects of the design team including engineering, environment, construction, and the ARTC. This process has culminated in a more robust design that addresses the underpinning principles, project constraints and design objectives. This refined Project description is detailed in Chapter 7.

6.2.7 Challenges to Design Standards

As outlined in Section 6.1.1, one of the Design Objectives is to challenge and improve upon the current ARTC design standards. The challenges raised during the option development (during and subsequent to the Feasibility design) are to achieve increased safety, improved whole of life maintenance, reduced environmental impacts, reduced community impacts and increased performance of the rail network.

The standards challenges that have been raised include:

- Track centre spacing of 4.5 metres. Project track centres for the third track have been nominated at 8.0 metres (average):
  - Improves safety during construction and operation.
  - Increases the availability of the rail network.
- Maintenance access track width of 5.5 metres. The nominated access track width is 6.5 metres:
  - Improves safety during construction and operation.
- Removal of signal posts and replacement with signal gantries:
  - The relevant RailCorp standard for signal gantries would be applied.
  - Still under investigation.
- Reduction of nominal overbridge clearance from 7.1 to 5.15 metres:
  - Reduces the extent of works and area of disturbance.
- Increase the capacity of top drains from 20-year design rainfall event to 100-year design rainfall event.
- Rail at 68 kilogram per metre length and new rail welding methods:
  - Still under investigation.
- Sleeper spacing greater than current standards:
  - Still under investigation.
- Crossovers would be designed for the new 8.0 metre (typical) track centres:
  - Still under investigation.
- Slab track at turnouts and crossovers:
  - Still under investigation.

These standard challenges have been developed in consultation with the ARTC to provide a higher standard design and better outcome in terms of safety and reduced ongoing operational and maintenance costs.

7. Description of the Project

7.1 Introduction

This chapter provides a description of the Maitland to Minimbah Third Track Project (the Project), including construction and operation.

7.1.1 Director General's Environmental Assessment Requirements

A requirement of the Director-General's Environmental Assessment Requirements is that the Environmental Assessment includes a detailed description of the Project. The Director-General's Environmental Assessment Requirements also identify general construction impacts as a key issue for consideration.

This chapter provides a detailed description of the various elements of the Project including details of both operational and construction activities. Table 7-1 outlines the Director-General's Environmental Assessment Requirements relating to the description of the Project and operational and construction activities and where each of these items is addressed.

Table 7-1 Director-General's Environmental Assessment Requirements

Director-General's Environmental Assessment Requirements	Where Addressed
General Requirements	
A detailed description of the project including:	
◗ Location, corridor, adjoining land uses (current and proposed) and planning context.	**Chapter 14**
◗ Key design elements of the project, including:	
Key operational components (track components, retaining structures etc).	Section 7.9 and 7.11
Ancillary operational components (access tracks, bridging structures, station modifications, flood mitigations works etc).	Section 7.13, 7.15 and 7.19
◗ Public and private property and infrastructure (utility) interactions.	Section 7.6
◗ Operational characteristics, including predicted rail corridor capacity, rail traffic frequency and opportunities for increased general freight and passenger trains.	Section 7.21
◗ Construction facilities, including construction compounds, lay-down areas, spoil stockpiling/management areas and haul roads.	Section 7.10.4, 7.10.5 and 7.19.1
◗ Project staging and timing.	Section 7.20

Director-General's Environmental Assessment Requirements	Where Addressed
General Construction Impacts	
The Environmental Assessment must assess and present a management framework for:	
◗ Site compounds and ancillary construction locations. Consideration should be given to:	
The identification and assessment of both primary and secondary site compounds and facilities on the receiving environment, and	Section 7.19.1
A strategy for managing site compounds, with particular focus placed on primary site compounds, and a broader, more generic approach developed for lower-risk activities;	Section 7.19.1
◗ Noise and vibration, including a considered approach to undertaking works outside standard construction hours. Consideration should be given to:	
Scheduling construction works having regard to the nature of construction activities (including transport, blasting and tonal or impulsive noise-generating works),	Section 7.20
◗ Traffic and access, including a considered approach to minimising construction traffic impacts on public and private access. Consideration should be given to:	
Route identification and temporary haul roads,	**Chapter 17**
The number, frequency and size of construction related vehicles,	**Chapter 17**
◗ Earthwork, including a considered approach to minimising impacts associated with the excavation, movement, stockpiling, rehabilitation and disposal of spoil and fill. Consideration should be given to:	
Quantification of bulk earthworks and spoil balance and the disposal of excess spoil.	Section 7.9.5 and 7.10

7.2 Project Location

The Project consists of the construction of a third track adjacent to the existing two tracks of the Main Northern Railway between Maitland and Minimbah, within the Hunter Valley, NSW.

The Project commences in Farley approximately two kilometres west of Maitland Station at chainage 194.500 kilometres and continues through the local government areas of Maitland, Cessnock and Singleton for approximately 30 kilometres, concluding at Minimbah at chainage 224.200 kilometres.

Figure 7.1 provides an overview of the Project location and the locations of key project elements. Further details on adjoining land uses and conditions are provided in **Chapter 14**. Smaller scale versions of Figure 7.1 are provided in Appendix T.

7.3 Rail Corridor and Property Acquisition

The rail corridor is generally defined as the area between fence line to fence line and ranges from approximately 25 metres to approximately 90 metres in width. This is generally reflected by the cadastre and property acquisition (land parcels) boundaries of the RailCorp property containing the rail infrastructure.

The existing rail corridor, which adjoins both public and private land, would be widened to accommodate the third track and associated infrastructure. The proposed new rail corridor would range in width from approximately 40 metres to approximately 110 metres in width.

Construction of the third track and associated infrastructure, such as rail access tracks, overbridges and drainage structures would require the strip acquisition of properties adjacent to the existing rail corridor to form the new rail corridor.

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Proposed Station Modification
- Proposed Station Relocation
- Proposed New Underbridge
- Proposed Modification of Existing Underbridge
- Proposed Culvert Extensions
- Construction Impact Area
- Proposed Spoil Areas
- Areas Requiring Cut
- Areas Requiring Fill
- Site Compounds
- Proposed Third Track
- Watercourse
- Watercourse area

Hunter ALLIANCE

Maitland To Minimbah Third Track
Environmental Assessment

Job Number	22-14471
Revision	A
Date	May 2010

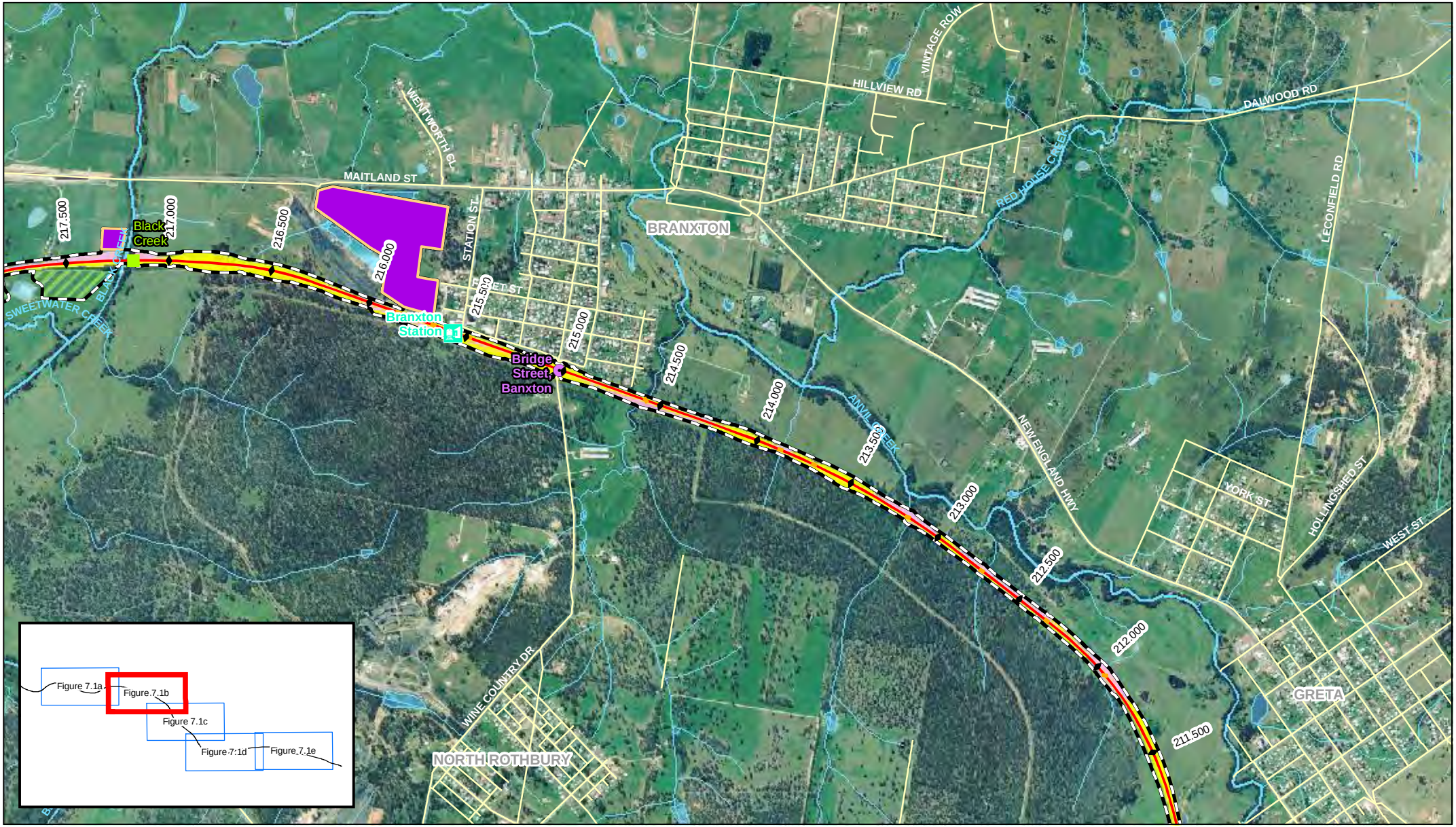
Project Location

Figure 7.1a

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay



1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Proposed Station Modification
- Proposed Station Relocation
- Proposed New Underbridge
- Proposed Modification of Existing Underbridge
- Proposed Culvert Extensions
- Construction Impact Area
- Proposed Spoil Areas
- Areas Requiring Cut
- Areas Requiring Fill
- Site Compounds
- Proposed Third Track
- Watercourse
- Watercourse area

Maitland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

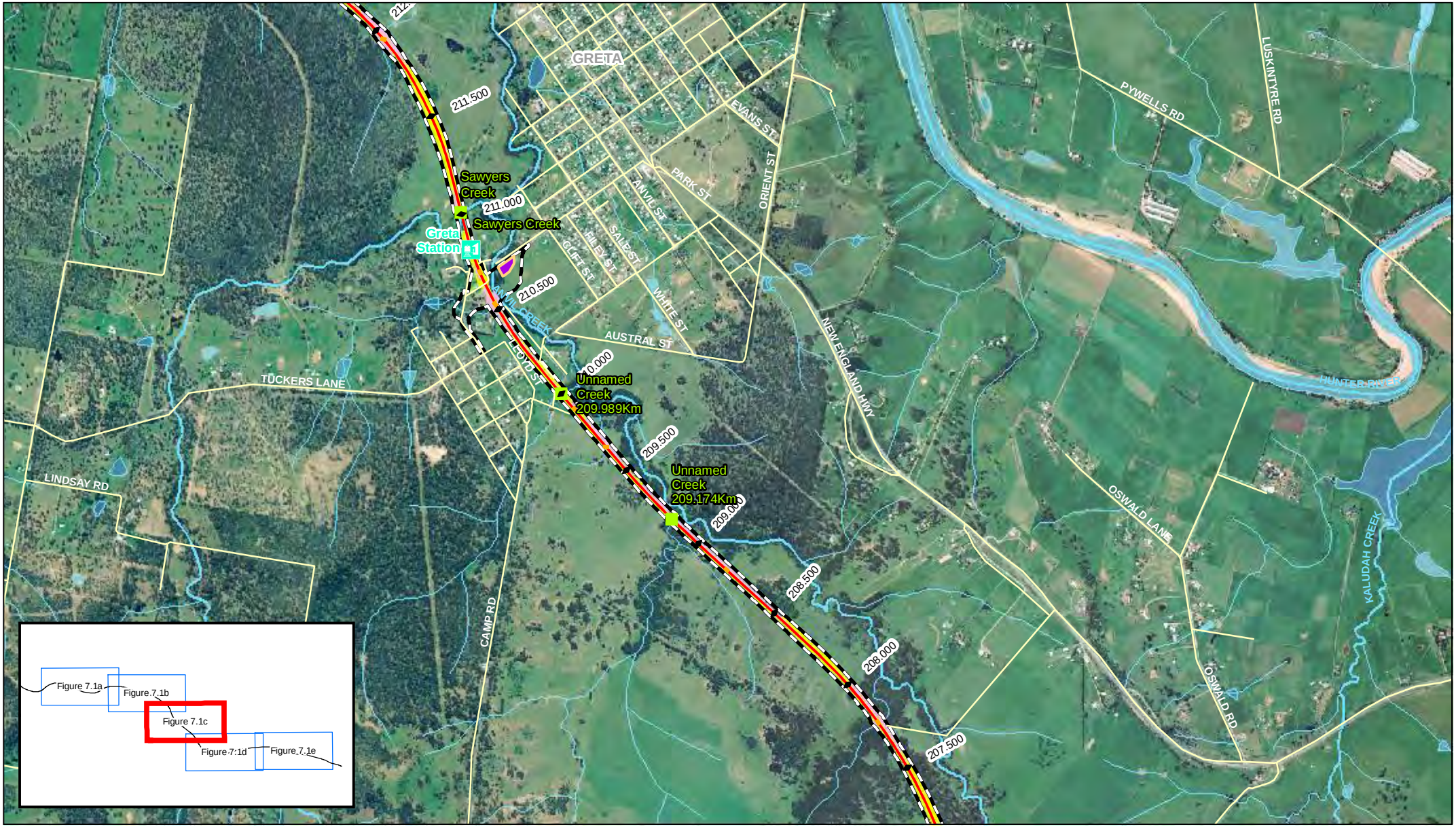
Project Location

Figure 7.1b

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com.au W www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay



1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Proposed Station Modification
- Proposed Station Relocation
- Proposed New Underbridge
- Proposed Modification of Existing Underbridge
- Proposed Culvert Extensions
- Construction Impact Area
- Proposed Spoil Areas
- Areas Requiring Cut
- Areas Requiring Fill
- Site Compounds
- Proposed Third Track
- Watercourse
- Watercourse area

Hunter ALLIANCE

Maitland To Minimbah Third Track
Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Project Location

Figure 7.1c

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Proposed Station Modification
- Proposed Station Relocation
- Proposed New Underbridge
- Proposed Modification of Existing Underbridge
- Proposed Culvert Extensions
- Construction Impact Area
- Proposed Spoil Areas
- Areas Requiring Cut
- Areas Requiring Fill
- Site Compounds
- Proposed Third Track
- Watercourse
- Watercourse area

Hunter ALLIANCE

Maitland To Minimbah Third Track
Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Project Location

Figure 7.1d

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Proposed Station Modification
- Proposed Station Relocation
- Proposed New Underbridge
- Proposed Modification of Existing Underbridge
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- Construction Impact Area
- Proposed Spoil Areas
- Areas Requiring Cut
- Areas Requiring Fill
- Site Compounds
- Proposed Third Track
- Watercourse
- Watercourse area

Hunter ALLIANCE

Maitland To Minimbah Third Track
Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Project Location

Figure 7.1e

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

The proposed new rail corridor (depicted in Figure 7.1) would be the property of RailCorp and operated and maintained under a lease held by ARTC. Figure 7.2 is a photomontage of the corridor (near Branxton Railway Station) after construction of the third track (on the right side of the picture).

The strip acquisition to achieve the required width of the new rail corridor would involve the partial or entire acquisition of approximately 128 lots from 100 landowners and would need to occur on both sides of the track. In identifying the property required for acquisition, effort has been made to minimise the impact of the Project on landowners where possible. Refer to **Chapter 14** for further details on existing land use and property acquisition.

Figure 7.2 Photomontage Showing Indicative Representation of the Rail Corridor with Third Track

7.4 General Terminology

The general terminology provided in Table 7-2 is used throughout this chapter and environmental assessment. Further specific terminology is defined in the relevant section.

Table 7-2 General Terminology

Element	Term	Definition
General	Up side	In a situation with more than one rail track in the rail corridor, the Down side is the side of the track on which trains travel when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney.
	Down side	In a situation with more than one rail track in the rail corridor, the Up side is the side of the track on which trains travel when they are heading towards Sydney and is usually positioned on the left when facing towards Sydney.

Element	Term	Definition
	Chainage	Chainage is generally the location in kilometres of the position of a railway in relation to Sydney (NSW only) based on the 0.00 kilometres being located at the end of Central No. 1 Platform.
	Country (direction)	The direction along the track away from Sydney.
	City (direction)	The direction along the track towards Sydney.
	Construction impact zone	The area which would be affected by construction works as part of the Project and incorporates the Project's extent of works, proposed site access, construction compound locations and spoil locations
Earthworks	Earthworks	Re-shaping of the natural ground level.
	Cut	An excavation for constructing below the natural ground level.
	Fill	Earth used to construct an embankment.
Track	Up Main	In a situation with more than one rail track in the rail corridor, the Up Main is the primary (main) rail line that trains usually traverse when they are heading toward Sydney and is usually positioned on the left when facing towards Sydney.
	Down Main	In a situation with more than one rail track in the rail corridor, the Down Main is the primary (main) rail line that trains usually traverse when they are heading away from Sydney and is usually positioned on the right when facing towards Sydney.
	Up Relief	Secondary rail line that runs parallel with the main line(s) that trains usually traverse when they are heading toward Sydney and is usually positioned on the left of the Up Main line when facing towards Sydney. The Up Relief usually provides a passing facility enabling trains to pass those traversing or stationary on the main line thus giving relief to the main line operations.
	Turnout	A rail track component that connects two railway tracks. The turnout comprises a length of straight track and a section of curved track that joins the straight track. The curved track includes a moveable section of track. The moveable section is adjusted to allow a train to travel from the curved track to the straight track.
	Crossover	Railway infrastructure which provides a train the ability to cross between two adjacent tracks.
Drainage	Central drainage	Longitudinal earth drains between the new and existing tracks. The central track drain would allow stormwater runoff to be collected and transferred to the outer cesses by a series of pits and pipes
	Cess drain	A surface drain that is located at formation level at the side of tracks to remove water.

Element	Term	Definition
	Cross drainage	Cross drainage structures allow catchment runoff from outside the rail corridor to flow through the rail corridor.
Bridges	Underbridge	A bridge where a road, pedestrian footway or waterway crossing is situated under the railway line.
	Overbridge	A bridge where a road or pedestrian footway is situated over the railway line.

7.5 Project Outline

The Hunter 8 Alliance, on behalf of ARTC, is proposing to construct a third track adjacent to the existing Main Northern Railway between Farley and Minimbah. The Project would involve the construction of approximately 30 kilometres of new rail track as well as construction and / or modification of major infrastructure along the Main Northern Railway.

Major elements of the Project would include track, turnouts and junctions, major earthworks, drainage, minor structures, new bridges, bridge modifications and station modifications.

A summary of the major infrastructure elements of the Project is provided in Table 7-3 and the location of these is presented in Figure 7.1.

Further detailed description of each element is included in Sections 7.9 to 7.17.

Table 7-3 Major Project Elements

Project Elements	
Earthworks	Major cut and fill earthworks along the route. Other minor earthworks.
Track	Approximately 30 kilometres of new track including turnouts and junctions. Relocation of turnouts from Minimbah and Branxton to Belford. Upgrade of maintenance siding turnouts at Branxton. Track reconditioning of existing Up Main at Greta and Branxton Stations and of the Branxton crossovers.
Drainage	Central and cess track drainage. Amendments to 53 culverts for cross drainage. Re-alignment of Sawyers Creek. Other drainage works around new structures.
Bridges	A new rail underbridge at Stony Creek and Wollombi Road, Farley. Closure of the stock crossing at Farley. Demolition of the existing rail overbridge at Old North Road, Allandale. A new rail underbridge at Allandale Road, Allandale. A new rail underbridge for an unnamed tributary of Anvil Creek (chainage 207.776 kilometres).

Project Elements	
	Demolition and replacement of the existing rail underbridge at an unnamed tributary of Anvil Creek, Greta (chainage 209.989 kilometres). A new rail underbridge at Sawyers Creek, Greta. Modification of the existing rail overbridge at Bridge Street, Branxton. A new rail underbridge at Black Creek, Belford. A new rail underbridge at Jump Up Creek, Belford.
Station Modifications	Modifications to Lochinvar Railway Station. Modifications to Greta Railway Station. Modifications to Branxton Railway Station.

7.6 Enabling Works

The design and construction of the Project impacts on existing signalling infrastructure, services and utilities as shown in Figure 7.3.

Service relocations include gas, electricity, communications, power, water and sewer infrastructure. Signalling relocations include construction of new cable route on the Down side of the mainline and relocating signal locations from the Up side to the Down side of the mainline, in most cases. Some relocations of the signalling from the Down to the Up side are required at Greta and Branxton Railway Stations.

The relocation of this infrastructure is being undertaken separately to the Project construction and will be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* and the ARTC *Code of Practice for Environmental Impact Assessment of Development Proposals in NSW* (2006).

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Construction Impact Area
- Proposed Third Track
- Watercourse
- Watercourse area
- Energy Australia
- Gas
- Hunter Water Corporation
- Private
- Railcorp
- Telstra

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Maitland To Minimbah Third Track
Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Existing Services Locations

Figure 7.3a

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Construction Impact Area
- Proposed Third Track
- Watercourse
- Watercourse area
- Energy Australia
- Gas
- Hunter Water Corporation
- Private
- Railcorp
- Telstra

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Maitland To Minimbah Third Track
Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Existing Services Locations

Figure 7.3b

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Construction Impact Area
- Proposed Third Track
- Watercourse
- Watercourse area
- Energy Australia
- Gas
- Hunter Water Corporation
- Private
- Railcorp
- Telstra

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Maitland To Minimbah Third Track
Environmental Assessment

Job Number	22-14471
Revision	A
Date	May 2010

Existing Services Locations

Figure 7.3c

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Construction Impact Area
- Proposed Third Track
- Watercourse
- Watercourse area
- Energy Australia
- Gas
- Hunter Water Corporation
- Private
- Railcorp
- Telstra

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Maitland To Minimbah Third Track
Environmental Assessment

Job Number	22-14471
Revision	A
Date	May 2010

Existing Services Locations

Figure 7.3d

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd
Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Construction Impact Area
- Proposed Third Track
- Watercourse
- Watercourse area
- Energy Australia
- Gas
- Hunter Water Corporation
- Private
- Railcorp
- Telstra

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Maitland To Minimbah Third Track
Environmental Assessment

Job Number	22-14471
Revision	A
Date	May 2010

Existing Services Locations

Figure 7.3e

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Project_Location_A4_1in25000_20091210.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

7.7 Summary of Major Construction Activities

A summary of the typical construction activities for each element of the Project is provided in Table 7-4.

Further details of construction activities for each element are included in Sections 7.10 to 7.20.

Table 7-4 Major Construction Activities

Pre-construction	
Site establishment	Site set out defining boundaries and sensitive environmental areas. Establishment of primary and secondary construction compounds. Implement initial environmental controls, such as silt fences and detention basins, to ensure protection of environmentally sensitive areas. Install monitoring instrumentation for the measurement of airborne particulates, noise and stormwater run-off turbidity.
Construction	
Earthworks	Clear vegetation in construction impact zone as required. Excavate cut sections and construct fill sections on both the Up and Down sides, including trimming and compaction. Construction of structural and capping layers of track and access roads. Undertake other minor earthworks such as local excavations for drainage structures, construction of central and cess drain channels.
Track works	Install new track, track slews, turnouts/crossovers, track sleepers and ballast.
Drainage works	Construct drainage culverts. Construct longitudinal drainage along the rail alignment consisting of cess drainage and central drainage.
Bridge works	Construction of six new underbridges. Closure of one new stock underpass. Demolition and replacement of one existing underbridge. Demolition of one existing overbridge. Modifications to one overbridge.
Station modifications	Construction of railway platform access facilities, including disabled access ramps. Construct platform extensions and widening. Auxiliary works, including, upgrade of security, communications, lighting and stormwater drainage.

Construction	
Other construction works	Rehabilitation and Landscaping. Environmental controls.
Ancillary works	Construction of temporary haul roads and access ramps.
Finishing works	
Removal of temporary construction compounds	Remove and restore temporary construction compounds.
General site clean up	Leave the site in a clean condition.

7.8 Construction Impact Zone

The construction impact zone is defined as the area which would be affected by construction works as part of the Project and incorporates the Project's extent of works, proposed site access, construction compound locations and spoil locations. In general this would comprise activities within the proposed rail corridor along the Project route and some areas outside this corridor for other ancillary works.

The construction impact zone would include provision for areas outside the proposed rail corridor that would be impacted during the construction of ancillary works such as bridge works, road works, station upgrades (including car parks) and also areas required for construction purposes such as spoil areas, borrow areas, stockpile locations and site compounds.

A typical cross-section of the construction impact zone within the rail corridor is shown in Figure 7.4. The extent of the construction impact zone is defined in Figure 7.1.

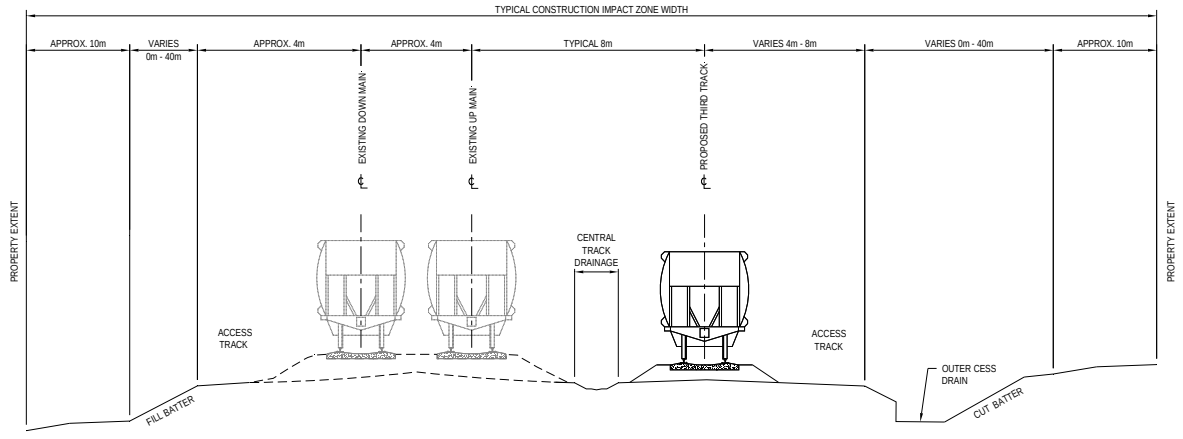

Figure 7.4 Typical Construction Impact Zone Cross-section

7.9 Earthworks – Design

7.9.1 Design Principles

To enable track construction adjacent to the existing line, the Project requires widening of the existing track formation through cut and fill earthworks.

The earthworks formation supports the track formation (capping pavement, ballast and rails) and consists of:

- A structural zone (material with appropriate strength and drainage properties).
- General fill.

Locations of cut and fill are shown in Figure 7.1. Typical cross sections illustrating the cut and fill earthworks scenarios are illustrated in Figure 7.5 and Figure 7.6. Design drawings are provided in Appendix S.

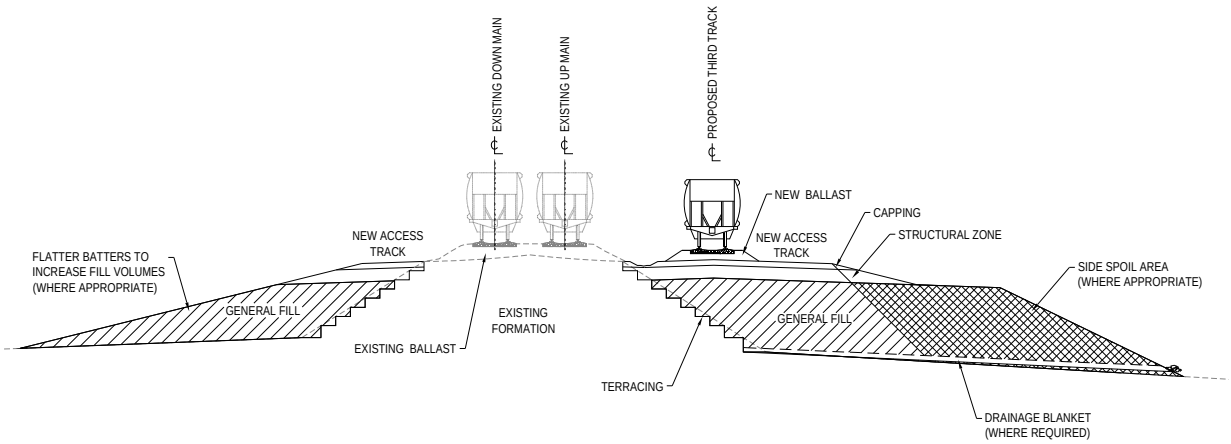

Figure 7.5 Typical Cross Section - Fill

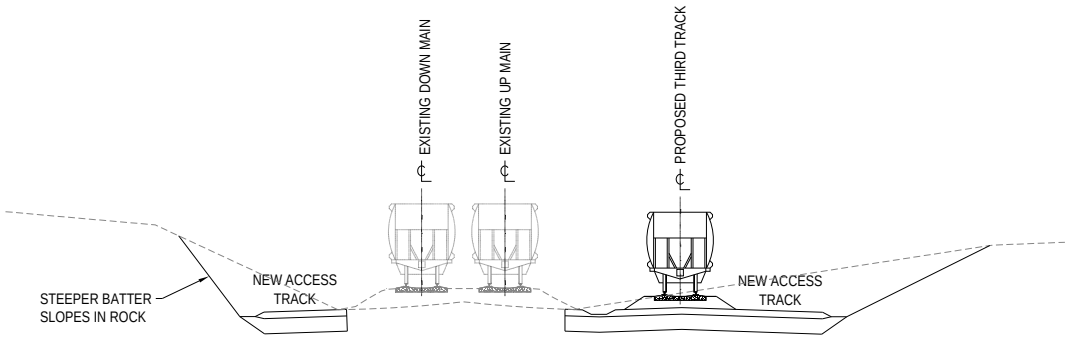

Figure 7.6 Typical Cross Section – Cut

The Project would include the following earthwork design elements:

- Bulk earthworks to widen the track formation and provide access tracks.
- Other minor earthworks including, drainage works, earthworks for structures, and screening mounds.

7.9.2 Bulk Earthworks

Bulk earthworks include all earthworks supporting the track and adjacent access tracks. Earthworks would occur on both sides of the existing track formation for the majority of the Project and would include cut and fill configurations. The proposed new third track level would generally be slightly lower than the existing track level to allow for drainage.

The existing track formation would not generally be modified, however in order to tie-in the new and existing earthworks formations in fill sections, terracing of the existing embankment and drainage would be undertaken. Where required, drainage blankets (a layer of free draining material between geotextile fabric) would provide drainage from the existing embankment through the new earthworks formation (Figure 7.5).

In some locations additional formation width would be provided, referred to as a 'Side Spoil' area, and allows for the disposal of excess material within the rail corridor (Figure 7.5).

The approximate bulk earthworks requirements for the key elements of the Project are:

- Cut material to be excavated: 1, 400,000 cubic metres.
- Fill material required: 800,000 cubic metres.
- Capping material required: 100,000 cubic metres.
- Structural Zone material required: 250,000 cubic metres.
- Maximum cut depth: 8 metres.
- Maximum fill depth: 10 metres.
- Spoil: 250,000 cubic metres.

It should be noted that these quantities are approximate and based on concept design estimates. The quantities would be further refined during the detailed design phase.

A summary of the largest anticipated cut and fill configurations is provided in Table 7-5 and Table 7-6.

Table 7-5 Summary of Largest Cut Configurations

Approximate Chainage (kilometres)	Approximate Depth to Formation Level (metres)
196.000	8.5
204.750	8.0
216.500	11.5
221.000	11.0
218.750	10.5

Table 7-6 Summary of Largest Fill Configurations

Approximate Chainage (kilometres)	Approximate Height to Formation Level (metres)
195.500	9.5
203.750	9.5
214.500	8.0
217.250	8.5
224.000	9.0

7.9.3 Access Tracks

The addition of a third track to the existing track formation, combined with increased freight haul capacity, is likely to have an impact on maintenance requirements for the network. For this reason fully developed access tracks on both the Up and Down sides of the rail would be required. Each of these tracks would provide a three metre single lane for maintenance and emergency vehicles. The access tracks would generally provide uninterrupted access to both sides, for the full Project length.

In some locations the access track would be wider to accommodate trackside features (such as signals) and at some creek crossings, the access track would ramp down and cross the creek over a causeway. At some locations on the Down side, the existing access track would be maintained or require only minimal improvements.

The access tracks would be located near finished rail formation levels and provide all weather access over cross drainage structures. The tracks would be gravel surfaced with suitable cross slope to provide adequate drainage and include pavements suitable for maintenance vehicle traffic.

7.9.4 Minor Earthworks

Earthworks would be required to form drainage elements along the Project route including central track drainage, outer cess drainage and cross drainage structures (refer Section 7.13). Some earthworks would be required at major structures such as the construction of bridge abutments.

Earthen noise mounds would be constructed in some locations to mitigate the operational noise impacts of the Project. The length, height and width of the noise mounds would be determined to suit safety and environmental requirements.

7.9.5 Cut and Fill Movements and Balance

Earthworks design aims to balance the volume of cut (material removed from the existing ground via excavation) with the volume of fill (material added to raise the existing ground level). Due to the track alignment requirements on this Project there would be significantly more cut volume than the required fill volume.

The earthworks design considers the ability to re-use cut material on the Project. Different material properties are required for the general fill, structural and capping layers (refer Figure 7.5) and all cut material would be evaluated for suitability of re-use in these engineered fill layers. Initial geotechnical information indicates that material suitable for the use in the general fill and structural zone is available within the Project cuts (subject to secondary processing in the case of structural material). It is likely that material suitable for the capping layer would need to be imported.

In order to further reduce the volume of excess material, referred to as spoil, the following would be included where possible in the Project:

- Additional formation width (side spoil areas) to increase fill volumes.
- Steeper cut batters in hard rock to decrease cut volumes.
- Flatter fill batters to increase fill volumes.

To cater for the remaining spoil material the Project would include a number of spoil areas. Spoil areas would be engineered for stability and environmental, geotechnical, and drainage requirements. Refer to Section 7.10.5 for more information related to spoil locations.

Earthworks design also aims to reduce the frequency and distance of material transportation in order to minimise construction and environmental implications. Generally material would be transported from a cut to the nearest fill section, this is referred to as “Free-haul”. Where this is not possible, due to material quality, quantity or location, material would be transported from one location to another via haul roads primarily within the rail corridor such that noise and dust impacts on sensitive receptors, and fuel consumption are minimised. The transportation of material on local roads would be minimised to reduce impacts on the community.

7.10 Earthworks – Construction

Materials

There would be various quality and types of soil and rock material excavated in the Project. Where possible this material would be re-used as fill or formation materials. Material would be referred to generally by classification of its ability to be re-used in particular layers of new earthworks and track formation and would include:

- General fill – Cut material with properties appropriate to be re-used as part of the general earthworks formation.
- Structural material – Cut material with properties appropriate to be re-used as part of the structural zone towards the top of the formation.
- Capping material – Cut material with properties appropriate to be re-used as part of the capping pavement at the top of the formation.
- Unsuitable material – Cut material with properties that make it unsuitable for re-use. This may include acid sulfate soils (if encountered), oxidised coal materials, alluvial, dispersive or organic soils.
- Topsoil – Top layer of soil.

7.10.1 Excavation Methodology

The methodology for the construction of cuttings would generally involve the following:

Table 7-7 Excavation Methodology

Preparation	Clearing and grubbing of the site vegetation. Stripping of the topsoil to expose a cleared area to excavate. Separate stockpiling of the topsoil. Construction of a haul road, nominally 4.8 metres in width with lay-bys (widenings) to 9.6 metres at rises in the formation.
Excavation	Construction of the cutting methodologies may include: ◗ Using excavators, and dozers fitted with rippers to rip the exposed ground to the required depth. ◗ Using scrapers if no rock is present. ◗ Use of hydraulic rock hammers or blasting to break up hard rock. ◗ Use of pre-splitting techniques, by pattern drilling to break up hard rock and then excavating in small portions using rock buckets.
	◗ Use of hydraulic pressure guns inserted into pre-drilled holes to break up hard rock. ◗ Use of high pressure hose or chemical break down to break up hard rock. Construction of the cuttings would be a 'top down' method, excavating in layers progressively downwards over a set length, until sub-grade is reached.

Finishing Works	Testing of the sub-grade for unsuitable or suitable material and compaction bearing. Trimming and compacting the exposed sub-grade. Testing of the compacted sub-grade for compaction, bearing capacity and moisture content. Trimming the face of the embankment using a special shaped bucket fitted to an excavator sitting at the top of the cutting.

Locations of hard rock where blasting would potentially be required are presented in Table 7-8 and Figure 7.7. The potential impacts of blasting works are discussed in **Chapter 17**.

Table 7-8 Potential Blasting Locations

Chainage (kilometres)	Up or Down Side
195.360 to 195.380	Up and Down
195.960 to 195.980	Up and Down
204.740 to 204.860	Up and Down
205.280 to 205.400	Up and Down
211.540 to 211.760	Up and Down
213.460 to 213.620	Up and Down
214.100 to 214.180	Up and Down
214.940 to 215.100	Up and Down
216.340 to 216.600	Up and Down
216.700 to 216.920	Up and Down
218.740 to 218.960	Up and Down
221.160 to 221.320	Up and Down
221.640 to 221.940	Down
222.480 to 222.680	Down

Blasting would involve:

- Drilling a hole in the rock to the required depth.
- Placing an amount of explosives into the blasthole.
- Placing aggregate in the blasthole on top of the explosives.
- Detonating the explosives.

The design parameters of each blast, such as the depth and diameter of the blasthole and the type and amount of explosives, would be determined by the blasting contractor based on a number of factors, including the type of rock present and the distance to the nearest receivers.

The following measures would be implemented to minimise potential impacts from blasting (where appropriate):

- Applying a minimum face burden. A face burden is the distance from a blasthole to the free face in front of it, and controls the movement of material and control overpressure.
- Applying a minimum design stemming height. Stemming is the aggregate placed in the blasthole on top of the explosive product to confine the energy and optimize blast performance while reducing environmental impact. This measure would control overpressure and flyrock.
- Covering any presplit blasts (blasting undertaken to split a large section of rock from the proposed cutting) with a blanket of heavy clay to control flyrock and overpressure.
- Delaying any presplit blasting holes to be fired in groups of holes rather than instantaneously to reduce overpressure.
- Monitoring overpressure and vibration at the nearest residence.
- Notifying neighbours of blasting events and providing the opportunity for feedback.
- Minimising the number of blasting events.

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Potential Blasting Location
- Road Centre Line
- Proposed Third Track
- Watercourse area
- Watercourse

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Maitland To Minimbah Third Track
Environmental Assessment

Potential Blasting Locations

Job Number 22-14471
Revision A
Date May 2010

Figure 7.7a

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Blasting_maps_A4_1in25000_20100524.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Potential Blasting Location
- Road Centre Line
- Proposed Third Track
- Watercourse area
- Watercourse

Maitland To Minimbah Third Track
Environmental Assessment

Potential Blasting Locations

Job Number	22-14471
Revision	A
Date	May 2010

Figure 7.7b

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Blasting_maps_A4_1in25000_20100524.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

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1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Potential Blasting Location
- Road Centre Line
- Proposed Third Track
- Watercourse area
- Watercourse

Maitland To Minimbah Third Track
Environmental Assessment

Potential Blasting Locations

Job Number	22-14471
Revision	A
Date	May 2010

Figure 7.7c

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Blasting_maps_A4_1in25000_20100524.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Potential Blasting Location
- Road Centre Line
- Proposed Third Track
- Watercourse area
- Watercourse

Maitland To Minimbah Third Track
Environmental Assessment

Potential Blasting Locations

Job Number 22-14471
Revision A
Date May 2010

Figure 7.7d

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Blasting_maps_A4_1in25000_20100524.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com.au W www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

1:25,000 (at A4)

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Australian Geodetic Datum 1966
Grid: Integrated Survey Grid, Zone 56-1

N

LEGEND

- Potential Blasting Location
- Road Centre Line
- Proposed Third Track
- Watercourse area
- Watercourse

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Maitland To Minimbah Third Track
Environmental Assessment

Potential Blasting Locations

Job Number	22-14471
Revision	A
Date	May 2010

Figure 7.7e

G:\22\14471\GIS\Maps\Deliverables\EA\EA_Blasting_maps_A4_1in25000_20100524.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data Source: DPT of Lands: DCDB - 2007, Aerial Photography - 2006. Created by: msmiljkovski, tmorton, fmackay

7.10.2 Processing and Treatment of Excavated Material

Where feasible, material excavated on site would be processed into structural, capping material or useable fill.

Structural and Capping Material – Processing

Material excavated from hard rock locations would need to be processed to be suitable for use as structural and capping zone material in the track formation. A 'rock crusher' would be used to process large rock fragments into a size appropriate for either the structural or capping zones. It is anticipated that two to three mobile rock crushers would be used and these would be located at the cut sites and site compound areas.

Processed material would then be transported to the required locations along the Project route.

Unsuitable Material Treatment – Soil Stabilisation

Soil stabilisation can take many forms and not all have been decided upon as yet. The most common is soil stabilisation with in-situ lime amelioration. This is undertaken to increase the shear strength and reduce the moisture sensitivity of the soil.

This involves turning over the identified poor ground with a motorised scarifying tool and mixing hydrated lime with the soil as the machine proceeds in a given direction. Another material, other than lime, that may be used where dispersive soils are encountered is gypsum.

Unsuitable Material Treatment – Acid Sulfate Soils

Preliminary geotechnical advice has identified the potential for acid sulfate soils in limited regions associated with the Greta Coal Measures at Greta at approximate chainage 194.850 to 195.680 kilometres. Where and if acid sulphate soils are encountered they would be excavated and taken to a lined stockpile area for treatment. The excavated area would be treated with lime and select material placed and compacted in the area.

At the stockpile site, the affected removed soil would be spread out and treated with lime. If tests reveal that the soil has achieved the specified quality after treatment the soil would be used as general fill on the site.

If the soil still shows no improvement after treatment it would be loaded for road transport and removed off site to a suitable disposal facility.

7.10.3 Fill and Track Formation Methodology

The methodology for the construction of embankments is outlined in Table 7-9.

Table 7-9 Fill and Track Formation Methodology

Preparation	Clearing and grubbing of the site vegetation. Stripping of the topsoil – to expose a nominal 'sub-grade' or base. Construction of a haul road.
Construction of Fill Embankments	Testing of the sub-grade for unsuitable or suitable material and compaction bearing. Removal of any unsuitable material. Trimming and compacting the exposed sub-grade. Testing of the compacted sub-grade for compaction, bearing capacity and moisture content. Construction of the embankment in compacted and trimmed layers with appropriate general fill material. Testing of the layers for compaction, bearing capacity and moisture content.
Construction of Track Formation Layers	Laying of the structural layer. Trimming and compaction of the structural layers. Testing of the structural layer for compaction, bearing capacity and moisture content. Laying of the capping layer. Trimming and compaction of the capping layers. Testing of the capping layer for bearing capacity, compaction and moisture content.

In some areas where the sub-grade is unsuitable for embankment construction, above ground improvement works may need to occur either with lime or gypsum stabilisation. This would involve the addition of lime and gypsum to the affected areas by on-site mixing to ameliorate the soil.

Another alternative where the sub-grade is exhibiting excessive soil moisture content would be to place a layer of high strength geotextile grid material, covering the area with hard rock and placing another layer of geotextile fabric over the rock to form a drainage layer. The earthworks would then be constructed on top of the drainage layer.

7.10.4 Movement of Material

As discussed in Section 7.9.5 material would need to be transported from cut locations for use in other locations along the Project route. Design optimisation strives to minimise these movements. Table 7-10 provides an overview of the required movements.

Table 7-10 General Material Movements

Material Suitable for	From	To	Comment
Structural and Capping zones	Cut locations	Processing locations	Transported to rock crusher locations (either at cut location or at compound locations). May also be transported to stockpile location for temporary storage.
Structural and Capping zones	Processing locations	Entire length of Project	Transported via scrapper if distance less than 800 metres, via articulated truck if distance greater than 800 metres.
General Fill	Cut locations	Nearby Fill section (within 800m)	Pushed to new location using a scrapper ("Free-Haul")
General Fill	Cut locations	Fill section (located between 800 m- five kilometres)	Trucked to location using articulated trucks along haul roads within the construction impact zone.
Unsuitable Material	Cut Locations	Stockpile Locations	Material transported to stockpile locations to be ameliorated (where appropriate).
Ameliorated Material	Stockpile Locations	Fill Sections	Transported to fill locations via scrapper if distance less than 800m, via articulated truck if distance greater than 800 metres.
Excess Fill Material	Cut or Stockpile Locations	Spoil Areas	Where material can not be used on the Project it would be transported to a nominated spoil area.

Haul Roads

Haul roads would be constructed on an as needs basis within the defined construction impact zone depending on the quality of the sub-grade material. Nominally the surface of the haul road would be unsealed with any pavement material. If required the haul roads would be surfaced with crushed rock material.

7.10.5 Storage of Material

As presented in Table 7-10 a number of areas would be required for the temporary storage of material, referred to as a stockpile location, and for the permanent storage of excess or unsuitable material, referred to as a spoil area.

Stockpile Locations

Temporary stockpile locations are anticipated to be located at primary and secondary site compound locations identified in Section 7.19.1.

Stockpiles would be constructed into berms (piled dirt). The width of each berm would vary depending on the stockpile storage area and embankment sides would be at a geotechnically stable angle.

It is proposed that each stockpile area would have a silt fence to the perimeter to control loose material in storm water run-off during a rain event.

Access to the stockpile areas and associated turning areas would be constructed with gravel. This hardstand material would be shaped to form broad shallow flow channels for rainwater run-off. In addition to the use of silt fences, the stormwater run-off would be collected in detention basins, flocculated and would not be discharged into waterways until turbidity and water quality is at an acceptable level. Acceptable water quality levels would be based on the *Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZECC/ARMCANZ, 2000) fresh water trigger values for toxicants for the protection of aquatic ecosystems at the 95 per cent level of protection.

The stockpile sites chosen would have material other than spoil stored into berms for an interim period. This could include the following:

- Topsoil that has been stripped from site.
- Select structural processed soil and rock for track road and access track construction.
- Select pavement processed soil and rock for road.
- Bedding sand for storm water drainage pipes.

Spoil Areas

As described in Section 7.9.5 spoil areas would include areas identified within the construction impact zone and may potentially include area landowner property where material has been requested. Table 7-11 presents the location of potential spoil areas within the construction impact zone.

In the event that additional areas outside the construction impact zone are required for spoil disposal they would be investigated as discussed in Section 7.21.

Table 7-11 Spoil Areas – Location

Chainage (kilometres)	Up or Down Side
196.060 to 196.720	Down side
202.760 to 204.400	Down side
210.600 to 210.730	Down side
210.620 to 210.700	Up side

Chainage (kilometres)	Up or Down Side
217.250 to 218.050	Down side
221.300 to 221.620	Up side

The construction equipment required to undertake this work is summarised in Section 7.19.5.

A range of erosion and sediment control measures would be incorporated into the Project as part of the detailed design to minimise any impacts on waterways due to spoil. These would include, but not limited to:

- Permanent catch and diversion drains to divert runoff from upslope land and reduce erosion hazard.
- Permanent diversions to outlet to stable discharge areas.
- Revegetation of disturbed areas to encourage infiltration.
- Permanent spoil disposal areas to be located clear of flood prone areas, stream banks, channels and stormwater drainage areas.
- Permanent spoil disposal areas to have maximum batter slopes of one vertical to two horizontal and be stabilised by vegetation.
- Flows to be diverted around spoil areas and quarries by bunds/diversion drains.

7.11 Track – Design

The construction of a rail track is divided into two main elements (Figure 7.8). These are:

- Track structure:
  - Rail and sleepers.
- Track formation:
  - Pavement – Ballast and Capping layers.
  - Structural Zone – Structural layer.
  - Earthworks.

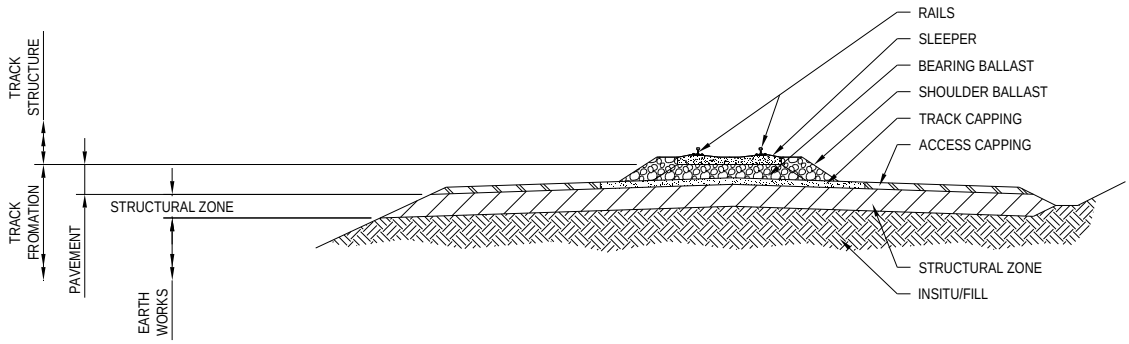


Figure 7.8 Typical Track Formation Composition

Figure 7.9 depicts terminology used when describing different areas within the rail corridor.

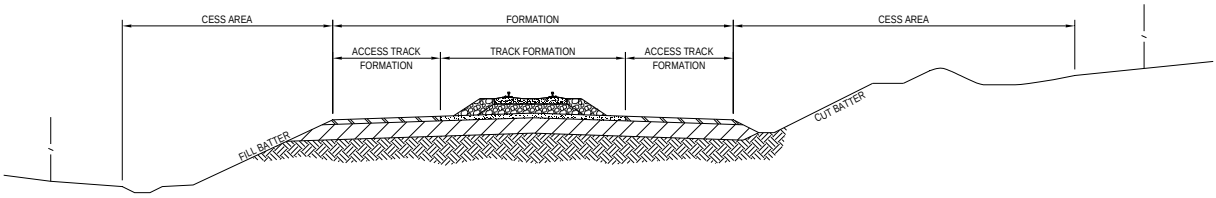


Figure 7.9 Rail Corridor Areas Terminology

Design drawings are provided in Appendix S. The proposed third track would connect to the existing Up Main at the eastern end at Farley and would join the third track of Stage 1 (Minimbah Bank Third Track Project) at Minimbah at its western end. Key track design data is provided in Table 7-12.

The proposed third track would be predominantly located on the Up side of the Main Northern Railway. Approximately four kilometres of track around Branxton and Greta stations from chainage 210.176 kilometres to 211.716 kilometres and 214.064 kilometres to 216.360 kilometres would be located on the Down side. Heritage sites at both stations (as described in Section 13.2) and the close proximity of Anvil Creek at Greta require the track to be located on the Down side at these two locations.

The vertical alignment of the third track is generally similar to the existing main line. The level of the third track is lower than the existing tracks in areas of straight track to improve track drainage.

Maintenance vehicle access tracks would be located on the outer side of the Up Relief Main and the Down Main. The access tracks would provide sufficient space for vehicles to travel for track maintenance and emergency access.

Rail sidings for rail maintenance plant would be located in similar location to the existing sidings at Branxton and access for trains to the existing Rothbury Riot siding at Branxton would be retained via the Down side maintenance sidings.

The existing Up track at Branxton and Greta railway stations would be reconstructed along with the crossovers at Branxton. The existing rail and sleepers may be reused subject to an asset inspection to determine suitability for reuse.

Track drainage would include longitudinal drains on both sides of the track (cess drains) and a centre drain between the existing tracks and the new third track. Upgrades to existing cross track drains and construction of new pits and pipes from the centre drain would be completed. This is further discussed in Section 7.13.

Table 7-12 Track Design Data

Item	Key Data
Existing track centres between Up and Down mains	3.66 metres approx.
Chainage Extents of Stage 2 Third Track	Approximate chainage 194.500 kilometres to 224.200 kilometres.
Future track centres between Up and Down mains	4.5 metres.
Third Track offset	8.0 metres minimum (measured from existing Up track centreline).
Shoulder Distance/ Access Track	6.5 metres (measured from track centreline).
Track lowering relative to existing straight track	0.4 metres.
New third track constructed on the Up side between:	Approximate chainage 194.500 kilometres to 210.176 kilometres. Approximate chainage 211.716 kilometres to 214.064 kilometres. Approximate chainage 216.360 kilometres to 224.200 kilometres.
New third track constructed on the Down side between:	Approximate chainage 210.176 kilometres to 211.716 kilometres. Approximate chainage 214.064 kilometres to 216.360 kilometres.
Location of existing crossover (to enable switching of trains from one track to an adjacent track)	Allandale: Approximate chainage 204.360 kilometres and 204.640 kilometres. Branxton: Approximate chainage 215.085 kilometres and 215.370 kilometres.
Location of three new track turnouts at Branxton	On the Up Main at approximate chainage 215.600 kilometres, on the Down Main at approximate chainage 215.694 kilometres and on Down side siding adjacent to approximate chainage 215.600 kilometres.
Location of one new turnout at Farley	Between the Up Main and the Up Relief Main at approximate chainage 224.500 kilometres.

The proposed configuration and alignment for the Project is illustrated in Figure 7.10 and Figure 7.11.

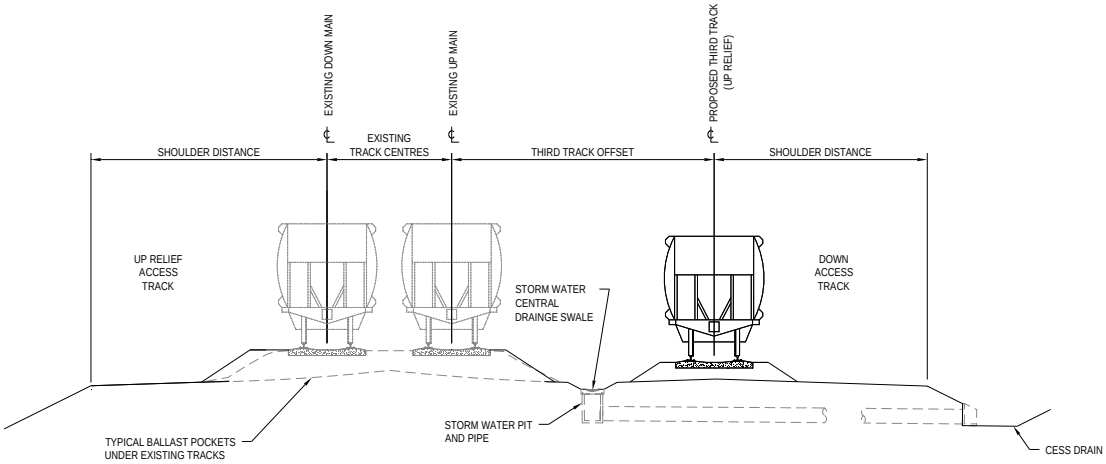


Figure 7.10 Maitland to Minimbah Third Track Configuration (Up Main)

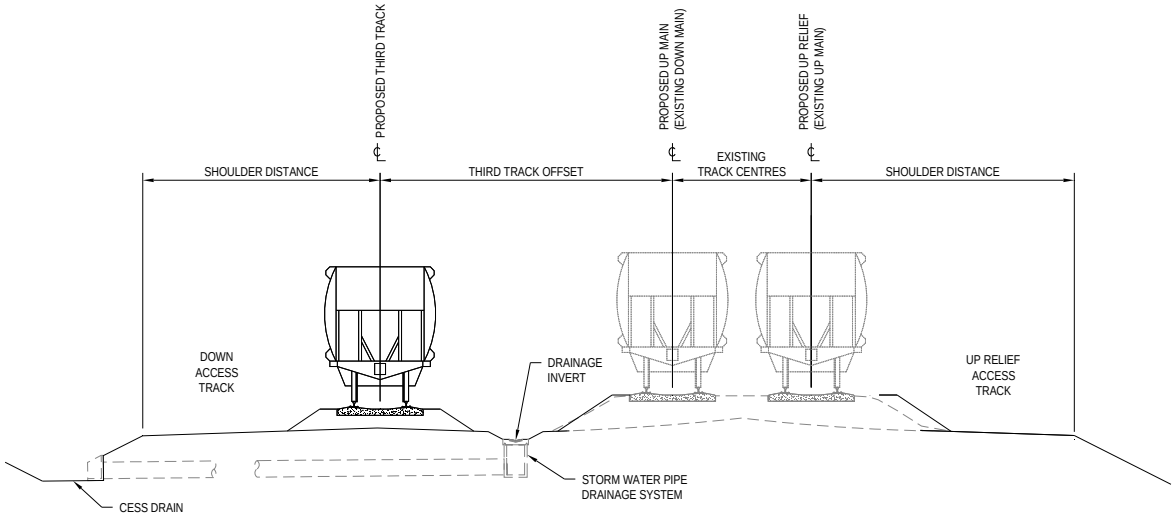
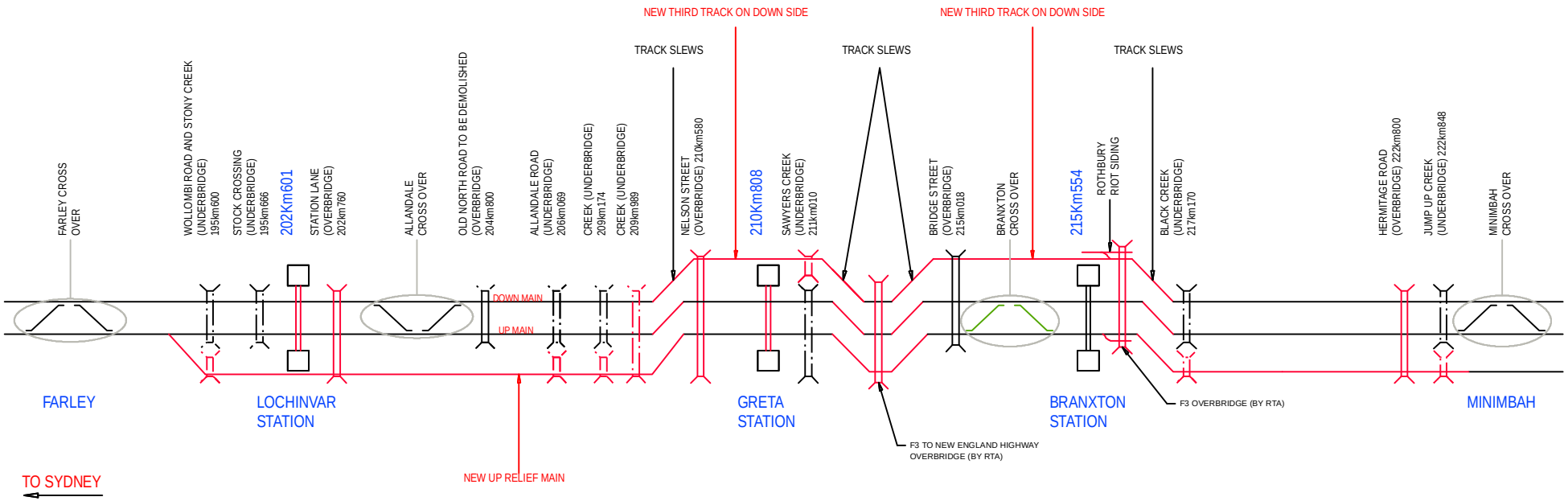


Figure 7.11 Maitland to Minimbah Third Track Configuration (Down Main)

Figure 7.12 depicts a schematic of the entire track works along the Project route and provides an indication of the major Project elements.



1:563 (at A4)

0 2.5 5 10 15 20

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 50

N

Miatland To Minimbah Third Track Environmental Assessment

Job Number 22-14471
Revision A
Date May 2010

Track Layout Diagram

Figure 7.12

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Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com.au **W** www.ghd.com.au

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by: msmiljkovski

7.12 Track – Construction

7.12.1 Materials

The materials required for the track construction are listed in Table 7-13 along with the method of delivery and details on the timing and/or location of delivery.

Table 7-13 Track Installation Construction Materials and Delivery Details

Material	Delivery Method	Delivery Timing and/or Location
Sleepers and rail lengths	Road	Approximately 53,000 heavy duty Fast Clip pre-cast concrete sleepers would be delivered by road to site and offloaded at various suitable works areas within the construction impact zone.
	Rail	Approximately 3,840 tonnes of AS60 Head Hardened Rail Track would be delivered on rail sets (flat rail cars) in 110 metre lengths and offloaded at nominated locations adjacent to the existing track within the construction impact zone.
Capping material	Road	Delivered to temporary stockpile locations.
Bottom ballast	Road	Delivered to temporary stockpile locations.
Top ballast	Rail	Delivered during track possessions to temporary stockpile locations.
Turnout	Road	Materials for one (1) only Turnout R1200 Swing Nose Crossing (SNS) at a turn ratio of 1:18.5 would be required at Branxton. This would be offloaded near to the construction works area. (See below).

7.12.2 Construction Methodology

The track installation would be undertaken using the following methodology:

- Establish temporary environmental control measures of ballast and capping material stockpiles.
- Lay, trim and compact new capping material on the new structural layer.
- Lay new bottom ballast onto the new capping material using a machine fitted with a ballast box that travels along the formation in the direction in which the track is being laid.
- Lay new sleepers at 600 millimetre centres with a machine known as an ‘octopus’. This machine would lay up to six sleepers at a time from the nearby stockpile of sleepers.
- Fix new rail lengths to the sleepers in 110 metre track lengths. Track lengths would be pulled into position with the aid of front end loaders.
- ‘Gauge’ the track. The ‘gauge’ or parallel equidistant rail separation would be achieved by a standard measure rod and checked by the track supervisor as rail is laid.

- Place top ballast using ballast wagons pulled along the formation by a modified tractor in the direction in which the track is being laid.
- Weld and de-stress the newly installed track. The preferred method of welding would be the thermit weld process, which includes an aluminothermic thermit weld kit including a crucible heat powder mixture, gas, grinder, paste and mud.

  The track joint would be left with a 25 millimetre gap between ends. The weld kit would then be fitted over the track and the mixture within the crucible would be lit to form a continuous and consistent weld of the track steel. The track would be allowed to cool and the excess material would be cleaned away.

  When steel rail is laid the long lengths have differing sectional properties as a result of heating and cooling differentials from one exposed side of rail to the other. The result would be track rail that is not 'true' in straightness. When installed and the 110 metre lengths welded together, the track would be jacked true and de-stressed to alleviate kink and curves. This would be achieved by heavy duty track jacks and rail tensor tools.

  The track would be tensioned at every second weld. The alternative welds without tensioning are known as free welds.
- Install new glued insulation joints where and if required to provide insulation for signalling sections if required at turnouts.
- 'Tamp' the newly installed track. This would involve adjusting the track to its correct level and grade as designed by survey with a regulator. This would be achieved by two machines joined together and travelling in the direction in which the track has been laid in what is known as a 'consist'. The first machine is known as a 'regulator' and the second is known as a 'tamper'. The tamper would vibrate the track and top ballast to ensure proper seating of the sleepers into the ballast layer.
- Cut and 'match mark' the turnout. Turnout materials would be delivered to site and off-loaded from the road transport vehicles at a suitable level lay down location. Special long fast clip heavy duty pre-cast concrete turnout sleepers would be fixed to the rail sections. The turnout would then be pre-assembled and 'match marked' (re-surveyed) to the correct transition and radial alignment. All required connections and terminations for signals equipment would then be checked. The turnout would then be transported in two sections via a special machine referred to as a 'Pen Lem' to the works area where the turnout is to be installed.
- Install the turnout directly at the works site during a track possession.
- Clean ballast. After the track has been laid, regulated and tamped, the tamper would disperse surplus ballast into the 'four foot' area between the tracks and the 'six foot' area outside of the tracks. This would then be 'cleaned' by another rail machine running on the track immediately after and in the same direction as the 'consist' of the regulator and tamper. The ballast cleaner would have angled metal blades on the outside of the machine which would pull the ballast up onto the face of the ballast bank and leave the four foot and six foot areas clear of excess ballast.
- Rail grinding where required. After ballast cleaning a machine known as a rail grinder would run along the tracks to grind excess rough spots and weld deformations from each of the rails.

The construction equipment required to undertake the track works is summarised in Section 7.19.5.

7.13 Drainage – Design

7.13.1 Drainage Works Overview

The general drainage components of the Project consist of:

- Central track drainage – Longitudinal drains between the new and existing tracks.
- Cess drainage – Longitudinal Outer Cess drains, top drains and toe drains within the cess Area.
- Cross drainage – Extension of secondary drainage structures.
  – Provision or replacement of major drainage structures (discussed as underbridges in Section 7.15).

Figure 7.13 depicts the typical drainage components.

Design drawings are provided in Appendix S.

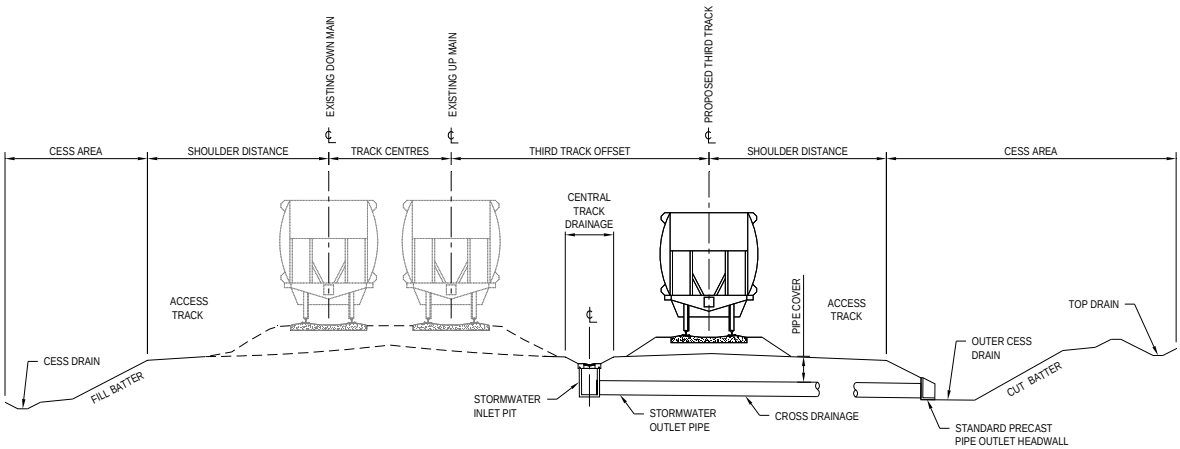

Figure 7.13 Typical Drainage Design

7.13.2 Central Track Drainage

A new central drainage system would be required between the existing Up Main and the new third track for the length of the Project.

The central track drain would allow stormwater runoff to be collected and transferred to the outer cesses by a series of pits and pipes. In locations where the track centres increase from the nominated eight metres, a longitudinal pipe and pit network would be required to achieve central drainage however, the majority of track would incorporate an individual pit and pipe at designed locations, crossing under the new third track formation to the outer cess drain.

Pit locations would vary depending on cess gradients and the catchment area resulting from various track centres. Stormwater would be channelled to pits via a central swale (shaped drain lined with concrete where necessary) that generally matches the rail gradients. In areas of flatter grades, the pit spacings would be closer together and in areas of steeper grades the pit spacings would be increased.

The pits would be relatively shallow, only deep enough for minimum pipe cover (the distance from the base of track material to the top of pipe) under the new third track formation. This cover and pipe size would determine the outer cess depth.

7.13.3 Cess Drainage

On both the Up and Down sides a new drainage system in the cess area would include open channels along:

- The edge of access tracks (outer cess drain).
- Top of cut batters (top drain).
- Toe of fill batters (toe drain).

The outer cess drains capture runoff from cut batters and convey stormwater away from the track formation. They discharge at the end of cuttings, flattening out to the natural surface through energy dissipaters and tail out drains.

The outer cess drains are sized to capture runoff from the maintenance access tracks and pipe outlets from the central drains. The outer cess depth would be just lower than the capping layer to allow pavements to drain. Sizes would be confirmed hydraulically based on the total contributing catchment areas and generally the cess gradients would match the rail grades. In some locations they would be graded separately to improve functionality.

Top and toe drains would minimise flows contributing to the rail corridor and protect the rail earthworks. The drains would divert water away from cuttings with diversion mounds that would redirect water in the direction of the natural surface grade. The top drain would be hydraulically sized to convey flows to controlled outlets and would be lined with concrete where necessary.

Toe drains would be provided where fill batters and the natural surface would create runoff capture points. This would allow these areas to freely drain to cross drainage structures.

7.13.4 Cross Drainage

Cross drainage structures allow catchment runoff from outside the rail corridor to flow through the rail corridor. There are approximately 53 cross drainage structures that would be extended, upgraded or replaced as part of the Project.

Existing Cross Drainage Structures

The existing structures primarily consist of brick arches and reinforced concrete pipes. A summary of the drainage structures (at waterway crossings) is provided in Table 7-14. These structures are numbered W1 to W59 in accordance with the Surface Water Assessment (refer to Chapter 18) and have been listed according to the overall catchment to which they contribute. The waterways associated with these catchments comprise major waterways, minor waterways and drainage lines.

Table 7-14 Cross Drainage Structures

Catchment	Waterway Crossings
Stony Creek	W1 to W17 (exclusive of W3)
Unnamed Tributary of Swamp Creek	W18
Lochinvar Creek	W19 to W25
Bishops Creek	W26 to W27
Anvil Creek	W28 to W48 (exclusive of W30, W34 and W37)
Black Creek	W50 to W56
Jump Up Creek	W57 and W59

W3, W30, W34, W37, W49 and W58 are the underbridges for Stony Creek, unnamed creek (chainage 207.776 kilometres), Anvil Creek, Sawyers Creek, Black Creek and Jump Up Creek respectively. Bridge structures are discussed in Section 7.15.

Figure 7.14 provides two examples of existing cross drainage structures.

Figure 7.14 Typical Cross Drainage Structures

New Cross Drainage Works

Cross drainage works would involve the extension or replacement of all existing culverts or arches below the rail formation. Both the existing and new cross drainage structures would be designed to convey a 50 year design storm event. The extension or replacement would generally comprise:

- Precast concrete box culverts.
- Reinforced concrete pipes.

In one location (at chainage 209.174 kilometres) the new structure would be a precast concrete arch structure in a similar style to the existing brick arch. A new precast concrete arch structure would be constructed adjacent to the existing structure (on the Up side) and would extend for approximately 10 metres, the design for which is shown in Figure 7.15.

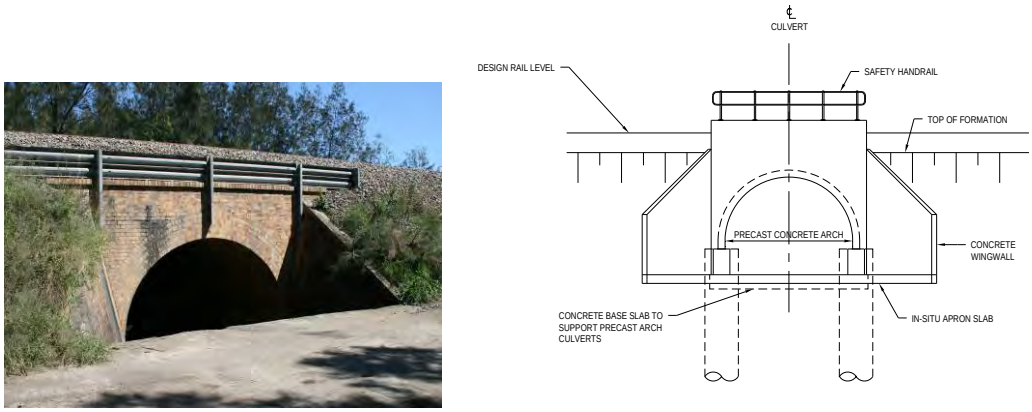

Figure 7.15 Existing Creek Underbridge at 209.174 kilometres (left) and Proposed Underbridge at 209.174 kilometres Design Schematic (right)

Modification to Existing Drainage Works

During the detail design phase, the capacity of each of the existing cross drainage structures would be assessed to determine if they meet the nominated design criteria of conveyance of the 50-year design storm event. Structural capacity of the culverts would also be assessed. It is anticipated that the majority of secondary structures would only require extension to cater for the additional earthworks associated with the Project, however some structures may need to be augmented or replaced.

Detailed Design of Cross Drainage Works

A range of erosion and sediment control measures would be incorporated into the Project as part of the detailed design of the cross drainage works. These would include, but not limited to:

- Permanent catch and diversion drains to divert runoff from upslope land and reduce erosion hazard.
- Permanent diversions to outlet to stable discharge areas.
- Revegetation of disturbed areas to encourage infiltration.

Review of the extent of encroachment into existing waterway areas would occur during the detailed design process. The flood models developed for the existing conditions would be updated to incorporate the configuration of the Project. In the event that water levels and flood levels increase upstream of new or extended waterway crossings outside the rail corridor, the configuration of the Project would be revised to minimise the extent of impact such that no increase in flood levels would occur outside the rail corridor.

The open waterway area of culverts would be increased through the use of oversized culverts or at least maintained where feasible. The alignment of the inlet and outlet earthworks would consider the existing waterway alignment and be designed to minimise the risk of constrictions or the potential for scour through the inclusion of natural form outlets that utilise rock and / or vegetation as protection.

Rehabilitation works such as rock beaching would be undertaken to provide protection and stabilisation of the bed and banks of waterways from erosion and to minimise velocity of stormwater flows.

Rock beaching involves the placement of quarried rock (rip rap) on stream banks. The rock is founded on the bed of the stream and generally extends up the portion of the bank threatened by erosion.

Rockworks would generally:

- Be made up of angular rock (either quarried or broken up field rock).
- Be made up of well sized, well graded, well embedded, well interlocked rock.
- Have all voids sealed to provide stability and resistance to flow velocities and infiltration / undermining.
- Form an interlocking mass of rock in which the larger rocks in the mix are not free to move.

Culverts at perennial waterways or waterways where there is evidence of regular flows would be designed to provide suitable conditions for fish passage. This would maintain and possibly improve breeding opportunities and allowances for fish to complete their lifecycle, and would maintain and possibly increase geographic distribution of desired fish species. Culverts would be designed to:

- Provide light and encourage fish to enter and pass through the culvert.
- Not reduce stream cross-section to the extent that flow velocities are in excess of fish burst speed.
- Contain flow velocity diversity and depth suited to target species.
- Have a natural substrate (bed material).

Guidelines of both NSW Fisheries and the Queensland Department of Primary Industries would be considered when establishing fish passage.

7.13.5 Sawyers Creek Realignment

The location of the third track on the Down side, north of Greta Station results in encroachment on the existing alignment of Sawyers Creek. To minimise the impact of the Project on this creek, it is proposed to realign approximately 120 metres of Sawyers Creek.

Sawyers Creek has migrated to its current position over time and there is evidence of a historical flow path to the west of its current alignment. It is proposed that the creek would be realigned to this historical flow path. The concept for the proposed realignment is provided in Figure 7.16.

Construction of the Sawyers Creek realignment would include maintaining the existing flow length, grade and power, as well as re-instatement of riparian vegetation and provision of geomorphic features, such as pools and riffles, where possible. Connection to the existing creek would then occur once the realignment is determined to be stable and reinstatement of vegetation completed. These design principles would also be adopted for any additional creek realignments required.

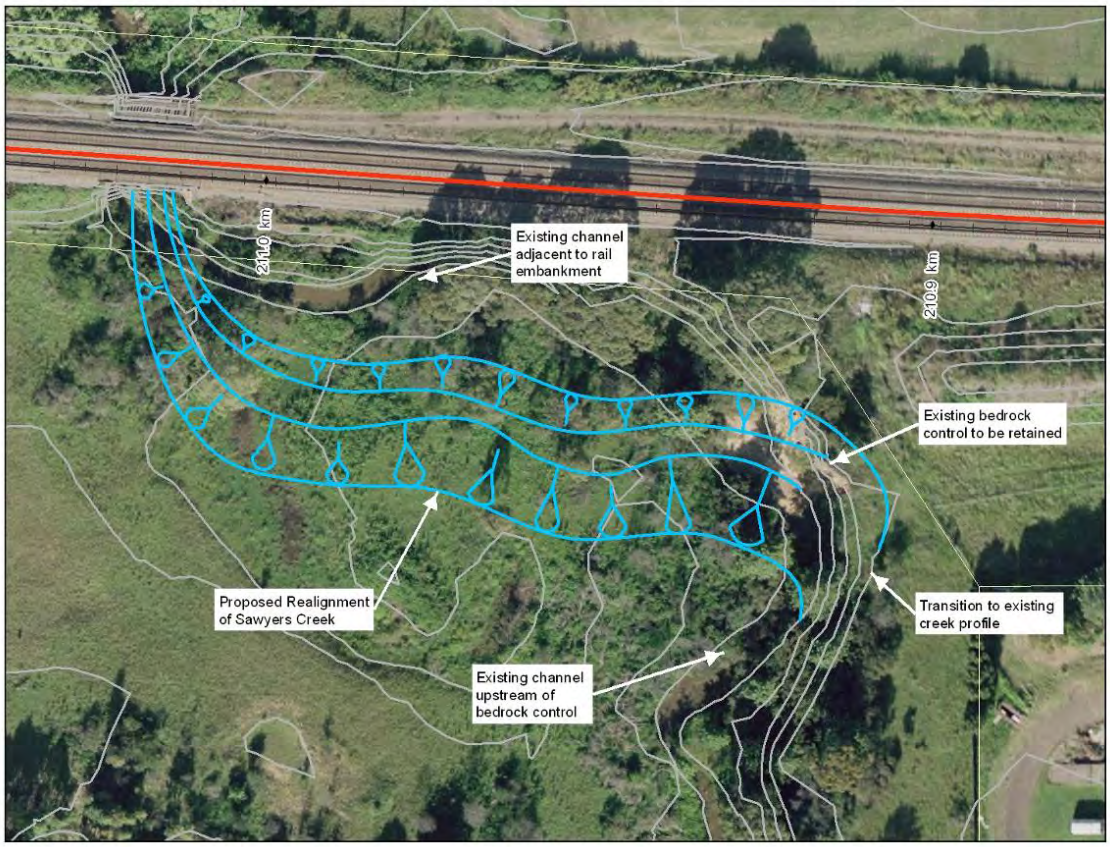

Figure 7.16 Sawyers Creek Realignment

7.14 Drainage – Construction

Generally the drainage works for the central and cess drains would be undertaken during profiling (shaping) of the earthworks formation. Therefore, this section describes the construction works required for cross drainage structures, primarily consisting of box culverts and reinforced concrete pipes.

7.14.1 Cross Drainage - Box Culverts

Materials

The materials required for the construction of box culverts are listed in Table 7-15 along with the method of delivery and details on the timing and/or location of delivery.

Table 7-15 Box Culverts Construction Materials and Delivery Details

Material	Delivery Method	Delivery Timing and / or Location
Concrete	Road	During track possessions
Pre-cast culvert units	Road	Day
Pre-cast culvert headwall	Road	Day
Reno Mattress	Road	Day
Rip rap or rock	Road	Day

Construction Methodology

The construction of box culverts would typically involve the following:

- Construction of a level earth platform at the end of the culvert to be extended.
- Excavation for and construction of reinforced concrete footings including blindings, formwork, all rebates, dowels, reinforcement and concrete.
- Supply and installation of 2.44 metre length pre-cast culvert units laterally across the alignment of the Up or Down Main Corridor and connection of the units to the reinforced concrete base, including stitch waterproofing at culvert unit joints. The pre-cast units would be placed with the aid of a mobile all terrain hydraulic crane.
- Supply and installation of one pre-cast culvert headwall to the adit of the extension. The wing-wall sections of the pre-cast headwall unit would be placed with the aid of a mobile hydraulic all terrain crane.
- Supply and installation of scour protection at the headwall in the form of a rock filled mattress consisting of salvaged chain wire filled with rock laid on geofabric.
- Installation of a fish race for major culverts. The fish race would consist of a series of over size rip rap or rock.
- Supply and installation of culvert name plates where required.

7.14.2 Cross Drainage - Reinforced Concrete Pipes

Materials

The materials required for the construction of reinforced concrete pipes are listed in Table 7-16 along with the method of delivery and details on the timing and/or location of delivery.

Table 7-16 Reinforced Concrete Pipes Construction Materials and Delivery Details

Material	Delivery Method	Delivery Timing and/or Location
Reinforced concrete pipe	Road	Day
Pre-cast concrete headwall	Road	Day
Wire mattress	Road	Day
Rock for wire mattresses and rip rap	Road	Day

Construction Methodology

The construction of reinforced pipes would typically involve the following:

- Demolition of existing headwall.
- Batter protection (if required).
- Demolition of existing reinforced concrete pipe back to the first joint, and inspect the condition of the remaining existing pipe. Some locations may require partial or full replacement of the existing drainage pipe.
- Excavation of the bed.
- Place sand bedding or concrete slab as per site conditions and specifications.
- Installation of new pipe.
- Installation of headwall and sparging of pipe using wire mattress.
- Backfilling and compacting.
- Supply and installation of scour protection at the headwall in the form of a rock filled mattress consisting of salvaged chain wire filled with rock laid on geofabric.
- Excavation, placement and backfill of corrugated steel batter chutes where required.

The construction equipment required to undertake the drainage works is summarised in Section 7.19.5.

7.15 Bridges – Design

The addition of a third track and subsequent widening of the rail corridor would result in the need for construction of new bridges and modification or replacement of some of the existing bridge structures along the Project route. Table 7-17 outlines the bridge works required as part of the Project which includes:

- Construction of six new underbridges.
- Closing of one stock underpass.
- Demolition and replacement of one existing underbridge.

- Demolition of one existing overbridge.
- Modifications to one overbridge.

The bridge works are described in further detail Sections 7.15.2 to 7.15.11.

Design drawings are provided in Appendix S.

Table 7-17 Proposed Bridge Works

Location	Chainage (kilometres)	Proposed Works
Wollombi Road and Stony Creek Underbridge	195.555 and 195.595	A new four span precast concrete underbridge would be constructed approximately 15 metres away from the existing underbridge on the Up side.
Stock Crossing Underpass	195.666	The existing concrete box culvert underpass would be closed by installing concrete walls at each end.
Old North Road Overbridge	204.800	The existing overbridge would be demolished.
Allandale Road Underbridge	206.069	A new two span precast concrete underbridge would be constructed adjacent to the existing underbridge on the Up side.
Unnamed Tributary of Anvil Creek Underbridge	207.776	A new single span precast concrete underbridge would be constructed adjacent to the existing underbridge on the Up side.
Unnamed Tributary of Anvil Creek Underbridge	209.989	The existing underbridge would be demolished and replaced with a new single span precast concrete underbridge.
Sawyers Creek Underbridge	211.010	A new single span precast concrete underbridge would be constructed adjacent to the existing underbridge on the Down side.
Bridge Street Overbridge	215.018	The embankments would be widened under both the Up and Down sides of the existing three span overbridge and the existing piers would be strengthened.
Black Creek Underbridge	217.175	A new three span precast underbridge would be constructed adjacent to the existing underbridge on the Up side. This bridge would be designed for two tracks.
Jump Up Creek Underbridge	222.848	A new single span precast underbridge would be constructed adjacent to the existing underbridge on the Up side.

7.15.1 Terminology

The existing bridge structures are either underbridges (where the road or creek crosses under the rail track), or overbridges (where the road crosses on a bridge over the rail track). Figure 7.17 and Figure 7.18 depict an existing underbridge and overbridge and other associated terminology.

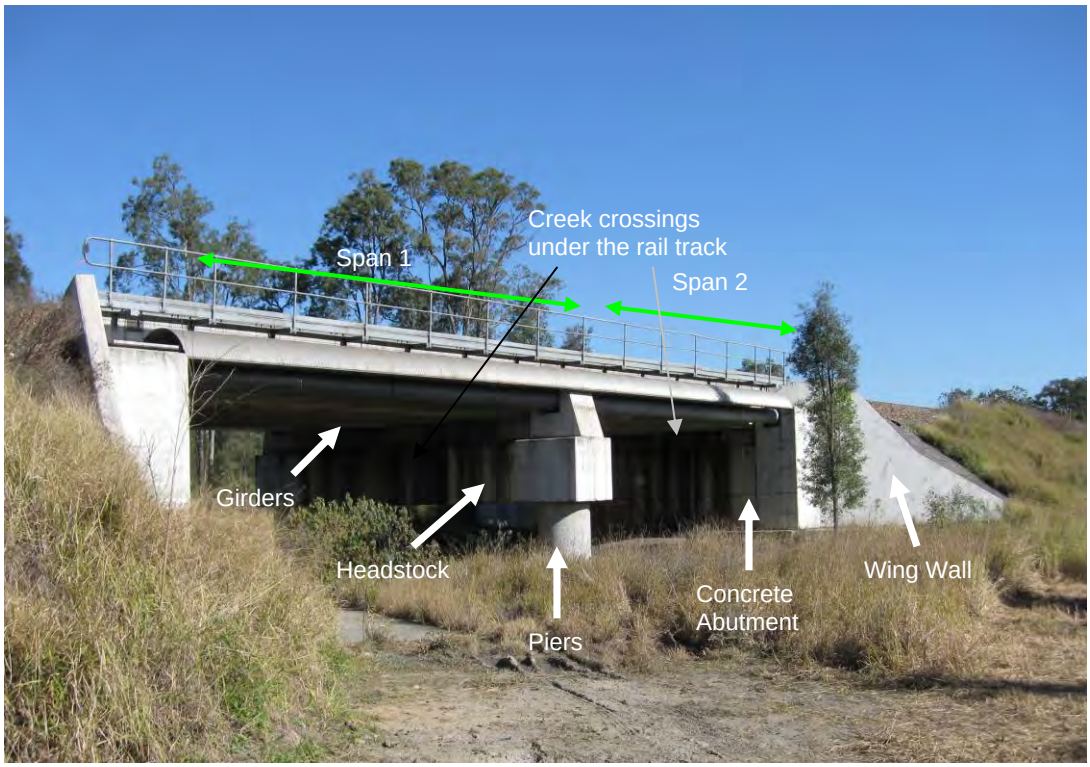

Figure 7.17 Example of Underbridge

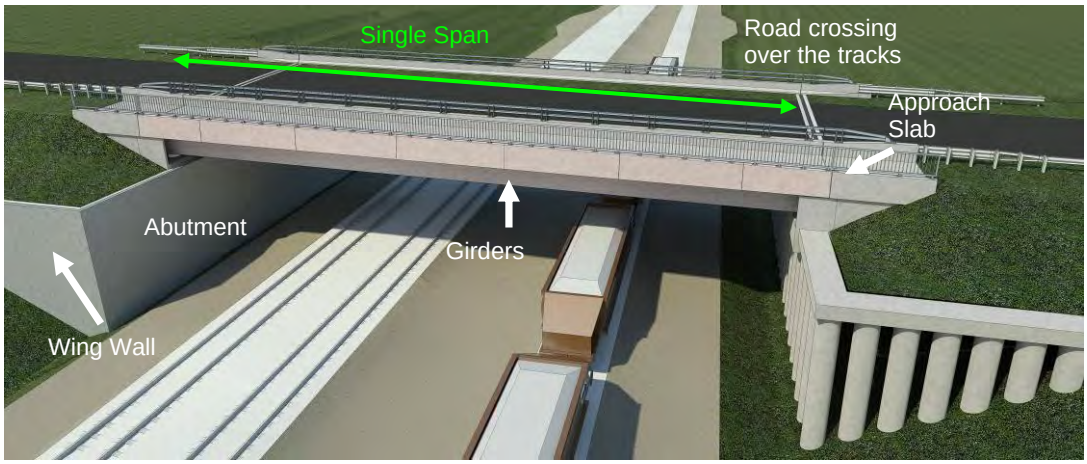

Figure 7.18 Example of Overbridge

Concrete bridges would be constructed using precast girders which are fabricated off-site and then transported to the bridge construction site. A typical cross section of a pre-cast concrete bridge is depicted in Figure 7.19.

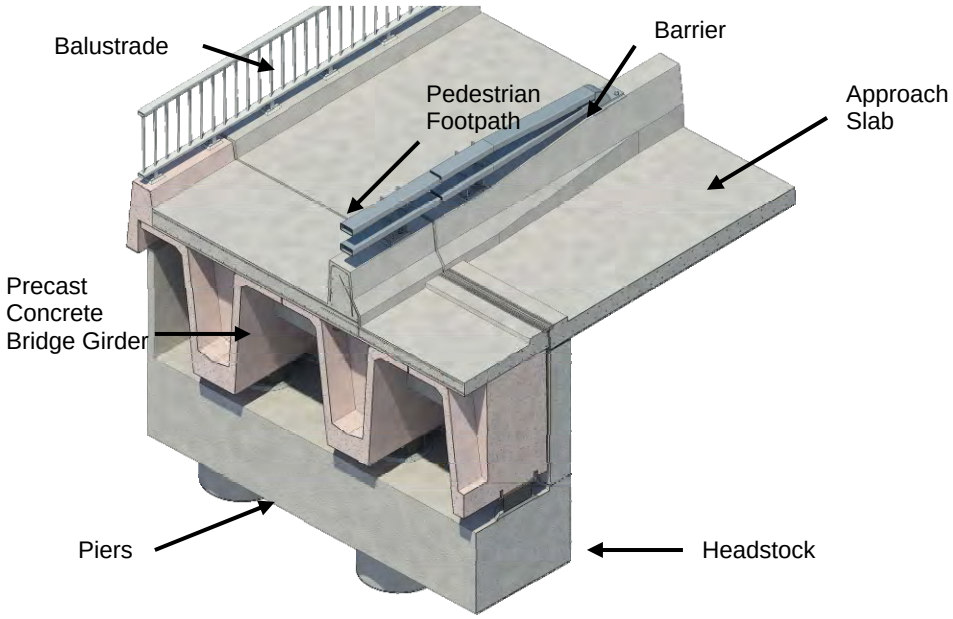

Figure 7.19 Typical Precast Concrete Bridge Structure

7.15.2 Wollombi Road (chainage 195.595 kilometres) and Stony Creek Underbridge (chainage 195.555 kilometres)

The existing brick arch culverts at Stony Creek and the existing Wollombi Road underbridge are shown in Figure 7.20. These structures would remain.

Figure 7.20 Existing Stony Creek Brick Arch Culverts (Left) and Existing Wollombi Road Underbridge (Right)

To cater for the third track a new four span bridge would be constructed parallel to the existing structures. The new bridge would be located approximately 15 metres on the Up side of the existing structures and would span over both Stony Creek (before it enters the existing arch culverts) and Wollombi Road as shown in Figure 7.21.

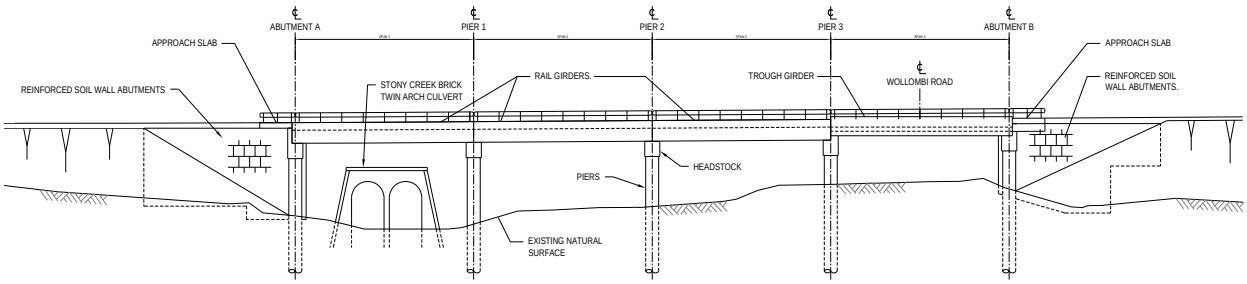

Figure 7.21 Proposed Wollombi Road/ Stony Creek Underbridge Design Schematic

The bridge would consist of precast concrete girders (various types) spanning between concrete headstocks that are supported by concrete piers. There would be approximately five piers supporting each headstock. On each bridge end the girders are supported on vertical reinforced soil wall abutments.

The proposed embankment widening to cater for the third track in this area would fill approximately 600 square metres of the existing Stony Creek wetland.

7.15.3 Stock Crossing Underpass (chainage 195.666 kilometres)

The existing stock crossing underpass is shown in Figure 7.22. This structure would remain and would be closed by installing concrete walls at each end.

Figure 7.22 Existing Stock Crossing Underbridge

Consultation with the landowner of the property that would be affected by the closure of the stock crossing has been undertaken and is continuing. The Hunter 8 Alliance is currently in negotiations with the landowner to acquire the property.

7.15.4 Old North Road Overbridge (chainage 204.820 kilometres)

The existing Old North Road Overbridge is shown in Figure 7.23. This brick arch structure would be demolished and the embankment widened to cater for the third track. No replacement bridge is proposed at this location as Old North Road is closed on the southern side of the main line and is not required for property access. One property currently uses Old North Road for access, however alternative access is available from Station Lane. Compensation has been agreed with the owner of the affected property taking into consideration the loss of access from Old North Road.

Figure 7.23 Existing Old North Road Overbridge

7.15.5 Allandale Road Underbridge (chainage 206.069 kilometres)

The existing Allandale Road underbridge is shown in Figure 7.24. This structure would remain.

Figure 7.24 Existing Allandale Road Underbridge

To cater for the third track a new two span bridge would be constructed adjacent to the existing structure (on the Up side).

The bridge would consist of precast concrete girders spanning between concrete headstocks supported by concrete piers and reinforced concrete abutments as shown in Figure 7.25. There would be approximately three piers supporting the headstock. The new abutments would cater for the existing drainage system behind the existing abutments and rail access tracks.

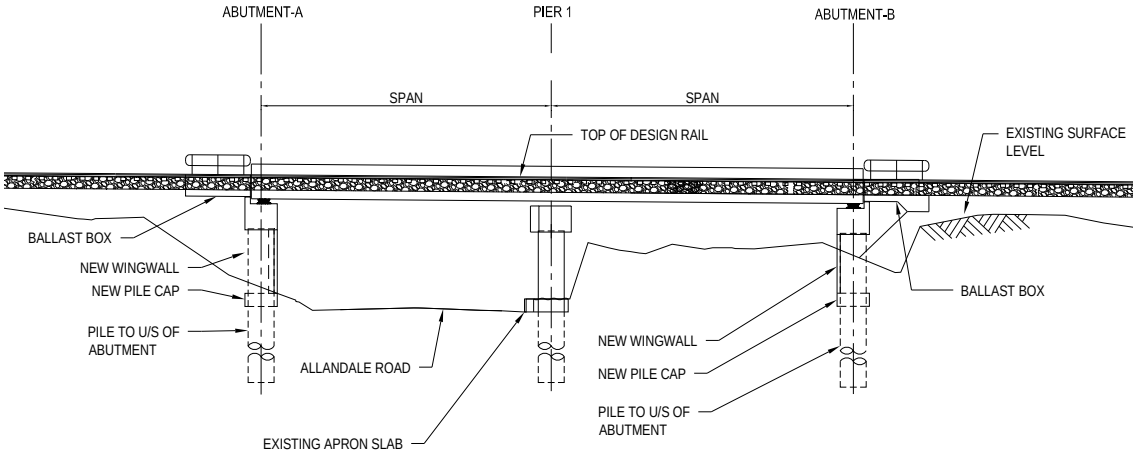

Figure 7.25 Proposed Allandale Road Underbridge Design Schematic

7.15.6 Unnamed Tributary of Anvil Creek Underbridge (chainage 207.776 kilometres)

The existing brick arch culverts are shown in Figure 7.26. This structure would remain.

Figure 7.26 Existing Unnamed Tributary of Anvil Creek Brick Arch Culverts (chainage 207.776 kilometres)

To cater for the third track a new single span bridge would be constructed adjacent to the existing structure on the Up side. The bridge would consist of precast concrete girders spanning between reinforced concrete abutments as shown in Figure 7.27.

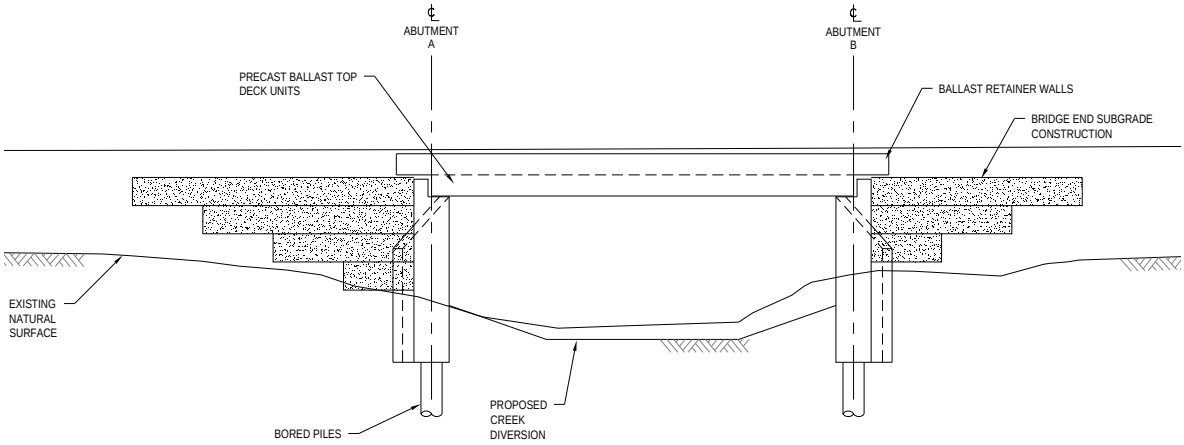

Figure 7.27 Proposed Underbridge at chainage 207.776 Design Schematic

7.15.7 Unnamed Tributary of Anvil Creek Underbridge (chainage 209.989 kilometres)

The existing underbridge for the unnamed tributary of Anvil Creek is shown in Figure 7.28. Due to its poor condition (damaged concrete upstand causing spreading of girders and loss of ballast through the structure), this structure would be demolished during a track possession.

Figure 7.28 Existing Creek Underbridge at chainage 209.989 kilometres

The existing bridge would be replaced by a single span underbridge to cater for the existing and proposed rail lines.

The bridge would consist of precast concrete girders spanning between reinforced concrete abutments as shown in Figure 7.29. Precast concrete wingwalls and erosion protection (such as a rock mattress) would be provided.

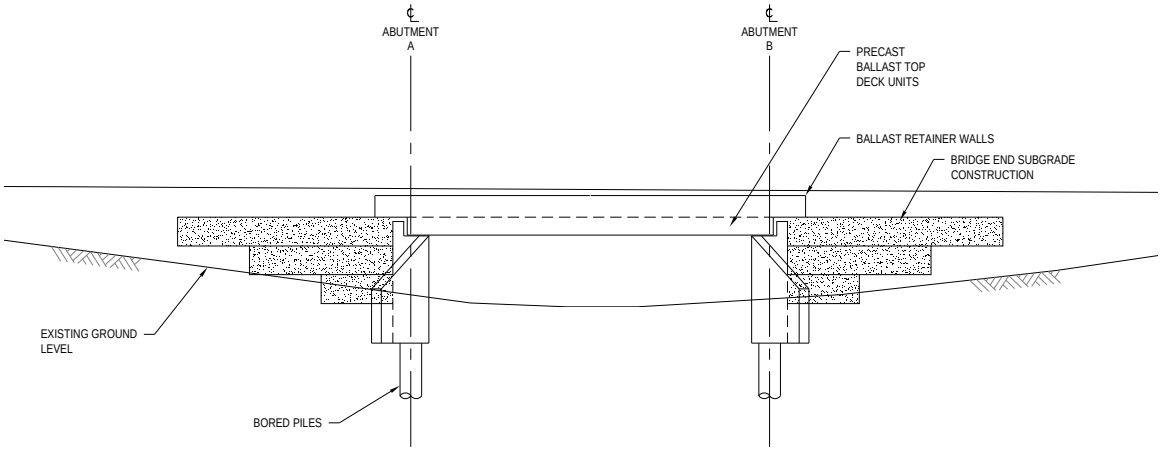

Figure 7.29 Proposed Underbridge at chainage 209.989 kilometres Design Schematic

7.15.8 Sawyers Creek Underbridge, Greta (chainage 211.010 kilometres)

The existing Sawyers Creek underbridge is shown in Figure 7.30. This structure would remain.

Figure 7.30 Existing Sawyers Creek Underbridge

To cater for the third track a new single span bridge would be constructed adjacent to the existing structure (on the Down side).

The bridge would consist of precast concrete girders spanning between reinforced concrete abutments as shown in Figure 7.31.

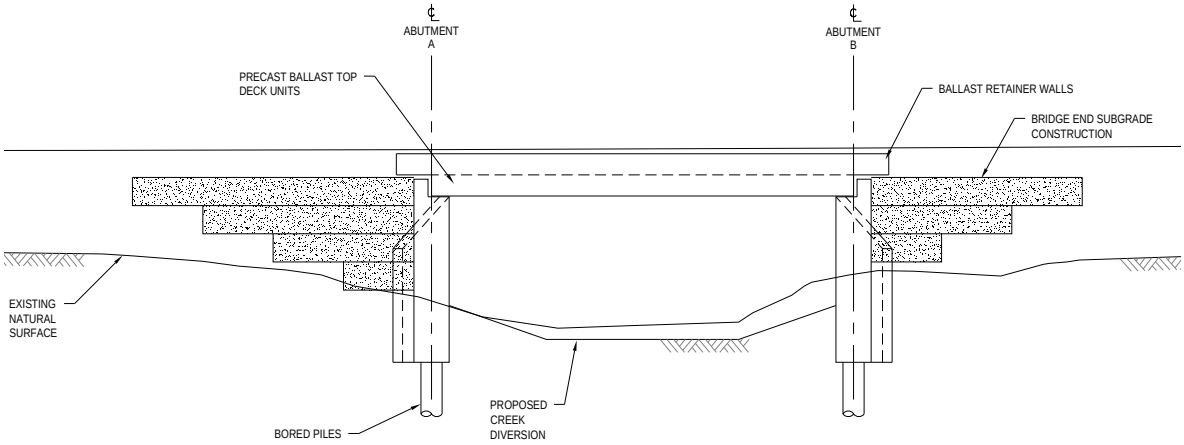

Figure 7.31 Proposed Sawyers Creek Underbridge Design Schematic

7.15.9 Bridge Street Branxton Overbridge (chainage 215.018 kilometres)

The existing three span reinforced concrete overbridge has the existing two tracks contained within the central span as shown in Figure 7.32. This structure would remain and be modified to cater for the proposed third track and access track by widening under both the end spans as shown in Figure 7.33. Works would include embankment cutting and soil nailing and strengthening of the existing piers for rail impact loads.

Figure 7.32 Existing Bridge Street Overbridge

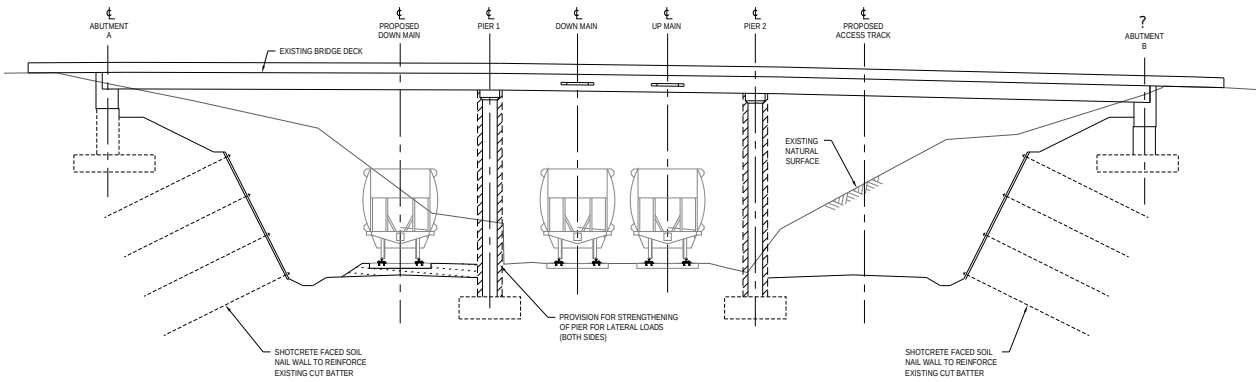

Figure 7.33 Proposed Modified Bridge Street Overbridge Design Schematic

7.15.10 Black Creek Underbridge (chainage 217.175 kilometres)

The existing bridge at Black Creek is a heritage listed multi-span brick arch structure supporting the Up and Down mains as shown in Figure 7.34. The capacity of the existing bridge is expected to be exceeded in future and therefore remedial work would be required without the Project proceeding. This heritage structure would remain.

Figure 7.34 Existing Black Creek Underbridge

In order to reduce loads on the existing heritage bridge structure a new bridge would cater for the proposed third track and slewing of the existing Up Main onto the new bridge. A new three span precast concrete underbridge would be constructed adjacent to the existing structure (on the Up side) as shown in Figure 7.35 and Figure 7.36.

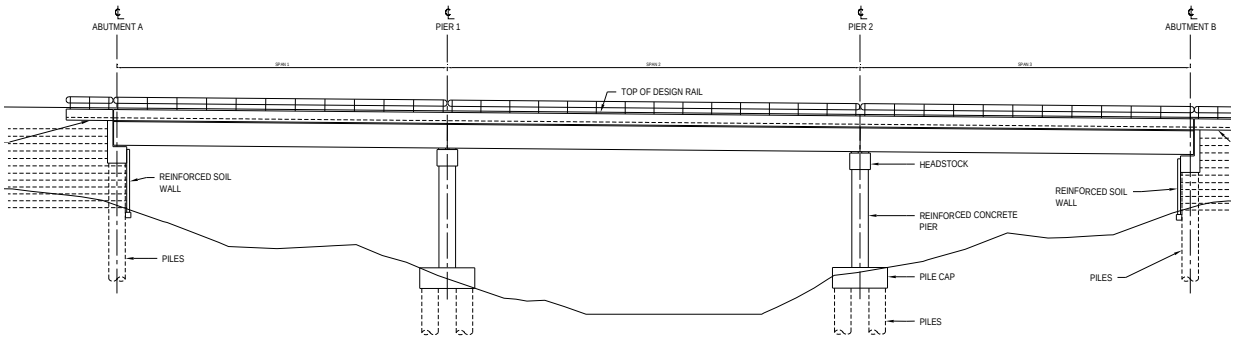

Figure 7.35 New Black Creek Underbridge Schematic: Elevation

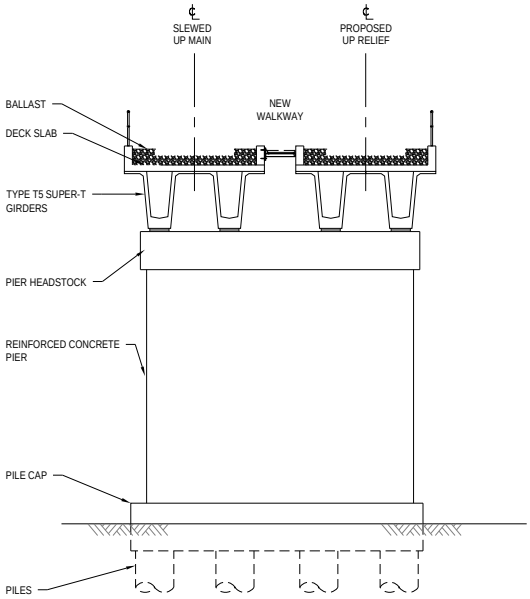

Figure 7.36 New Black Creek Underbridge Schematic: Section

The bridge would consist of precast concrete girders spanning between concrete headstocks that are supported by a concrete pier on four sets of piers. On each bridge end the girders would be supported on vertical reinforced soil wall abutments.

7.15.11 Jump Up Creek Underbridge (chainage 222.848 kilometres)

The existing Jump Up Creek underbridge is shown in Figure 7.37. This structure would remain.

Figure 7.37 Existing Jump Creek Underbridge

To cater for the proposed third track a new single span bridge would be constructed adjacent to the existing structure (on the Up side).

The bridge would consist of precast concrete girders spanning between reinforced concrete abutments and an end pier offset to match the existing structure, as shown in 3D schematic in Figure 7.38.

Figure 7.38 Proposed Jump Up Creek Underbridge 3D Schematic

7.16 Bridges – Construction

As presented in Table 7-17, bridge works would involve:

- Construction of six new underbridges.
- Closure of one stock underpass.
- Demolition and replacement of one existing underbridge.

- Demolition of one existing overbridge.
- Modifications to one overbridge.

7.16.1 Rail Underbridge Construction

Materials

The materials required for the construction of rail underbridges are listed in Table 7-18 along with the method of delivery and details on the timing and/or location of delivery.

Table 7-18 Rail Underbridges Construction Materials and Delivery Details

Material	Delivery Method	Delivery Timing and/or Location
Fill material	Select soil material processed on site and delivered by tipper truck	Day
Run of crush material	Select soil material processed on site and delivered by tipper truck	Day
Concrete	Road truck	Day
Steel forms	Road truck	Day
Scaffolding	Road truck	Day
Dowel bars	Road truck	Day
Laminated bridge bearing strips	Road truck	Day
Pre-cast concrete girders	Road truck	Day
Placing of bridge girders to form bridge spans	Mobile hydraulic crane	Crane arrival and set up by day. Crane lift during track possessions
Pre-cast deck floor panels	Road truck	Delivered by day. Crane lift during track possessions.
Galvanised maintenance walkway	Road truck	Delivered by day. Crane lift during track possessions.
Galvanised safety rails	Road truck	Delivered by day. Crane lift during track possessions.
Pre-cast concrete abutments and wingwalls	Road truck	Day

Construction Methodology

Prior to rail underbridge works taking place the footprint area of the proposed underbridge embankments up to the construction impact zone boundary would be cleared of vegetation. The footprint area of the proposed underbridge embankments would also be stripped of topsoil to a depth of 150 millimetres. The exposed ground would then be trimmed and compacted to the required bearing capacity. The topsoils would be stockpiled on vacant land adjacent to the work sites for re-use on embankments at the completion of the works.

The underbridge embankments would generally be constructed of imported fill material, tested to be of the appropriate bearing capacity once compacted to its optimum medium dry density. Road haulage tippers would deliver the imported fill material, with approximately 450 vehicle movements required for this operation.

The reinforced soil walls would be constructed using precast concrete panels and suitable fill (tested to have the optimum coefficient of friction (slippage factor) and the appropriate bearing capacity once compacted to its optimum medium dry density). Road haulage tippers would deliver the imported fill material and concrete panels.

Rail underbridge works would typically involve the following:

- Construction of access tracks for the piling rig and construction of a level earth platform. The surface of the access tracks and earth platform would be all weather gravel material, possibly run of crush (ROC) material.
- Construction of piles to the approximate required level at each abutment and piers. Piles may be:
  - Bored Piles: Pile boring equipment would excavate a circular hole to the required depth (bentonite slurry may be required to lubricate whilst cutting material), reinforcement and concrete would then be placed in the hole.
  - Driven Piles: Pile driving equipment would drive a steel or pre-cast concrete pile into the ground to the required depth.
- Construction of reinforced concrete piers with steel forms from the top of the pile to the underside level of the headstocks scaffolding, framework and reinforcement.
- Construction of reinforced soil walls, consisting of select fill interspersed with hold down straps attached to the rear of pre-cast reinforced soil wall panels to retain the fill. Some pre-cast reinforced soil wall panels would be attached to the abutment column piers.
- Construction of reinforced concrete abutments over the top of column piers, including scaffolding, formwork and reinforcement.
- Construction of reinforced concrete headstocks over column piers including scaffolding, formwork and reinforcement.
- Installation of laminated mortar pads and elastometric bearings.
- Installation of pre-cast rail girders over spans. This would require the establishment of a mobile hydraulic crane with up to 250 tonnes lifting capacity.

- Construction of reinforced concrete over the top of the pre-cast deck, including temporary safety rails, formwork and reinforcement. The concrete would be poured with the aid of a concrete boom pump.
- Construction of reinforced concrete approach slabs with wheel guard at each abutment.
- Supply and installation of a galvanised maintenance walkway consisting of expanded mesh or similar to the northern face of the bridge, attached to the external girders.
- Supply and installation of galvanised safety rails to the outside of the maintenance walkway.
- Installation of seal expansion joints, drainage sub base, base, asphalt, batter protection and line marking.
- Supply and installation of bridge name plates where directed.

The construction equipment required to undertake this work is summarised in Section 7.19.5.

7.16.2 Bridge Street Overbridge Modifications

Materials

The materials required for the strengthening of the Bridge Street overbridge at Branxton are listed in Table 7-19 along with the method of delivery and details on the timing and/or location of delivery.

Table 7-19 Rail Overbridge Construction Materials and Delivery Details

Material	Delivery Method
Concrete	Road
Rock Anchors	Road
Steel Reinforcement	Road

Construction Methodology

The works at the Bridge Street overbridge would involve the following:

Cut Widening

- Relocate existing signalling, communications and power cables.
- Excavate material to widen the existing cutting and dispose of spoil to a site stockpile.
- Drill holes and install rock anchor bolts (fill with grout and tension at the free end).
- Reinforcing mesh would then be placed over the trimmed face of the embankment.
- Install drainage tubes into the embankment horizontally in a set pattern for sub-soil water drainage.
- Spray concrete (Shotcrete) over the reinforcing mesh and let set or dry.

Pier Strengthening and Protection

- Prepare existing concrete piers by roughening of existing surface and installation of dowel bars.

- Place supplementary concrete around the existing concrete bridge piers within fabricated metal formwork.
- Construct a concrete protection guard wall, at ground level around the modified bridge piers, anchored into bedrock below by drilled ground anchors.

The construction equipment required to undertake this work is summarised in Section 7.19.5.

7.16.3 Bridge Demolition

The existing overbridge at Old North Road and the existing underbridge for the unnamed tributary of Anvil Creek at approximate chainage 209.989 kilometres would both be demolished during 48 hour track possessions. The plant and equipment that would be used in the demolition of the bridges would be likely to include:

- 40 tonne excavator.
- 30 tonne Moxy.
- Bobcat.

All waste material would be collected and disposed of at an appropriate facility.

Prior to demolition, the overbridge at Old North Road would be archivally recorded as detailed in Section 13.4.

7.17 Station Modifications – Design

The Project would involve modifications to three existing RailCorp stations, being:

- Lochinvar Station.
- Greta Station.
- Branxton Station.

Station modification works would include new platforms for the new track at Greta and Branxton, and access consistent with current standards at all station locations.

Design drawings are provided in Appendix S.

7.17.1 Lochinvar Station Modifications

Table 7-20 identifies the key station elements and the proposed amendments at the Lochinvar Railway Station.

Table 7-20 Proposed Lochinvar Station Modifications

Station Element	Proposed Modifications
Buildings and Structures	Construction of a new footbridge and access to the east of the existing platforms No other structures to be amended or altered.
Track Alignment	The present Up Main would remain the Up Main The present Down Main would remain the Down Main. The proposed third track would become the new Up Relief Main, passing north of the present Up platform.
Platforms	The existing platforms would be retained with minor modifications at the eastern and western ends platforms (retention of both platforms and access ramp on the Down side platform; removal of the access ramp from the Up side platform).
Parking and Access	Construction of a new car park to the south of the existing station accessible from the north via a new rail overbridge to be constructed by the ARTC to replace the Station Lane level crossing.

The proposed Lochinvar Railway Station layout in included in Appendix S.

The existing Lochinvar Station platforms are located closely adjacent to the former Station Lane level crossing and diagonally adjacent to Clifton House. However, this level crossing would be replaced by an overbridge to the west of the existing station.

Road access to the station would be provided from the existing Station Lane road alignment connecting servicing a relocated car park on the Down side. Access across the rail line to this road alignment and car park would be available from the overbridge. The Down side platform would be accessed from the car park by an existing ramp. The new pedestrian footbridge would provide pedestrian access to Up side platform.

7.17.2 Greta Station Modifications

Table 7-21 identifies the key station elements and the proposed amendments at the Greta Railway Station.

Table 7-21 Proposed Greta Station Modifications

Station Element	Proposed Modifications
Buildings and Structures	No station buildings would be modified or affected. The existing footbridge would not be modified or affected.
Track Alignment	The existing Up Main would become the Up Relief. The existing Down Main would become the Up Main. The new track passing immediately south of the present Down platform would become the new Down Main.

Station Element	Proposed Modifications
Platforms	Other than minor, non-structural de-commissioning work, the Up (eastern) platform would not be modified. Access to the present Up platform would be restricted by the construction of fencing and a lockable gate. The existing Down platform would not be modified (apart from as described below). The present Down platform would be converted into an island platform by the construction of a new platform area to the west and south to align with the proposed new Down Main. This redevelopment would involve the following to be consistent with current Railcorp standards for level access: ◗ Demolition of the southern fascia of the platform and reconstruction to the required height. ◗ Raising of the level of the northern component of present platform fascia. ◗ Filling and sealing the new/replacement work to a consistent surface.
Parking and Access	The present carpark and drop-off area on the northern side of the station would not be modified.

The proposed Greta Railway Station layout is included in Appendix S.

The Greta Railway Station area is listed on the State Heritage Register. The listing includes, but is not limited to, the buildings, platforms, existing footbridge and stairs. Impacts to key heritage elements would be limited to the upgrading of the height of the existing Down Main platform, and incorporating the existing footbridge into the new Down Main platform. No alterations to the heritage buildings and most of the existing platform are proposed.

It is noted that the height of some existing platform areas is likely to require modification to meet current standards. The final upgraded platform length is expected to be approximately 55 metres.

7.17.3 Branxton Station Modifications

Table 7-22 identifies the key station elements and the proposed amendments at the Greta Railway Station.

Table 7-22 Proposed Branxton Station Modifications

Station Element	Proposed Modifications
Buildings and Structures	No station buildings would be modified or affected. The existing footbridge would not be modified or affected. The 'moveable relics' at Branxton Station would not be modified or affected.
Track Alignment	The existing Up Main would become the Up Relief The existing Down Main would become the Up Main The new track passing immediately south of the present Down platform would become the new Down Main. An additional track would l be constructed south of the proposed new Down Main as a siding.
Platforms	Other than minor, non-structural de-commissioning works, the Up (northern) platform would not be modified. The present Up platform would not be modified. Access to the present Up platform would be restricted by the construction of fencing and a lockable gate. From the eastern alignment of the present Down platform building to the western end, the present Down platform would not be modified The eastern section of the present Down platform would be converted into an island platform by the construction of a new southerly platform area to align with the proposed new Down Main.
Parking and Access	The existing carpark and drop-off area on the northern side of the station would not be modified. Access to the present Up platform would be restricted by the construction of fencing and a lockable gate.

The proposed Branxton Railway Station layout is provided in Appendix S.

The Branxton Railway Station area is listed on the State Heritage Register. The listing includes, but is not limited to, the buildings, platforms, existing footbridge and stairs, and loading siding.

As such, the design and construction of new platform areas would aim to minimise impact on these heritage items, with impacts limited to minor modifications where the existing Down Main platform adjoins the proposed Down Main platform, and incorporation of the existing footbridge into the proposed Down Main platform. The final upgraded platform length is expected to be in the order of 55 metres.

7.18 Station Modifications – Construction

7.18.1 Lochinvar Station

Materials

The materials required for the construction of the new station footbridge and ramps at Lochinvar are listed in Table 7-23 along with the method of delivery and details on the timing and / or location of delivery.

Table 7-23 Lochinvar Station Construction Materials and Delivery Details

Material	Delivery Method
Asphalt and fill	Road
Pre-fabricated steelwork and concrete ramp and footbridge infills	Road
Concrete	Road
Miscellaneous station and platform infrastructure	Road

Construction Methodology

Details of the station construction methodology would be further developed and would include consideration of construction staging to minimise disturbance to passengers and the community. Construction is likely to include:

- Clearing of the proposed site.
- Construction of concrete ramp footing piles.
- Installation and fabrication of steel footbridge / ramps and concrete infill panels using crane.
- Modification of carpark pavement and drainage.
- Installation of auxiliary works including lighting and signage.

The existing parking area at Lochinvar Station would remain accessible until completion of the proposed footbridge linking the two platforms.

After this stage, this parking area would be replaced by the proposed parking area described in Section 7.17.2. Construction of the proposed rail overbridge to replace the Station Lane level crossing would be completed by ARTC prior to construction of the Project and therefore this parking area would be accessible.

The construction equipment required to undertake this work is summarised in Section 7.19.5.

Passenger Safety

Throughout the construction phase a number of passenger and public safety measures would be implemented to maintain accessibility to the platforms while protecting passenger and public safety. Such measures would be consistent with WorkCover requirements and may include (but not be limited to):

- Isolating construction areas through the use of concrete barriers constructed from pre-cast or tilt up panels and / or expanded galvanised steel mesh panels with steel framing. Such barriers would be provided around the third track construction area, as well as on the existing platforms while the footbridge and existing Down platform access ramp are under construction.
- Completion of the footbridge, new road access and parking area, as well as closure of the existing level crossing, prior to commencing the Up Relief.
- Staging of construction activities and reopening of public access to areas.

7.18.2 Branxton Station

Materials

The materials required for the modification of Branxton Station are listed in Table 7-24 along with the method of delivery and details on the timing and / or location of delivery.

Table 7-24 Branxton Station Construction Materials and Delivery Details

Material	Delivery Method
Precast concrete platform modules	Road
Asphalt and fill	Road
Pre-fabricated steelwork and concrete ramp and footbridge infills	Road
Concrete	Road
Miscellaneous station and platform infrastructure	Road

Construction Methodology

Details of the station construction methodology would be further developed and would include consideration of construction staging to minimise disturbance to passengers and the community. Construction is likely to include:

- Installation of precast concrete platform units using a crane where the platform is to be extended.
- Earthworks for preparation of level base for platforms.
- Earth filling between platform units.
- Installation of new pavement surface layer.
- Construction of concrete ramp footing piles.
- Installation of pavement layers on the existing platform where increased height is required.

- Installation and fabrication of steel footbridge / ramps and concrete infill panels using crane.
- Modification of carpark pavement and drainage.
- Installation of auxiliary works including lighting and signage.

As discussed in Section 7.17.2, the existing parking areas at Branxton Railway Station would remain operational.

The construction equipment required to undertake this work is summarised in Section 7.19.5.

Passenger Safety

Throughout the construction phase a number of passenger and public safety measures would be implemented to maintain accessibility to the platforms while protecting passenger and public safety. Such measures would be consistent with WorkCover requirements and may include (but not be limited to):

- Isolating construction areas through the use of concrete barriers constructed from pre-cast or tilt up panels and / or expanded galvanised steel mesh panels with steel framing. Such barriers would be provided around the third track construction area, as well as on the existing Down platform while the platform extension is under construction.
- Staging of construction activities and reopening of public access to areas.

7.18.3 Greta Station

Materials

The materials required for the modification of Greta Station are listed in Table 7-25 along with the method of delivery and details on the timing and/or location of delivery.

Table 7-25 Greta Station Construction Materials and Delivery Details

Material	Delivery Method
Precast concrete platform modules	Road
Asphalt and fill	Road
Pre-fabricated steelwork and concrete ramp and footbridge infills	Road
Concrete	Road
Miscellaneous station and platform infrastructure	Road

Construction Methodology

Details of the station construction methodology would be further developed and would include consideration of construction staging to minimise disturbance to passengers and the community. Construction is likely to include:

- Installation of precast concrete platform units using a crane where the platform is to be extended.
- Earthworks for preparation of level base for platforms.

- Earth filling between platform units.
- Installation of new pavement surface layer.
- Construction of concrete ramp footing piles.
- Installation of pavement layers on the existing platform where increased height is required.
- Installation and fabrication of steel footbridge / ramps and concrete infill panels using crane.
- Modification of carpark pavement and drainage.
- Installation of auxiliary works including lighting and signage.

As discussed in Section 7.17.2, the existing parking areas at Greta Railway Station would remain operational.

The construction equipment required to undertake this work is summarised in Section 7.19.5.

Passenger Safety

Throughout the construction phase a number of passenger and public safety measures would be implemented to maintain accessibility to the platforms while protecting passenger and public safety. Such measures would be consistent with WorkCover requirements and may include (but not be limited to):

- Isolating construction areas through the use of concrete barriers constructed from pre-cast or tilt up panels and/ or expanded galvanised steel mesh panels with steel framing. Such barriers would be provided around the third track construction area, as well as on the existing Down platform while the platform extension is under construction.
- Staging of construction activities and reopening of public access to areas.

7.19 Other Construction Activities

7.19.1 Site Establishment

Construction Compounds

Primary and secondary construction compounds would be required for the construction phase of the Project for offices, staff parking and storage of mobile and fixed plant and construction materials.

Primary Construction Compounds

The Project would be divided into three areas for construction, as follows:

- Area A – chainage 194.500 kilometres to chainage 203.000 kilometres.
- Area B – chainage 203.000 kilometres to chainage 217.200 kilometres.
- Area C – chainage 217.200 kilometres to chainage 224.220 kilometres.

Criteria that the primary construction compounds would need to comply with include:

Site Conditions	◗ All weather access. ◗ Adequate space. ◗ Relatively level land. ◗ Not require vegetation clearing beyond that already required for the Project. ◗ Not impact on heritage sites beyond those already impacted by the Project.
Location	◗ Ready access to the road network. ◗ Located to minimise the need for heavy vehicles to travel through residential areas. ◗ Separated from nearest residences by at least 200 metres. ◗ Not affect the land use of adjacent properties.
Services	◗ Electric power supply nearby. ◗ Proximity to other services (water, sewerage)

The primary construction compounds would require an area of approximately 30 hectares, would be static and would be required for the duration of the construction period.

Based on the above criteria, it is anticipated that the primary construction compounds would be established at the locations detailed in Table 7-26.

Table 7-26 Primary Construction Compound Locations

Location	Chainage (kilometres)
Station Lane, Lochinvar	202.500 – 203.050 Up side
Branxton	215.680 – 216.320 Up side

Generally the primary construction compounds would include demountable buildings for staff accommodation and would have the following facilities:

- Hardstand car parking areas.
- Hardstand storage areas.
- Explosives store.
- Bunded diesel fuel storage area.
- Security lighting.
- Anaerobic or aerobic septic system and sullage removal tanks.
- Water storage tanks.
- First aid room.
- Eyewash.

- Water coolers and ice machines.
- Ablution facilities.
- Equipment as required including rock crushing, grout batching, material storage silos or stockpiles.

Secondary Construction Compounds

Secondary construction compounds would be temporarily established within the construction impact zone primarily adjacent to each of the bridge construction sites and railway station modification work areas.

Table 7-27 provides a summary of the anticipated secondary construction compound areas that may be established and the associated works.

Table 7-27 Secondary Construction Compound Locations

Chainage (kilometres)	Side	Description	Possible Activity
195.450 – 195.520	Up side	Wollombi Road, Telarah	Small laydown area.
195.660 – 196.120	Down side	Wollombi Road, Farley	Satellite Office at new rail underbridge location.
204.540 – 204.800	Up side	Old North Road	Demolition of existing overbridge.
205.850 – 206.060	Up side	Allandale Road	Satellite Office at new rail underbridge location.
209.174	Up side	Arch culvert	New Rail Underbridge.
209 .989	Up side	Underbridge	New Rail Underbridge.
210.700	Both	Greta Station, Nelson Street	Access to existing railway station.
211.010	Down side	Sawyers Creek	New Rail Underbridge.
215.018	Down side	Bridge Street Overbridge	Existing road overbridge pier collision protection and embankment stabilisation works.
217.240 – 217.760	Up side	Black Creek underbridge, Belford	New Black Creek underbridge
222.480 -222.880	Up side	Hermitage Road, Belford	Satellite Office.

The secondary construction compounds would generally consist of the following facilities:

- Demountable offices.
- Water cooler.
- Ablution facilities.
- Hardstand car parking area.
- Hardstand storage area.
- Security lighting.
- Sullage removal tanks.
- Eyewash.

The secondary construction compounds may be relocated during bridge or railway station construction activities to cater for the bulk earthworks activities or signalling relocation works. Apart from topsoil removal, no excavation is anticipated at any of the secondary construction compounds.

7.19.2 Site Access

Construction materials would be transported to and from the site using on-road trucks (rigid bodied or semi-trailers), tippers and concrete mixers. Access to the site is proposed to be a mix of a number of types of egress and exit points dependant on the works required to be undertaken at any given time.

Construction truck traffic would travel to the site along the New England Highway and then typically access the site via local roads.

Main access points for the ingress and exit of major construction vehicles to the site are detailed in Table 7-28.

Traffic impacts are considered in **Chapter 15**.

In the event that construction personnel are required to access or pass through private property, approval is required of the landholder, and gates and access points left as they were found. Property fencing is to be maintained, and if damage to fencing does occur, it would be restored to it previous condition.

Table 7-28 Site Access Locations

Works Area	Chainage (kilometres)	Egress and Exit
Wollombi Road	195.580	From existing Wollombi Road, North and South directions
Lochinvar	202.500	From existing Station Lane
Old North Road	204.800	From existing Old North Road
Allandale Road new underbridge	206.080	From existing Allandale Road
Underbridge arch stormwater culvert	209.174	From existing maintenance track within rail corridor
Underbridge planks bridge stormwater	209.989	From existing maintenance track within rail corridor

Works Area	Chainage (kilometres)	Egress and Exit
Greta – Nelson Street bridge	210.700	From existing Nelson Street from the north and from existing Old North Road from the south
Sawyers Creek underbridge	211.010	From existing maintenance track within rail corridor
Bridge Street overbridge pier protection	215.018	From maintenance track access points at Branxton from Railway Street on the Up side and from Branxton Road on the Down side
Branxton Station renewal, turnout installation, track slews and track sub-grade remediation	215.600	From existing maintenance track within rail corridor and from Station Street on the Up side
Black Creek Underbridge	217.240	From existing maintenance track within rail corridor and possible access from Rix's Road on the Up country side
Rix's Road access road work	218.100	From Rix's Road
Belford Retaining Wall	221.700	From existing maintenance track within rail corridor
Jump Up Creek Underbridge	222.848	From existing maintenance track within rail corridor and from Hermitage Road
Track work	194.500 to 224.200	Access points as listed above and from other existing maintenance access gates
Earthworks – all	194.500 to 224.200	Access points as listed above and from other existing maintenance access gates

7.19.3 Landscaping and Rehabilitation

Landscaping would be undertaken at various locations along the Project route to minimise the potential visual impacts of infrastructure on nearby residents and road users, to stabilise exposed soil and earthworks sites, and to address the loss of vegetation as a result of the Project. Landscaping would generally incorporate indigenous plant species of appropriate size based on the proximity to rail and road infrastructure.

Indigenous plant species would be made available to adjoining property owners to plant on their property to use as a visual buffer.

Where possible, areas of native vegetation cleared for construction of the Project would be rehabilitated with indigenous plant species. Similarly, any areas of adjoining landowners' pasture subject to temporary access or use during the construction phase would be rehabilitated through grass seeding with appropriate pasture grass species.

The locations and design of landscaping would be detailed in a Landscaping Plan to be developed during the detailed design phase.

7.19.4 Environmental Controls

Environmental management would be undertaken throughout construction. The Construction Environmental Management Plan (CEMP) for the Project would address the requirements based on controls and mitigation measures described in Part C of this document.

7.19.5 Construction Plant and Equipment

The major plant items expected for construction of the Project are detailed in Table 7-29. The plant and machinery would be chosen on a fit-for-use basis and would consist of various makes, tonnages and capacities dependant on site conditions.

Table 7-29 Construction Plant and Equipment

Element	Plant / Equipment
Earthworks	Piling rigs, concrete transit mixer, excavators, scrapers, articulated trucks, front end loaders, rock breakers, graders, compactors, tippers, flat bed trucks, cranes, asphalt pavers, backhoes, dozers, rollers, water carts, various hand operated equipment, and hi-rail vehicles.
Track work	Front end loaders, 32 tonne excavators, Franna cranes up to 25 tonne, crawler crane up to 50 tonne with spreader bar, 25 tonne articulated dumpers, Unimat tamper, Plasser SSP110SW regulator, compressors, tools truck, 10 tonne SD roller, 12G grader, rail tensors, rail saws, and track jacks, PEM LEM (track turnout laying) machine.
Drainage works	5 tonne to 22 tonne excavators, site soil and rock cartage tipper vehicles (such as balloon tyred tippers, articulated trucks or road tippers), small tools (such as electric or hydraulically powered jack hammers or plate compactors), compressors, pedestrian compaction rollers, turfier, all terrain cranes, concrete pumps, concrete trucks, and backhoe diggers and loaders.
Bridge works	Excavator, rock breakers, tippers, saw cutting machine, piling rig, concrete transit mixer, flat bed truck, crane, asphalt pavers, front end loader, backhoes, concrete pump, hi-rail vehicles, roller-vibratory, mobile cranes and elevated work platform.
Station modifications	Crane, concrete trucks, piling rig, excavator, roller, piling rig, concrete transit mixer, flat bed truck, crane, asphalt pavers, front end loader, backhoes, concrete pump.

It is also expected that the following general plant would be required:

- Site accommodation units.
- Site toilets/ablution blocks.
- Storage containers.
- Air compressors.
- Generators.
- Temporary lighting equipment.

7.19.6 General Construction Materials

The Project would require a large quantity of resources for construction. A resource plan to source materials for construction would be developed when design is complete. In addition to the specific material required for the track work, earthworks, bridge works, station modifications and environmental controls listed Sections 7.10, 7.12, 7.14, 7.16, and 7.18 general resources would be required. These include:

- Water.
- Cement.
- Fuel.

Water Usage for Construction

Approximately three million litres of water per day is expected to be utilised for construction activities including dust mitigation.

Options considered for water supply for dust and air particulate mitigation include:

- Harvesting from existing dams.
- Harvesting from constructed detention basins.
- Treated effluent from Hunter Water treatment plants at Branxton and Farley.
- Some potable water.

Concrete

It is not anticipated that concrete batching would occur on site. Structures would be constructed where possible using precast concrete elements transported to site. Where concrete is required for example at bored pile locations, it would be transported to site in concrete transit mixer vehicles.

Refer to Section 7.19 for details of grout batching plant requirements.

Fuel

Diesel would be stored in the bunded fuel storage areas within the primary construction compounds. Capacity of above ground fuel storage is expected to be up to 20,000 litres at any one site. Diesel fuel usage is expected to be approximately 35,000 litres per day from late 2010 for a six month period. Delivery to the fuel storage areas would be by road tankers. The tank facility would include gravity feed to mini tankers. The mini tankers would then proceed to the works areas to re-fuel the works machinery and plant.

7.19.7 Waste Management

Recycling, re-use and non-reusable waste disposal strategies and plans would be developed. The strategies and plans would be consistent with the objectives of the *Waste Avoidance and Resource Recovery Act* 2001, the NSW Waste Avoidance and Resource Recovery Strategy (DECC 2007b) and other relevant legislation.

Where possible, waste material generated during construction activities would generally be reused. For example, excavated materials would be re-used as fill and some vegetated material would be re-used as mulch for landscaping purposes. Waste management is discussed in further detail in **Chapter 19**.

7.19.8 Construction Workforce

The construction workforce would peak at approximately 650 people. It would consist of engineers, surveyors, environmental scientists, para-professionals, site superintendents, foremen, leading hands, labourers, plant machinery operators, crane drivers, dogmen, mechanics, site administration staff, roustabouts and occupational health and safety personnel.

7.20 Construction Programming

7.20.1 Indicative Construction Program

The indicative start date for the construction program is October 2010. The construction program is expected to take approximately 18 months, with an expected completion date of March 2012.

Table 7-30 provides an indicative construction program for the main construction activities. Staging of the construction of the Project is not proposed. Construction would take place concurrently along the full length of the Project.

Table 7-30 Indicative Construction Program

Construction Activity	Indicative Construction Timing
Site establishment	October 2010 to November 2010
Earthworks	November 2010 to September 2011
Drainage works	November 2010 to September 2011
Bridge works	November 2010 to September 2011
Station modifications	November 2010 to August 2011
Track works	March 2011 to October 2011
Commission, handover and demobilisation	November 2011 to March 2012

7.20.2 Standard Construction Hours

Hunter 8 proposes that the standard business hours for construction activities associated with the Project would be:

- 7:00 am to 6:00 pm, Mondays to Fridays, inclusive.
- 8:00 am to 1:00 pm Saturdays.
- No works on Sundays or public holidays.

The current ARTC Environment Protection Licence 3142 (EPL) allows for maintenance and construction works to be undertaken outside business hours providing it is undertaken in accordance with specific conditions contained in the EPL. It is proposed that a new EPL for construction of the Project, or a revision of the existing EPL, would include similar conditions.

Communications with the local community with regards to out-of-hours work would be conducted in accordance with the relevant provisions of the existing ARTC EPL, which are as follows:

- (O3.2) – Hunter 8 Alliance must notify residents of any construction activity which is to be conducted outside normal business hours and which is likely to create offensive noise for those residents.
- (O3.3) – The notification required by condition O3.2 must be provided at least five days prior to the commencement of the applicable construction activities.
- (O3.4) – Hunter 8 Alliance must provide a central telephone contact number to DECCW whereby the following details regarding any construction activities conducted outside normal business hours can be accessed:
  - Dates and times of a proposed activity.
  - Location of a proposed activity.
  - Type(s) of work to be performed in conducting the activity.
  - Plant and equipment to be used.
  - Contact name and telephone number of a person who would be on site during the carrying out of the activity and who is authorized by Hunter 8 Alliance to take action, including the cessation of the activity or any part of it, if so directed by DECCW. A contact person must be contactable 24 hours a day via the supplied telephone number(s) during the whole of the period that the activity takes place outside normal business hours.

The mitigation measures, including the preparation and implementation of Noise and Vibration Impact Statements, described in Section 17.6 would be implemented to further minimise any potential impacts from construction activities outside of standard business hours.

7.20.3 Track Possessions

In addition, many construction activities would be programmed to utilise scheduled track possession periods. During such periods, train operations would cease for approximately 36 to 60 hours to allow activities that require work in close proximity to the track to occur. Work during track possessions would be undertaken continuously (24 hours).

Activities in close proximity to the track that would be completed during track possessions include:

- Extended concrete pours.
- Piling of major structures.
- Excavation close to existing rail and road infrastructure.

- Stormwater drainage culvert works.
- Placing bridge girders by crane.
- Crane movements required for major structures.

Programmed track possessions during the Project construction period are as follows:

- 16 to 19 November 2010.
- 8 to 10 March 2011.
- 3 to 5 May 2011.
- 9 to 11 August 2011.
- 15 to 17 November 2011.
- 6 to 8 March 2012.

7.20.4 Extended Hours of Operation

While work would be undertaken during the proposed work hours as far as possible, it is anticipated that construction work is likely to be conducted during extended hours in a number of instances, including 24 hour work during track possession periods.

The ARTC's Environment Protection Licence 3142 (EPL) allows for maintenance and construction works to be undertaken outside business hours providing it is undertaken in accordance with specific conditions contained in the EPL.

Communications with the local community with regards to out-of-hours work would be conducted in accordance with the relevant provisions of EPL 3142, which are as follows:

(O3.2) – Hunter 8 Alliance must notify residents of any construction activity which is to be conducted outside normal business hours (usually 7.00 am to 6.00pm Monday to Friday, 8.00 am to 6.00 pm Saturday and no works on Sunday and public holidays) and which is likely to create offensive noise for those residents.

(O3.3) – The notification required by condition O3.2 must be provided at least five days prior to the commencement of the applicable construction activities.

(O3.4) – Hunter 8 Alliance must provide a central telephone contact number to DECCW whereby the following details regarding any construction activities conducted outside normal business hours can be accessed:

- Dates and times of a proposed activity.
- Location of a proposed activity.
- Type(s) of work to be performed in conducting the activity.
- Plant and equipment to be used.
- Contact name and telephone number of a person who would be on site during the carrying out of the activity and who is authorized by Hunter 8 Alliance to take action, including the cessation of the activity or any part of it, if so directed by DECCW. A contact person must be contactable 24 hours a day via the supplied telephone number(s) during the whole of the period that the activity takes place outside normal business hours.

7.21 Potential Additional Construction Areas

The Project design and construction methodology is continuing to be developed. As such, a number of Project construction elements outside of the Investigation Area may be required. This could include:

- Spoil Areas – additional appropriate areas for spoil disposal on adjacent properties may become available following discussions with landholders.
- Borrow Pits – geotechnical investigations are continuing that may identify additional areas of appropriate materials (as described in Section 7.10) adjacent to the rail corridor for use in construction.
- Screening Mounds – mounds for noise attenuation and visual screening could be constructed on adjacent properties following consultation with adjacent landholders.
- Construction Compounds – in addition to those compounds described in Section 7.19, additional compounds or alternative locations may be identified following further detail design and construction methodology development.
- Access / Haul Roads – to connect these areas with the rail corridor, additional access and haul roads may also be required.

Any areas outside of the existing Investigation Area would be subject to an assessment of a similar methodology as that applied in this Environmental Assessment and submitted for approval by the Department of Planning prior to the commencement of construction. In addition, the following criteria would be applied in site selection:

- Avoid and, if not possible, minimise the requirement for native vegetation clearance, especially endangered ecological communities.
- Minimise noise and other impacts on nearby sensitive receptors. Construction compounds would be a minimum of 200 metres from the nearest residence unless agreement is reached with the affected landholder/s.
- Maximise opportunities to haul materials within the Project corridor and minimise traffic on public roads.
- Locations are a minimum of 20 metres from a watercourse.
- Where permanent elements (such as screening mounds) are proposed on property remaining privately owned, the design and location would be agreed with the property owner.

7.22 Operation Activities

7.22.1 Existing and Predicted Rail Traffic

Existing rail traffic volumes were determined from a detailed ARTC log of trains that passed by the East Greta Junction between 16 August and 15 September 2009. Analysis of the log led to the determination of the rail volumes shown in Table 7-31.

Table 7-31 Average Daily Rail Movements, 16 August 2009 – 15 September 2009

Description	Daytime (7:00 – 22:00)		Night-time (22:00 – 7:00)	
	Up	Down	Up	Down
Coal Train	21	20	14	14
Freight Train	2	2	1	1
Passenger	4	3	0	1

In addition to the above, ARTC 2009-2018 *Hunter Valley Corridor Strategy Consultation Document* indicates the following:

- The coal chain capacity for 2012 would be 158 million tonnes per annum.
- The coal chain capacity for 2016 would be 200 million tonnes per annum.
- The average coal train capacity is 7,200 tonnes.

Preliminary modelling undertaken by the ARTC indicates that the coal chain capacity for 2016 would stabilise at this level until at least 2022. This modelling by the ARTC is based on forecasting provided by the coal companies on their anticipated throughputs.

Based on the above information, the predicted coal train volumes for 2012 and 2022 can be estimated. For the purpose of the assessment, freight and coal trains have been grouped as they present similarities in terms of length and speed. Table 7-32 presents the existing and projected coal/freight train volumes used in the assessment.

Table 7-32 Average Daily Existing and Future Coal / Freight Train Movements

Year	Daytime (7:00 – 22:00)		Night-time (22:00 – 7:00)	
	Up	Down	Up	Down
2009	23	22	15	15
2012	37	35	24	24
2022	46	44	31	30

While it has been assumed that freight volumes would grow at a similar rate to coal trains, passenger train volumes have been assumed to remain stable over the years. Nonetheless, the Project would improve capacity of the Main Northern Railway between Maitland and Minimbah and would therefore allow for an increase in train volumes for all rail services.

On the basis that the third track would carry all additional coal rail traffic in the Up direction (Up relief), the rail volume distribution would be as shown in Table 7-33.

Table 7-33 Existing and Future Coal/Freight Train Distribution

Year	Existing Up Track		Existing Down Track		Third Track (Up Relief)	
	Daytime	Night-time	Daytime	Night-time	Daytime	Night-time
2009	23	15	22	15	-	-
2012	23	15	35	24	14	9
2022	23	15	44	30	23	16

7.22.2 Maintenance Activities

During the operation of the Project, ongoing maintenance activities would need to be undertaken. Minor maintenance works on associated infrastructure could potentially be undertaken throughout the operations during standard business hours.

However, where safety requirements require the closure of the line to rail traffic, maintenance activities would be undertaken during scheduled track possessions (during which train movements cease for 36 to 60 hours) that occur approximately every three months. Works are undertaken for the duration of the possession, subject to the sensitive receiver consultation process required by the ARTC Environment Protection Licence, as discussed in Chapter 17.

Typical maintenance activities may include:

- Rail welding.
- Re-railing.
- Rail grinding.
- Tamping.
- Ballasting.
- Track re-conditioning.
- General maintenance of drainage structures.
- General maintenance of access roads and embankments (including weed and vegetation management).
- Signal maintenance.

These works would be undertaken on accordance with ARTC's existing standard maintenance procedures and the ARTC *Code Of Practice For Environmental Impact Assessment Of Development Proposals In New South Wales*.