4. Project Description

This chapter provides a description of the proposed Project, including details of construction, operation and maintenance activities. Table 4a identifies the relevant DGRs and where the requirements are addressed.

Table 4a Director-General's Environmental Impact Statement Requirements – Key Design Elements

Director-General's Environmental Impact Statement Requirements	Location addressed
General Requirements	
The Environmental Impact Statement (EIS) must be prepared in accordance with and meet the minimum requirements of Part 3 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation), and include the following:	
1. the information required by clause 6 of Schedule 2 of the Regulation;	EIS Volume 1 including this chapter
2. the content listed in clause 7 of Schedule 2 of the Regulation of the Environmental Planning and Assessment Regulation 2000 (the Regulation) and including the following:	
• *a description of the project's relationship and/or interaction with the adjoining proposed Hexham Redevelopment Project (QR National Project);*	Section 4.7 of this chapter and **Chapter 24 Cumulative Impacts**

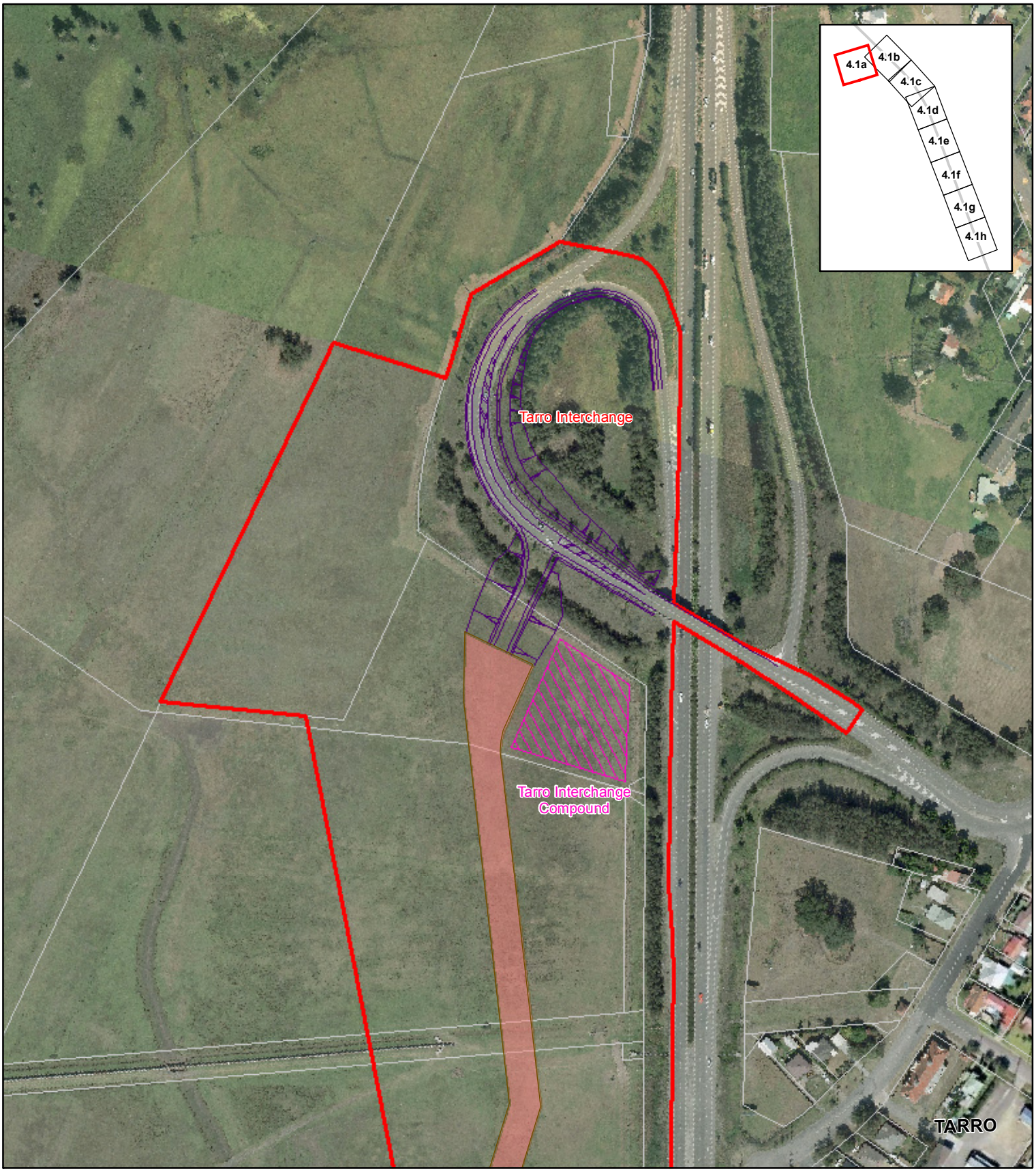
4.1. Overview of the Project

ARTC proposes to develop five Relief Roads (tracks) and associated infrastructure at Hexham in the NSW Hunter Valley (the proposed Project). The proposed Project is located at Hexham, approximately 16km north west of Newcastle and 176km north of Sydney by rail (refer to Figure 1.1 at **Chapter 1 Introduction**).

Key components of the proposed Project are shown on Figures 4.1a-h and comprise:

- Five Up Relief Roads (train lines) to the west of the existing Up Main, Down Main and Up Coal including:
  - The removal of the existing Down Coal (located to the west of the Up Coal);
  - The construction of five new train lines (tracks) for the Relief Roads;
  - The construction of a new Down Coal to the west and outside of the proposed Relief Roads;
  - Each Relief Road to accommodate trains generally comprising two or three locomotives and up to 91 wagons (1,543m long) requiring a minimum standing room of 1,670m.
  - New turnouts, return curves and other track changes.
- Installation of new signal infrastructure for the five Relief Roads including signal location cases, huts and gantries.
- Earthworks of approximately 265,000 cubic metres, including track formation, drainage and minor structures.
- Vehicular tracks, land acquisition and upgrading of existing rail infrastructure and public utilities.

The estimated cost of the proposed Project is $90 million and it is expect to take approximately 18 months to construct.



- Jemena Gas Pipeline
- Relief Roads
- Proposed Tarro Interchange Access
- Project Area
- Cadastre
- Proposed Compound Area
- Proposed Vehicular Access
- Proposed Vehicular Access to Lot 312 DP 58724
- Indicative Tarro Interchange Access
- Swale Drain

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1a

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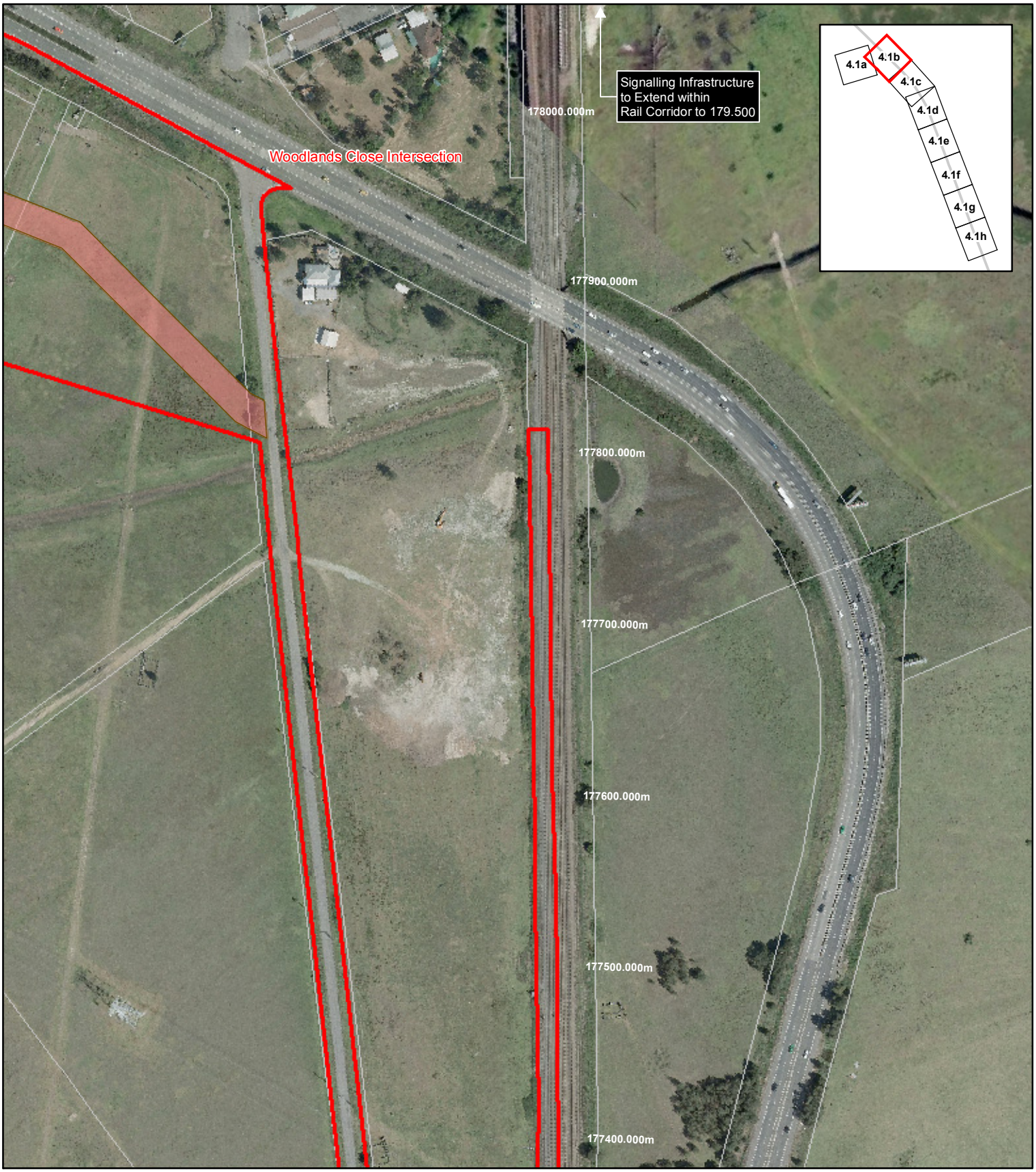

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- Project Area
- Cadastre
- Proposed Compound Area
- Proposed Vehicular Access
- Proposed Vehicular Access to Lot 312 DP 58724
- Indicative Tarro Interchange Access
- Swale Drain

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

UHVA

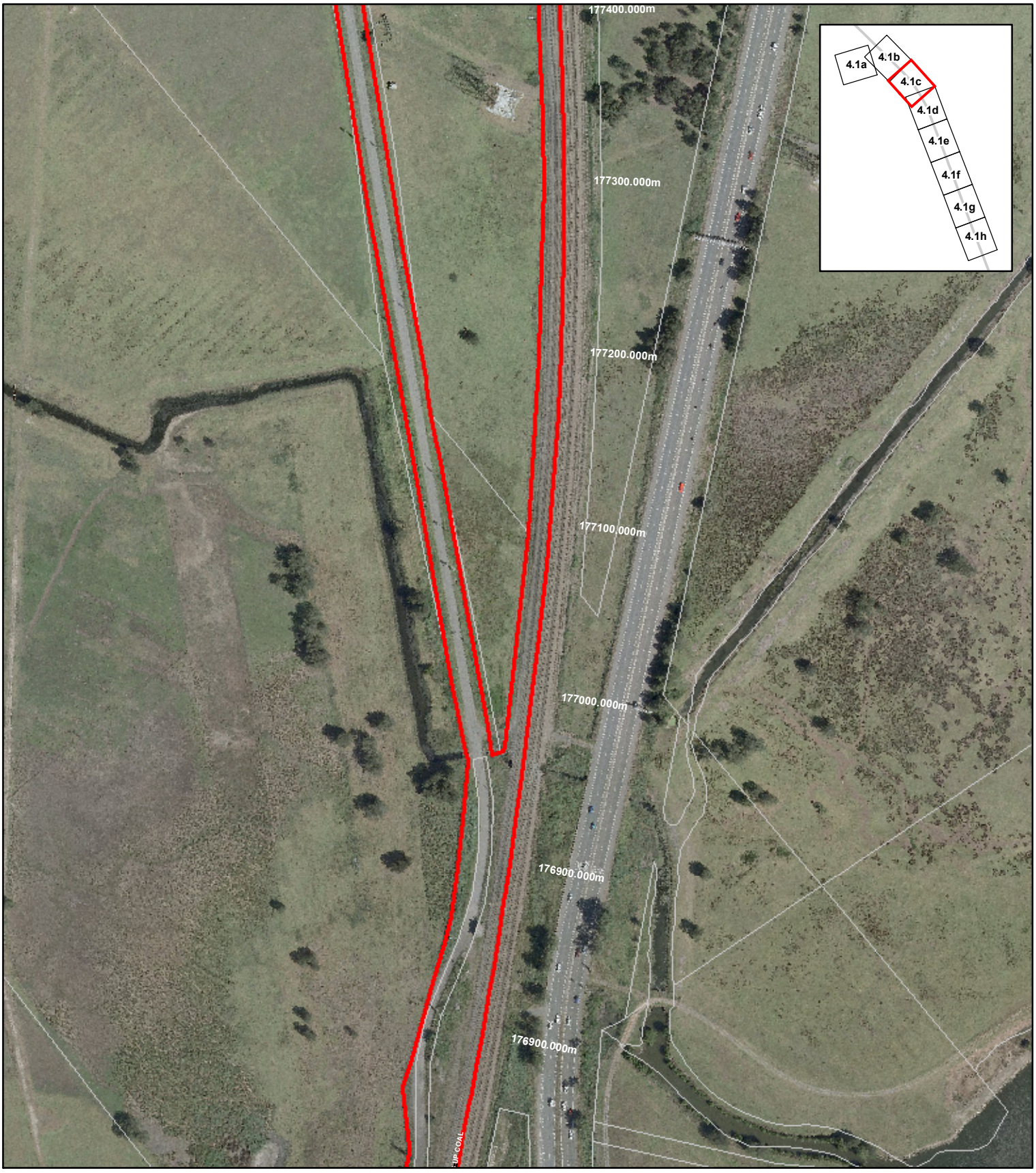
ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1b



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A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1c

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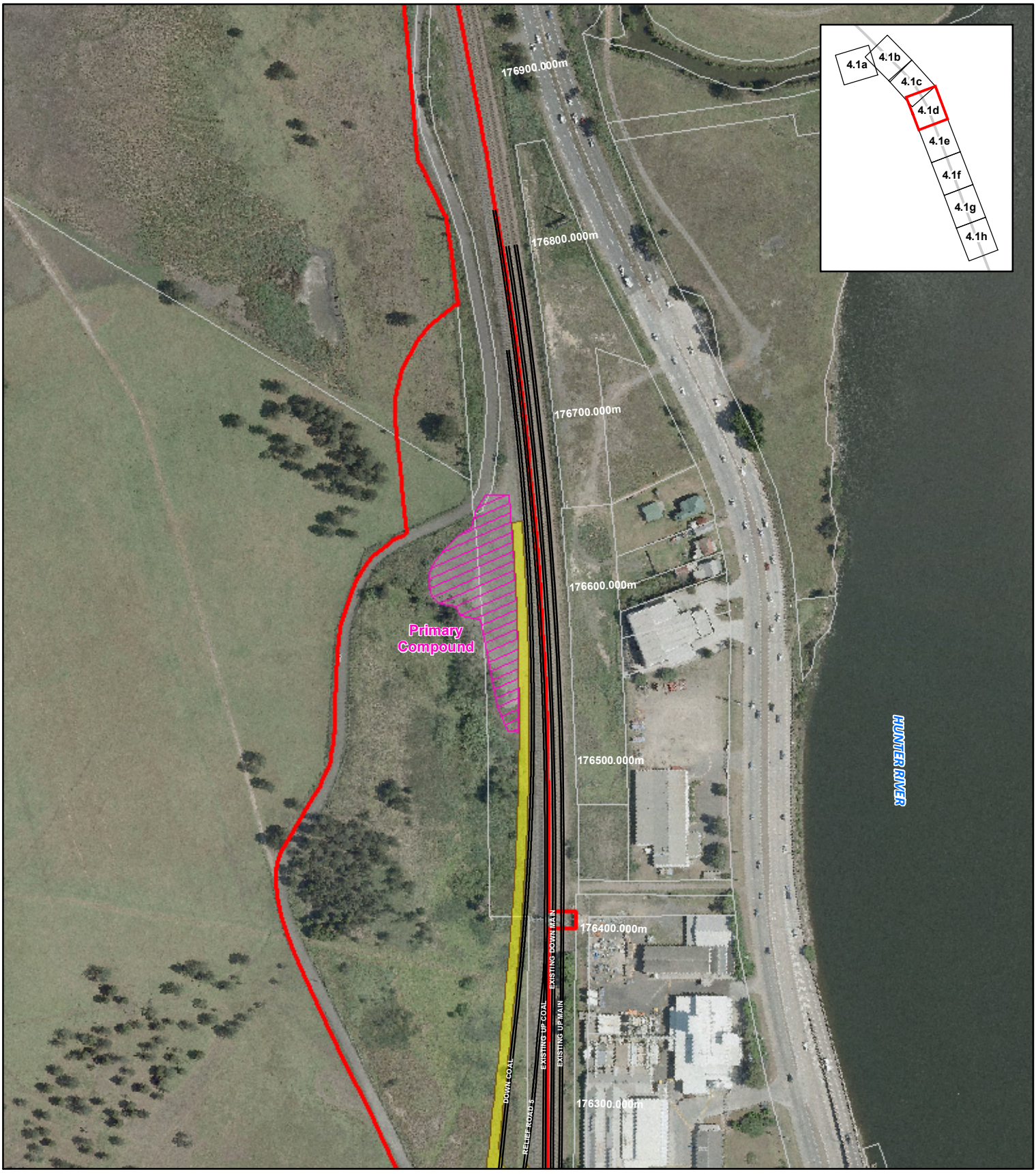

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- Proposed Vehicular Access
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- Swale Drain

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1d

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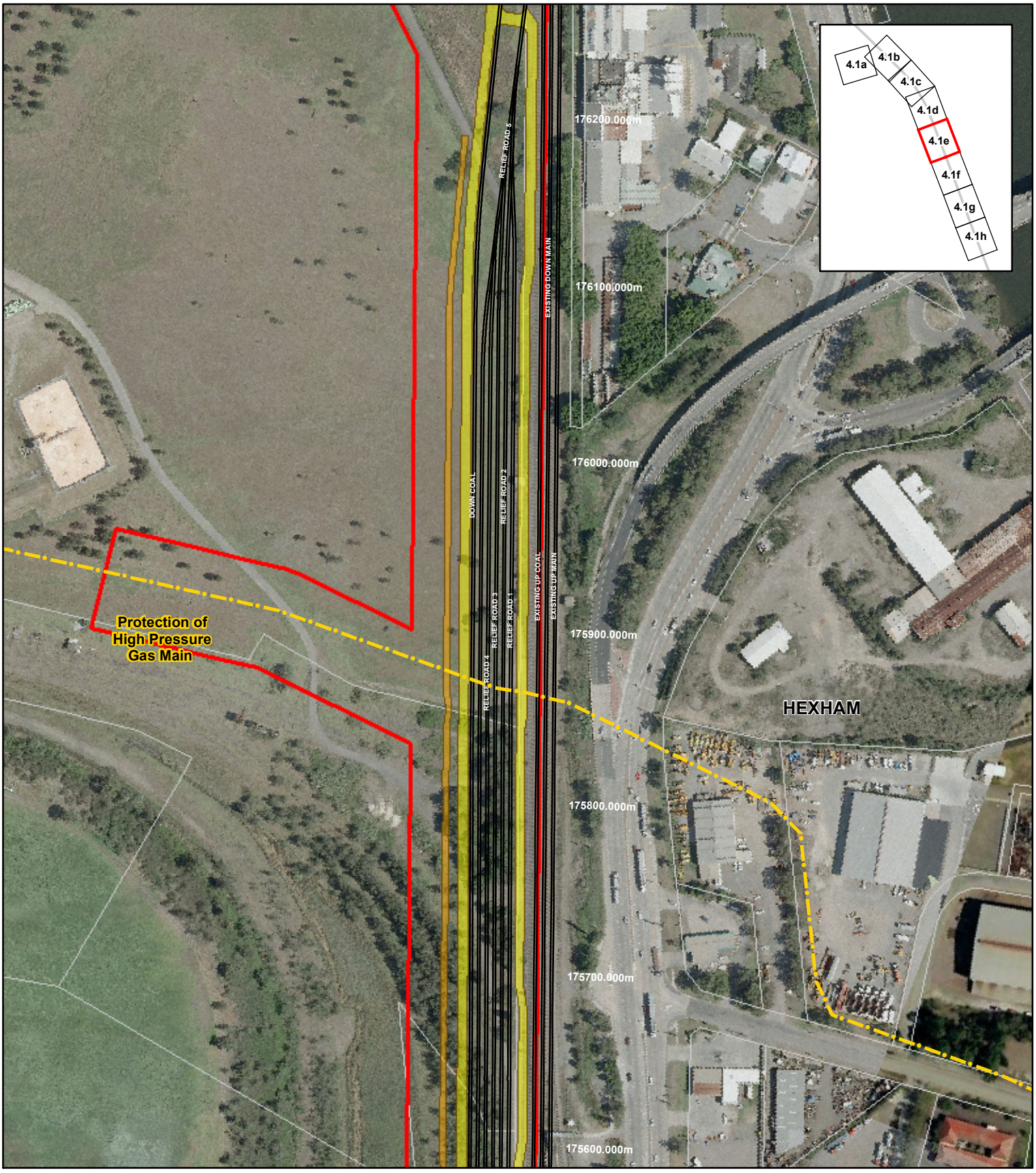

- Jemena Gas Pipeline
- Relief Roads
- Proposed Tarro Interchange Access
- Project Area
- Cadastre
- Proposed Compound Area
- Proposed Vehicular Access
- Proposed Vehicular Access to Lot 312 DP 58724
- Indicative Tarro Interchange Access
- Swale Drain

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1e

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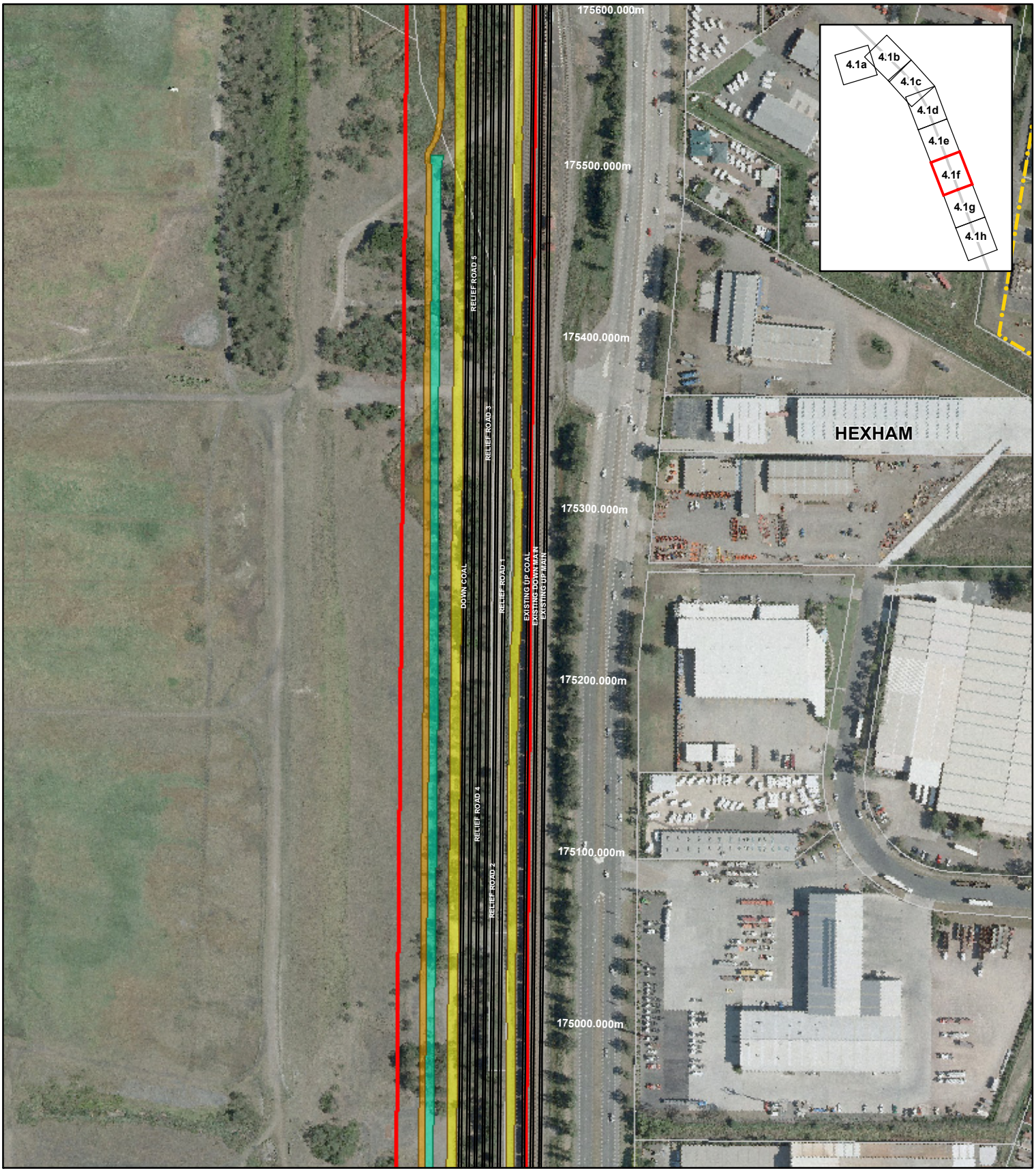

- Jemena Gas Pipeline
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- Project Area
- Cadastre
- Proposed Compound Area
- Proposed Vehicular Access
- Proposed Vehicular Access to Lot 312 DP 58724
- Indicative Tarro Interchange Access
- Swale Drain

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1f

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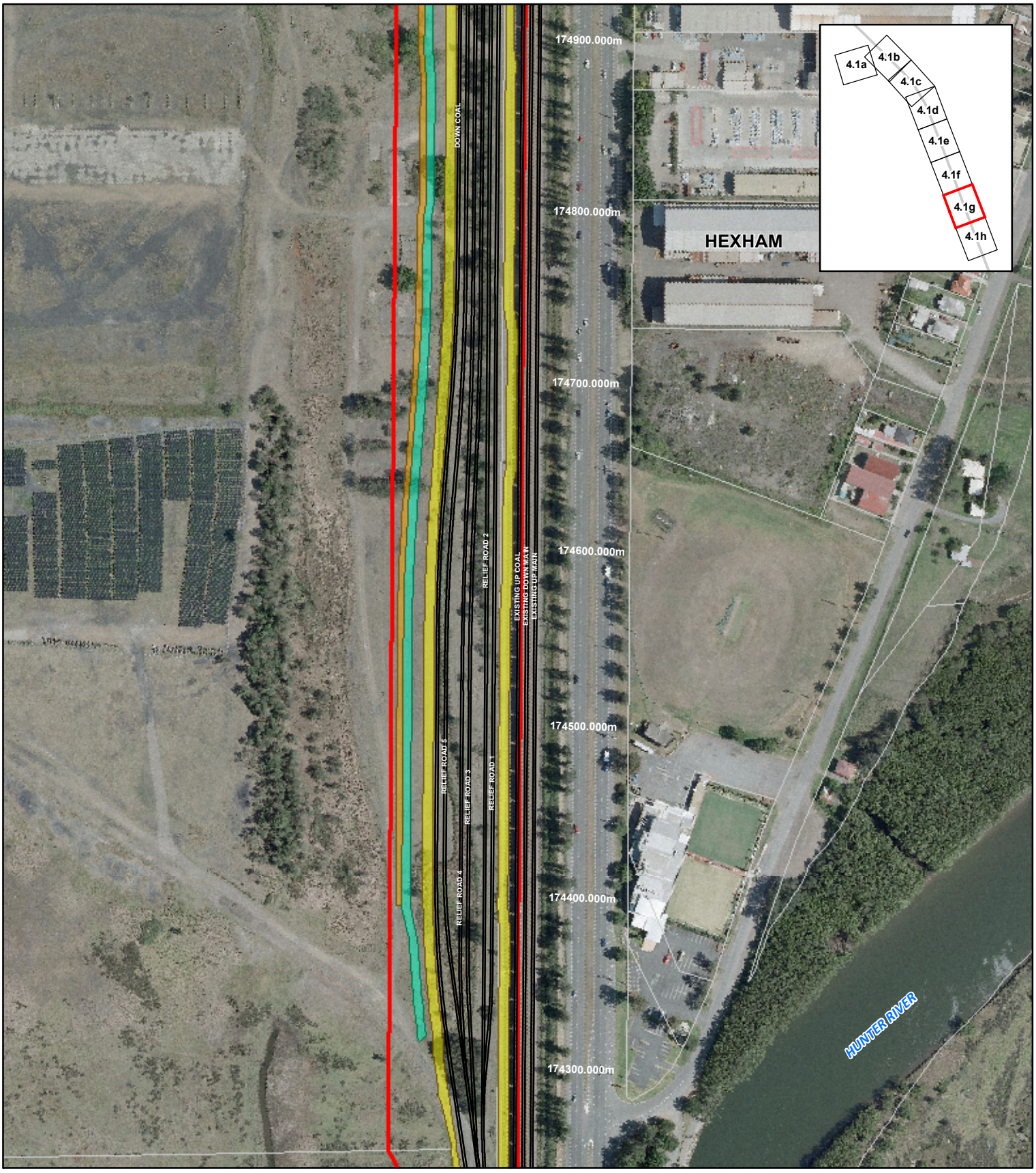

- Jemena Gas Pipeline
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- Cadastre
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- Proposed Vehicular Access
- Proposed Vehicular Access to Lot 312 DP 58724
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- Swale Drain

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1g

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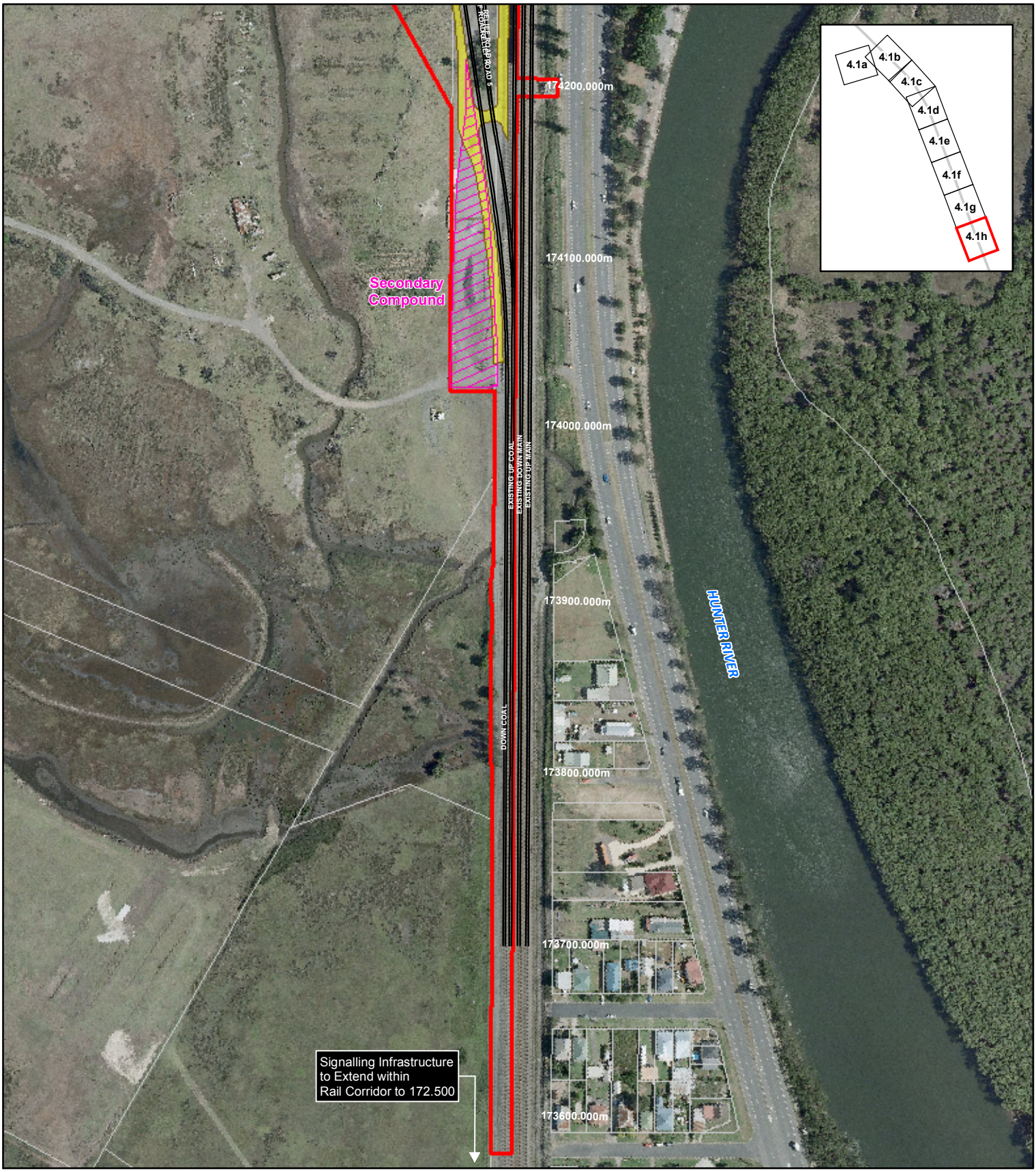

- Jemena Gas Pipeline
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- Cadastre
- Proposed Compound Area
- Proposed Vehicular Access
- Proposed Vehicular Access to Lot 312 DP 58724
- Indicative Tarro Interchange Access
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A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Job Number	21105015
Revision	A7
Date	03.05.2012
Scale	1:3,000

Key Project Features

Figure 4.1h

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4.2. Key Operational Components

4.2.1. Track Configuration

A turnout would be installed at approximate chainage 176.395km connecting the Up Coal to the branched system of five parallel Relief Roads. A second turnout would be located at approximate chainage 174.072km to connect the Relief Roads back to the Up Coal. The Down Coal would be relocated around the outside of the Relief Roads requiring slewing from approximate chainage 173.890km to approximate chainage 176.705km. The maximum train speed within the Relief Roads would be 45km per hour.

4.2.2. Civil Design

Formation

The design has been based on geotechnical investigations and civil design work undertaken over a series of stages. The formation design generally consists of:

- A layer of geofabric and geogrid placed on a levelled site;
- 400mm to 2,100mm of gabion rock (100-250mm size) depending on existing ground conditions;
- One layer of geogrid (Additional structural fabric may be required to maintain stability of formation); and
- 500mm of railway ballast (300mm minimum ballast below the sleepers).

Total material volumes are presented in Section 4.5 below. The formation level for the tracks and access roads has been to set a minimum of 900 mm (500mm ballast and 400mm to 2,100mm of rock fill) above existing natural surface levels.

Figure 4.2 presents a typical track cross section.

Ground Improvement

The proposed Relief Roads traverse varying ground conditions. Soft clay thickness at the city end is more than 25m and decreases to approximately 12m at the country end. Granular fill thickness required for railway formation varies across the project corridor from 0.4m to 2.1m. It is likely that ground improvement techniques would be required to improve the ground in order to reduce the granular fill requirements stated above and to improve lateral stability.

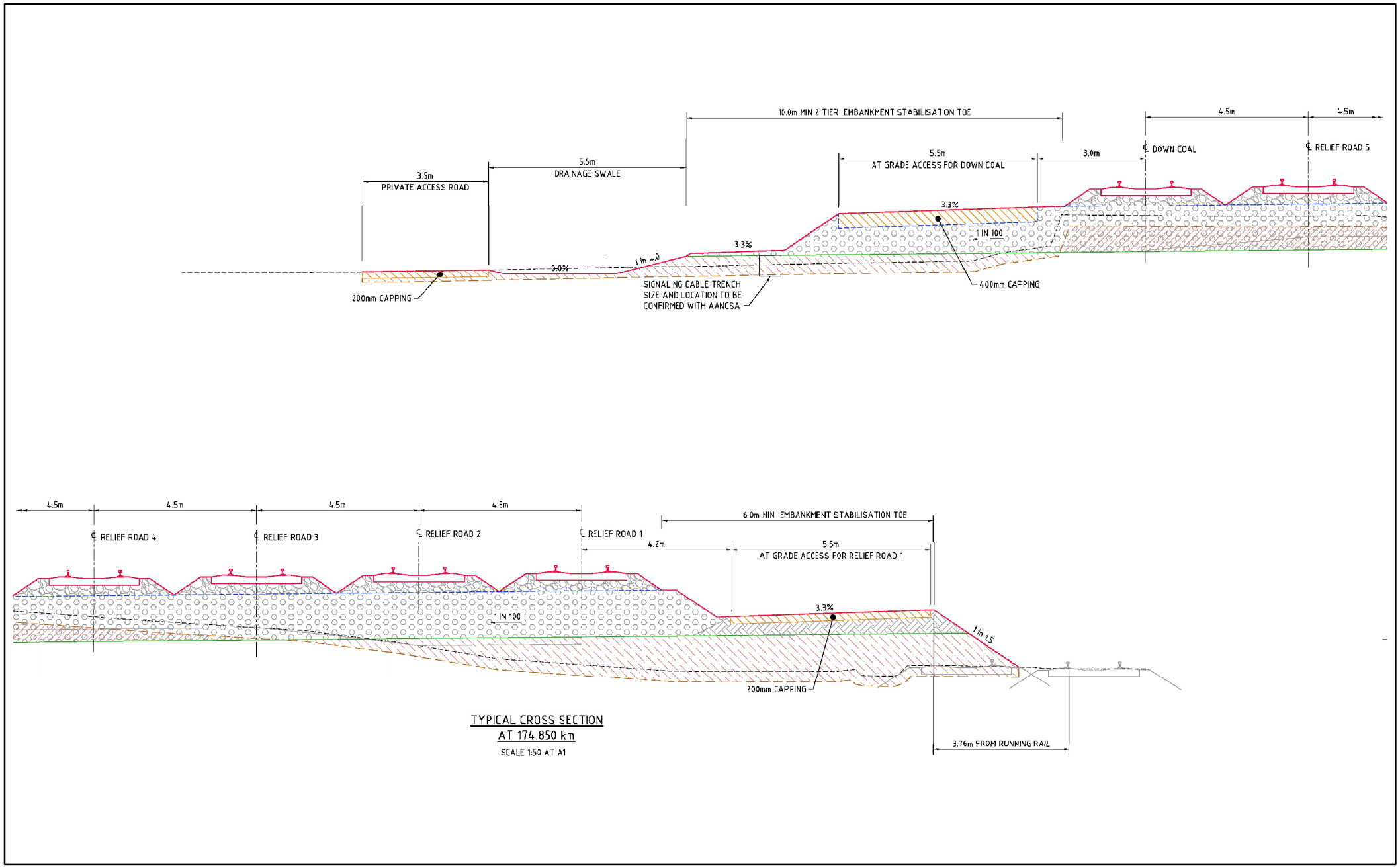
Ground improvement techniques would comprise either stone columns, controlled modulus columns or deep soil mixing (DSM) columns and mass stabilisation. The diameter of columns would be 450mm to 1m and spacing would vary from 1.3m to 2.5m depending on the technique used. Columns would be up to 10m in depth.

4.2.3. Drainage Design

The site ground levels are fairly constant ranging from approximately 1 – 2 m AHD. Due to the sites low level, flat profile, high groundwater levels and proximity to the Hunter River, drainage of the site is a key issue. The proposed drainage design allows water to travel through a pervious rock formation to an open drainage swale to the west of the down coal access road (UHVA 2012c). This drainage swale follows the approximate alignment of the existing drainage paths on the site and would thus maintain the preconstruction drainage behaviour.

Drainage from the formation would be divided into two regions, southern flowing swale (103 points and chainage 174.800), and northern flowing swale (chainage 174.800 and 104 points). The northern region would flow into the Mid-site creek and the southern region into Maitland Road Creek. The swale drain is shown on Figures 4.1f-g.

There are 5 culverts within the Project Area or immediately adjoining the area.



TYPICAL CROSS SECTION
AT 174.850 km
SCALE 1:50 AT A1

A4 Original

ARTC
Hexham Relief Roads

Job Number	2110501B
Revision	A4
Date	01.05.2012
Scale	N/A

Typical Cross Section **Figure 4.2**

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All relate to the flow of Mid-Site Creek and Maitland Road Creek as below.

Mid-Site Creek

Two culverts in the Project Area located at approximate chainage 177.500. One of the culverts crosses under Woodlands Close and the other culvert crosses under the existing rail corridor. Another culvert is located just outside the Project Area at the same chainage to the east and closer to the Hunter River.

Maitland Road Creek

Two culverts are located at approximate chainage 173.930. One crosses under Maitland Road outside the Project Area and adjoins the Hunter River. The other crosses under the existing rail corridor within the Project Area.

None of the culverts would require significant modification as part of the Project. However, some strengthening and/or minor earthworks around the culverts may be required.

4.2.4. Track Structures

The following track structures would be established:

- Approximately 11.5 km of rail (total for all 5 roads);
- Up to 10 x 1:12 R300 SNX radius tangential turnouts which allow for 45 km/h crossing speed;
- Modifications to existing turnouts at 103 and 104 points and removal of track crossovers; and
- Signal gantries.

4.2.5. Signalling

A new main cable route to contain optical fibre, power cable and local equipment cables would be constructed on the down side from approximate chainage 173.900km to approximate chainage 177.000km.

Additionally, at certain locations between Sandgate to Hexham and Hexham to Tarro, there would be works requiring signal or track circuits tail cables recoveries/provisions on both the Up Side and Down Side within the existing rail corridor between approximate chainages 172.500km to 179.500km.

Cable enabling works would be constructed between chainage 175.800km and 177.000km.

At locations along the length of the new cable route, bored or excavated under track crossings would provide signal cable connections to infrastructure located in the middle of the Relief Roads and to interface with existing infrastructure at each end of the cable route.

Up to 5 walk-in signal huts would be installed within the existing rail corridor on the Down Side. The huts would be a maximum of 12 x 3m and approximately 2.5m in height. The signal huts would be mounted on steel platforms in order that they stay above the 100 year flood level. The huts would be constructed of prefabricated colourbond panels.

Railway signals would be mounted on the signal gantries.

4.3. Ancillary Operational Components

4.3.1. Access Tracks

Two new access tracks would be established for the purpose of facilitating operational phase maintenance: one between the existing Up Coal and Relief Road 1 and a second to the west and on the outside of the proposed Down Main (refer Figures 4.1a-h). Both tracks would be unsealed and would be up to 5.5m in width.

Two vehicle level crossings would be located across the Down Coal and the Relief Road at either end of the branched Relief Road system. These crossings link both vehicular access tracks and would enable maintenance access to both the new Down Coal and the existing Up Coal.

4.3.2. Access to Site – Woodlands Close via New England Highway

Access is currently obtained to the site from Woodlands Close via the New England Highway. This access would be retained for the operational phase. Operational phase vehicle movements would be limited to maintenance and inspection activities.

A full description and assessment of operational phase vehicle access to the site is provided in **Chapter 10 Traffic and Transport** and **Appendix E Traffic and Transport**.

4.3.3. Property Acquisition

The proposed Project would require acquisition of land from QR National. QR National is proposing a Train Support Facility on land adjacent to the proposed Project (refer **Chapter 24 Cumulative Impacts**).

Approximately 13 parcels of land would be impacted upon by the proposed Project requiring part acquisition and/or lease for construction purposes. Further details and figures showing affected properties are provided in **Chapter 20 Land Use and Planning**.

The permanent acquisition of land would result in a change of use from agriculture or disused land to rail infrastructure.

4.3.4. Vehicular Access to Lot 312 DP 58724

A separate 3.5m wide property access track would be established to provide access to a private property located to the south of the Project Area, i.e. to Lot 312 DP 583724. This new access road would also serve Lot 270 DP 605404 and the Brancourt's effluent treatment plant (refer **Chapter 20 Land Use and Planning**). This private access track is additional to the vehicle access tracks proposed as part of the operation of the Relief Roads and would be permanently separated from the proposed Project by the drainage swale and safety fencing. This proposed private access track will retain access to the adjoining landowners and be available without restriction for the use of these property owners.

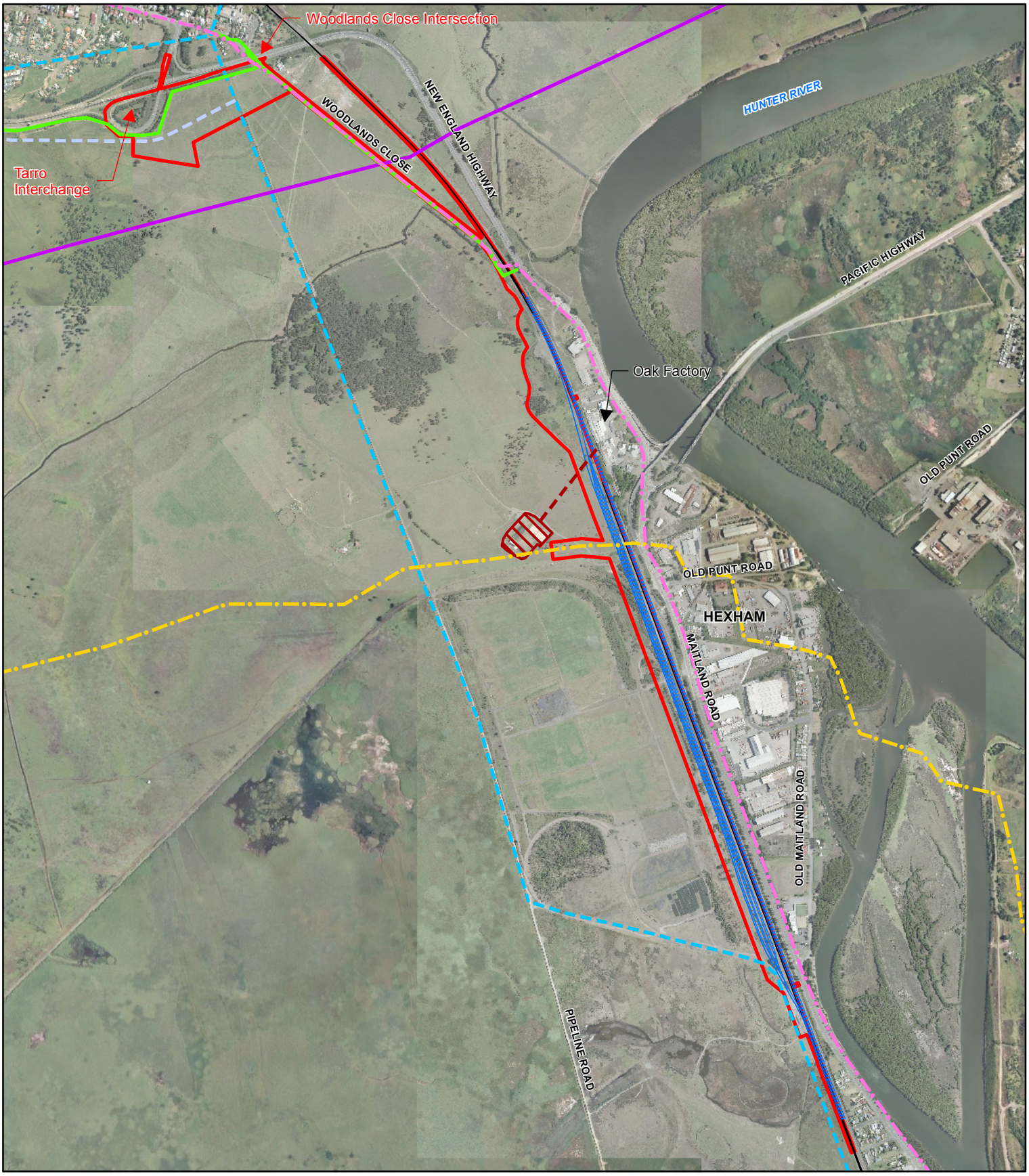
4.4. Services and Utility Adjustments

Major services and utilities in the vicinity of the Project Area, including gas and water utilities are shown in Figure 4.3 and include:

- **High Pressure Gas Mains:** Jemena's high pressure gas transmission main runs perpendicular to the Project Area. The main is 500mm diameter steel pipe operating at a pressure of 7MPa. It provides gas to Newcastle and the Hunter Valley. As part of the detailed design, potential impacts to the main would be addressed. This would include determining whether the existing pipe wall thickness is sufficient to withstand the proposed construction and operational loads. If not, protection works would be designed and constructed as part of the proposed Project in consultation with Jemena. These are likely to comprise a concrete cover slab supported on bored concrete/continuous flight auger piles.

  A secondary gas main, 350mm in diameter runs along the western edge of Woodlands Close. This conveys gas to the Hunter Valley. This main will be crossed twice by construction traffic. A Safety Management System workshop will be held with Jemena to determine the protection required for both of the pipelines.

- **Trunk Gravity Main Pipeline:** The Chichester Trunk Gravity Main (CTGM) pipeline is operated by the Hunter Water Corporation (HWC) and delivers water from the Dungog Treatment Plant to the Maitland and Cessnock systems as well as the Newcastle system. The 8km long Tarro to Shortland section of the CTGM is made up of a single 900mm pipeline. The section past Hexham has recently been upgraded and installed below ground. A 200mm branch line from CTGM supplies Hexham and crosses the Project Area at approximately 175.850km. As part of the detailed design, potential impacts on the pipeline would be addressed. If works are required, these would be undertaken as part of the proposed Project in consultation with HWC.



- Existing Alignment
- Proposed Alignment
- Ausgrid 33kV Powerline
- High Voltage Powerline
- Hunter Water Corporation Chichester Trunk Gravitation Main
- Proposed Hunter Water Corporation Main (2013)
- Jemena 500mm Transmission Main
- Jemena 350mm Secondary Main
- Oak Sewerage Line
- Oak Sewerage Treatment Plant
- Project Area

A4 Original

0 250 500 750

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Approximate Location of Major Services and Utilities

Job Number	2110501A
Revision	A5
Date	09.05.2012
Scale	1:18,000

Figure 4.3

\\Aunclf\2110501a\HR - Hexham Relief Roads\DE_Design\DE06_Design_Doc\Phase_3\Drafting\GIS\Projects\ESRI\2110501B_PHP3_GIS_F031_A5.mxd Author: WilkinSA 09/05/2012

- **Brancourt's (Oak) Treatment Plant and Effluent Pipeline:** The Brancout's (Oak) Factory is located between the existing rail corridor and the New England Highway at approximate chainage 176.300km. The treatment plant is located approximately 300m to the south west of the Oak Factory. Approximately 80m of the effluent pipeline is located within the Project Area. The capacity of this pipeline to withstand construction and operational loads would be reviewed as part of the design and protection measures provided.
- **Electricity Transmission Line:** A high voltage electricity transmission line is located to the north of the proposed Project. The Project would have no impact on the transmission line as only minor signalling works are proposed within the rail corridor under the line.
- **33kV Electricity Overhead Line:** As part of works to provide site access from the Tarro Interchange, an adjustment to the existing 33kV overhead line would be required to provide adequate clearance under the line for vehicular traffic. This would be undertaken by Ausgrid under separate approval.
- **Optus Fibre Optic Cable:** As part of works to provide site access from the Tarro Interchange, a minor adjustment to the existing Optus fibre optic cable may be required to provide sufficient cover within the proposed road works.

4.5. Construction

4.5.1. Program Outline

Subject to planning approval, construction would commence from February - March 2013 and continue for approximately 18 months. Details of the key construction phases are shown in the outline program in Table 4.5a. Not all phases are discrete and a number of activities would be conducted in parallel with others. Not shown in the outline program are a number of track possessions which would be required to install critical operational components such as new turnouts and modifications to existing track crossovers.

Table 4.5a Outline Construction Program

Work phase	2Q13	3Q13	4Q13	1Q14	2Q14	3Q14
Mobilisation and site establishment						
Construction						
Signalling						
Testing and commissioning						
Site cleanup and demobilisation						

4.5.2. Construction Methodology

The outline construction methodology is summarised in Table 4.5b and key construction activities identified.

Table 4.5b Indicative Construction Activities

Work phase	Activity	Indicative Timing
Mobilisation and Site establishment	• Install site fence boundaries and environmental controls • Isolate work areas from live rail corridor • Establish traffic control measures at Tarro Interchange • Construction of site access off Tarro Interchange • Establish compounds • Clear vegetation where Relief Roads are to be constructed • Survey set out for works • Pothole for existing services	Pre-construction – March 2013 to May 2013

Work phase	Activity	Indicative Timing
	• Protect or divert utilities	
Construction	• Clearing and grubbing • Stripping and stockpiling of topsoil • Bulk earthworks (cut to fill) • Install two new level crossings • Place gabion rock • Upgrade City (Newcastle) end turnout and install new turnouts • Place ballast • Construct new signal gantry • Install rail and sleepers and weld • Tamp and regulate • Connect to coal lines • Remove redundant turnouts and crossovers • Remove existing Down Coal • Construct eastern access track in place of Down Coal	During Construction – May 2013 to March 2014
Signalling Enabling Works	• Install new cable route on Down side between approximately 175.900km and 177.000km, outside of relief roads footprint • Cut over existing signalling control cable on the Down side to the new signalling cable. Possessions required on both the Main Lines and Coal Lines.	May 2013 – June 2013
Relief Roads Signalling Works	• Undertake trenching • Lay cables • Install signal huts and platforms • Install new signals • Install signals on overhead gantry • Decommission redundant signalling	Pre-construction to March 2014
Testing and commissioning	• Testing and commission of railway systems and signals	March 2014
Ancillary works, drainage and Demobilisation	• Completion of drainage works external to relief roads • Installation and commissioning of level crossings • Removal of site compound • Landscaping and rehabilitation of affected areas • Removal of environmental controls • Removal of site related traffic signage	March 2014 - October 2014

Mobilisation and Site Establishment

A range of preparatory activities would be undertaken to delineate the site and identify and establish work areas. If not already completed during pre-construction, all land acquisition and leases would be finalised to enable possession of the site. Fencing would be undertaken to delineate the site boundaries and to separate the work areas from the live rail corridor and traffic control measures would be installed on the Tarro Interchange to provide site access.

The location of the Relief Roads and access tracks would be identified and the areas cleared of vegetation in readiness for construction. Environmental and traffic management controls would be installed ahead of the main civil works. Utility services would be protected or diverted to allow the works to proceed.

Site Compounds

A primary compound would be established and remain in place for the duration of the construction phase. The area is an existing lay down yard located in the rail corridor at the southern end of Woodlands Close.

A secondary compound would be established at the southern end of the site. The area currently comprises a mix of degraded hard standing and grassland.

A third compound would set up in the location of the Tarro Interchange for the duration of the works required for the construction of the access road from the Tarro Interchange to Woodlands Close.

The compound locations are shown on Figure 4.1a-h.

Earth and Civil Works

The footprint area for the Relief Roads would be cleared of large trees and vegetation. Trees would be mulched and stockpiled on site for use in landscaping works. Topsoil would be stripped and a geotextile fabric installed over the formation. This would minimise wash out of soils during wet weather or dust generation during dry windy periods. Gabion rock would be imported and placed to form the track foundation.

Spoil from excavations would be stockpiled on site and either reused for fill operations or removed to approved facilities off site. Exposed earthworks would be covered with topsoil and vegetated. Proposed stockpile locations are shown in Figures 4.1a-h. Excess spoil proposed to be moved offsite would first be tested to confirm its waste classification and then be disposed of at an approved landfill facility. Further discussion of the geology and soils at the site and the mitigation and management measures to be employed are provided in **Chapter 11 Contamination** and **Chapter 12 Soil and Water Management**.

The approximate volume of earthworks for each material type is outlined in Table 4.5c.

Table 4.5c Approximate Earthworks Volume

Material	Approximate Volume (cubic metres)	Description
Topsoil	21,000	Topsoil would be stripped from the entire footprint of the site. This material would then be stockpiled within the construction site and reused at completion during landscaping activities.
Cut to Fill	133,000	A cut to fill operation would take place resulting in a level site.
Gabion Rock	88,500	Depending on ground conditions, a 600mm to 1,200 mm gabion rock layer would be placed on the cut to fill. This rock would be 100% imported.
Ballast	22,500	Ballast would be placed on top of the gabion rock layer.

Gabion Rock and ballast would be sourced from local quarries within the Hunter Valley. Approximately 11.5km of rail and 19,000 sleepers would be laid for the five Relief Roads. Up to ten new turnouts would be installed.

Installation of the majority of the Relief Roads infrastructure would occur during normal working hours following completion of earthworks. However, operationally critical works would be installed during track possessions (refer below).

While the proposed Project would require possessions, the majority of the work would be undertaken outside of possession and outside the existing rail corridor.

Activities to be undertaken during track possessions would include:

- Removal of existing track, turnouts, crossovers and sleepers;
- Reconditioning of formation where tracks have been removed;
- Installation of track equipment and modifications to existing turnouts and crossovers;
- Tamping and ballast regulation; and
- Installation and commissioning of signal civil structures.

Seven track possessions have been identified and proposed to be used between March 2013 and August 2014. Generally, each track possession is expected to be around 96 hours in duration with

works being undertaken on a 24 hour basis with the aim of handing the railway back to the ARTC in time for resumption of normal train operations.

Signalling

Installation of the new signalling cables would be carried out in parallel with the civil works for construction of the Relief Roads. Once the Relief Roads are built, the signalling works would be tested prior to a main commissioning possession. During the possession, there would be major track works occurring to connect the new track into the existing track. Once this has been completed, the site would be handed over to the signalling team to complete the commissioning activities before handing the proposed Project and existing operational railway back to ARTC to re-commence train operations.

Demobilisation

Following commissioning of the Relief Roads, external works would be completed including drainage, revegetation of exposed areas affected by the Relief Roads project. As these works are completed, the site would be progressively demobilised with the removal of site compounds, fencing, signage and temporary facilities. Any temporary environmental controls would also be removed.

4.5.3. Plant and Equipment

A range of plant and equipment would be required for the various construction activities and phases. Table 4.5d provides an indication of the plant and equipment that are likely to be used on the proposed Project.

Table 4.5d Construction Plant and Equipment

Plant/equipment	Number	Application
Grader	2	Trimming of access tracks, structural fill and capping layers
30t excavator	3	Excavating topsoil and cut material, loading tip trucks
Bulldozer	2	Stripping topsoil, pushing/placing fill, structural fill and capping
5t excavator	2	Small excavations, trenching for culvert extensions
Loader	2	Loading quarry material onsite
Backhoe	1	Trenching and general works
Bobcat	1	General site works
Tip trucks	4	Hauling material around the site
Articulated dump truck (ADT)	6	Hauling material around the site
Truck and dog	30+	Importation of structural fill, capping and ballast
Water Cart	2	Dust Suppression
Franna Cranes	2	Lifting precast culvert, turnouts and culverts
Mobile Crane	1	Lifting turnouts and crossovers
Roller	4	Compaction of access track and formation materials
Concrete trucks	4+	Delivery of concrete for culvert structures
Tamper	1	Tamping of track ballast

Plant/equipment	Number	Application
Regulator	1	Regulates and profiles ballast
Front end loaders	2	Movement of material and loading

4.5.4. Construction Workforce and Work Hours

It is anticipated that between 10 and 100 staff would be on site at any one time. During site establishment there would be approximately 10 staff. This number would peak at around 100 staff during bulk earthworks operations. Additional labour may also be required on site during the four track possessions.

Works would generally be undertaken during standard construction hours:

- 7am to 6pm Monday to Friday;
- 8am to 1pm Saturday; and
- No works on Sundays or public holidays with exception of works indicated below.

Construction work would be undertaken outside of the above standard work hours would include:

- Track possessions;
- Works undertaken by utility service providers;
- Works required for environmental management and emergency call outs;
- Works including structural filling, asphalt works and temporary lighting; and
- Oversize deliveries, unloading of machinery or any other emergency work required or as stipulated by the RMS/police for safety reasons.

Any work proposed to be conducted outside of the standard work hours would be undertaken in accordance with the Project EPL.

4.5.5. Construction traffic and access

A number of construction phase access options have been assessed between the proposed Project site and the external road network. The preferred option involves the construction of an access road connecting Anderson Drive (Tarro Interchange) and Woodlands Close (refer to Figures 4.1a-b). Discussions in relation to these options have been held with the NSW Roads and Maritime Services (RMS). The unsealed temporary construction access road would be approximately 10m wide. The speed limit on this access road would be 40 km/h.

Construction of the construction access road and the new intersection off Anderson Drive would take approximately three months. During this time period, construction vehicles would enter the construction site via the New England Highway/Woodlands Close intersection, primarily for the purposes of construction of the new access road and intersection.

Following the construction of the temporary construction access road, construction vehicle access would be via the Tarro Interchange at the temporary construction access road intersection. This newly created Anderson Drive/temporary construction access road intersection would be a Type AU auxiliary intersection with a separate right turn bay. Through traffic lanes would be provided in both directions at this intersection.

The temporary construction access road would allow right-in, left-in and left-out movements at the intersection with Anderson Drive. No right-out movement would be permitted from the temporary construction access road.

As part of the intersection construction, a concrete median barrier would be constructed to prevent illegal right turn movements from the Tarro Interchange eastbound off-ramp toward Anderson Drive.

Vehicles associated with the construction works would include light vehicles (workers travelling to and from site and start and finish of shift), semi-trailers delivering construction plant and equipment, truck

and dogs delivering quarry materials and mobile cranes. The anticipated maximum number of light and heavy vehicles entering the construction site during different phases of construction is provided in Table 4.5e.

Table 4.5e Anticipated Maximum Construction Traffic Volumes

Construction Traffic Type	Number of Vehicles Per Day
Light vehicles*	70
Heavy vehicles**	120

* Light vehicles include transportation used by staff to arrive at the worksite at start of shift and site visitors.
** Heavy vehicles include trucks and semi-trailers delivering construction plant and equipment and truck and dogs delivering quarry products (structural fill and capping).

Further details regarding traffic movements, potential impacts on surrounding land uses and mitigation measures are provided in **Chapter 10 Traffic and Transport** and **Appendix E Traffic and Transport**. Construction Water

Water supply for the project would likely be obtained from the Hunter Water Corporation (HWC), and sourced from a suitable hydrant location close to the Project Area. Therefore, no licence or works approval for water supply purposes would be required. Refer to **Chapter 2 Statutory Planning Framework** for further discussion regarding licence or works approvals for water supply purposes.

4.5.6. Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) would be established based on the mitigation and management measures in the EIS and the conditions of approval. The CEMP would provide the framework for the management of all potential environmental impacts resulting from the construction activities. The CEMP would outline the environmental mitigation measures to be implemented during the construction phase and would document mechanisms for demonstrating compliance with the conditions of approval and other relevant Project approvals. The CEMP would set out the auditing and inspection frameworks for the site and would cover the following issues:

- Construction traffic management;
- Construction noise and vibration management;
- Water quality and soil management;
- Groundwater management;
- Flora, fauna and weed management;
- Non-indigenous and indigenous heritage management;
- Community liaison;
- Hazards and risk management;
- Spoil management;
- Waste management; and
- Air quality management.

4.6. Operation and Maintenance

4.6.1. Operational Activities

Occupation of the Relief Roads would vary depending on rail traffic movements on the network. One of the primary objectives of the operation of the Relief Roads is to ease rail traffic congestion. Congestion is caused by unforseen breakdowns at terminal dump stations or by trains entering the network out of sequence.

Trains entering the coal chain carry a particular blend of coal that must be unloaded at a specified dump station and loaded onto a ship with a contract to carry that blend of coal. If unforseen breakdowns occur at the dump station, then the train cannot be unloaded and other trains are blocked from using the line. This has a flow on effect up the valley resulting in other trains scheduled for that

dump station having to be held, either at the point of loading or along the network. Consequently, this results in congestion if trains are unable to pass one another to overtake the held trains.

The system is further complicated if trains enter the network out of sequence from the mines. This could be either entering the network early or late. When this happens, they then have to reposition themselves in the queue before the Port in order to arrive at the correct dump station without being obstructed by a preceding train.

The planned construction of five Relief Roads at Hexham would provide flexibility in the network to enable trains to be rescheduled before they are called up to the coal terminals. This would alleviate congestion and would assist with allowing the planned capacity improvements to be realised.

The modelling undertaken by the HVCCC to determine the need for the new Relief Roads is based on throughput targets for each coal chain year (refer to discussion at **Chapter 3 Strategic and Project Justification** and **Appendix A DGRs, Consultation and Risk Analysis**). However, there are many variables regarding the cause of congestion including differences in the length of terminal breakdowns, variances with the timing of trains entering the network out of sequence, etc.

It is therefore not possible to predict a typical day in the operation of the Relief Roads.

For the purposes of undertaking environmental assessment, four operational scenarios were modelled for the noise and air quality assessments and are discussed at **Chapter 9 Noise and Vibration** and **Chapter 13 Air Quality**. These are:

- five trains have been modelled idling 24 hours per day to demonstrate worst case possible impact; and
- three, two and one train(s) have been modelled idling 24 hours per day to demonstrate impact under differing operational capacities.

Five trains idling continuously represent the worst case scenario. In reality this will not happen as trains would move in and out of the Relief Roads. A more common scenario is that either one or two of the Relief Roads would be occupied at any one time.

Table 4.6 shows the existing (2012) number and type of train pass bys per 24 hours through Hexham and the forecasted number and type for 2024. It is forecasted that 224 coal train pass bys through Hexham would be reached in 2024. These figures were used in the modelling for the noise and air quality assessments (refer **Chapter 9 Noise and Vibration** and **Chapter 13 Air Quality**).

Table 4.6 2012 and 2024 Train Forecast - Hexham

Train type	Train pass bys per 24 hours					
	2012 (Existing)			2024		
	Day	Night	Total	Day	Night	Total
	7am-10pm	10pm-7am	24-hour	7am-10pm	10pm-7am	24-hour
Coal	59	39	98	140	84	224
Passenger	63	42	105	66	39	105
Freight	10	7	17	18	11	29
Total	**132**	**88**	**220**	**223**	**134**	**357**

Source: ARTC, 2012

The Relief Roads are for improvements in coal traffic only and would not provide significant improvements to passenger or freight services.

4.6.2. Maintenance Activities

During operation, a variety of track maintenance activities would be undertaken by the ARTC using the constructed vehicular access tracks. Minor maintenance works would usually be undertaken without disruption to rail services. More substantial capital or maintenance activities would be undertaken during rail possessions and over consecutive 24 hour periods. Maintenance activities would include:

- Rail welding, grinding or re-railing;
- Tamping or ballast regulation;
- Track re-conditioning/ resleepering;
- Ballast cleaning;
- General maintenance of drainage structures, access tracks or embankments including weed and vegetation management; and
- Signalling maintenance.

These works would be undertaken in accordance with the ARTC's standard environmental management measures and the ARTC Code of Practice for Environmental Impact Assessment of Development Proposals in New South Wales.

4.7. Proposed QR National Train Support Facility

QR National is currently preparing plans for a Train Support Facility (TSF) immediately to the west of the Project Area. The proposal would provide QR National with a facility where:

- Locomotives can be provisioned;
- Trains can be inspected and tested in accordance with the accreditation requirements;
- Locomotives and wagons can be attached/detached from/to trains;
- Wagons can be serviced/maintained;
- Locomotives and wagons can be held awaiting use in service;
- Spare parts can be held for locomotives and wagons;
- Locomotives can be serviced/maintained; and
- Additional provisioning capacity can be provided in the future.

Figures 4.4a-e show the interrelation of the proposed Project with QR National's Train Support Facility.

For the purposes of providing greater detail, the operations of the facility can be nominally separated into three areas, i.e. provisioning, inspections and servicing/repairs. These are discussed in more detail below.

4.7.1. Provisioning Facilities

The provisioning facilities would enable:

- Replenishing locomotives with fuel, sand, water, oil and other consumables; and
- Cab preparation and cleaning.

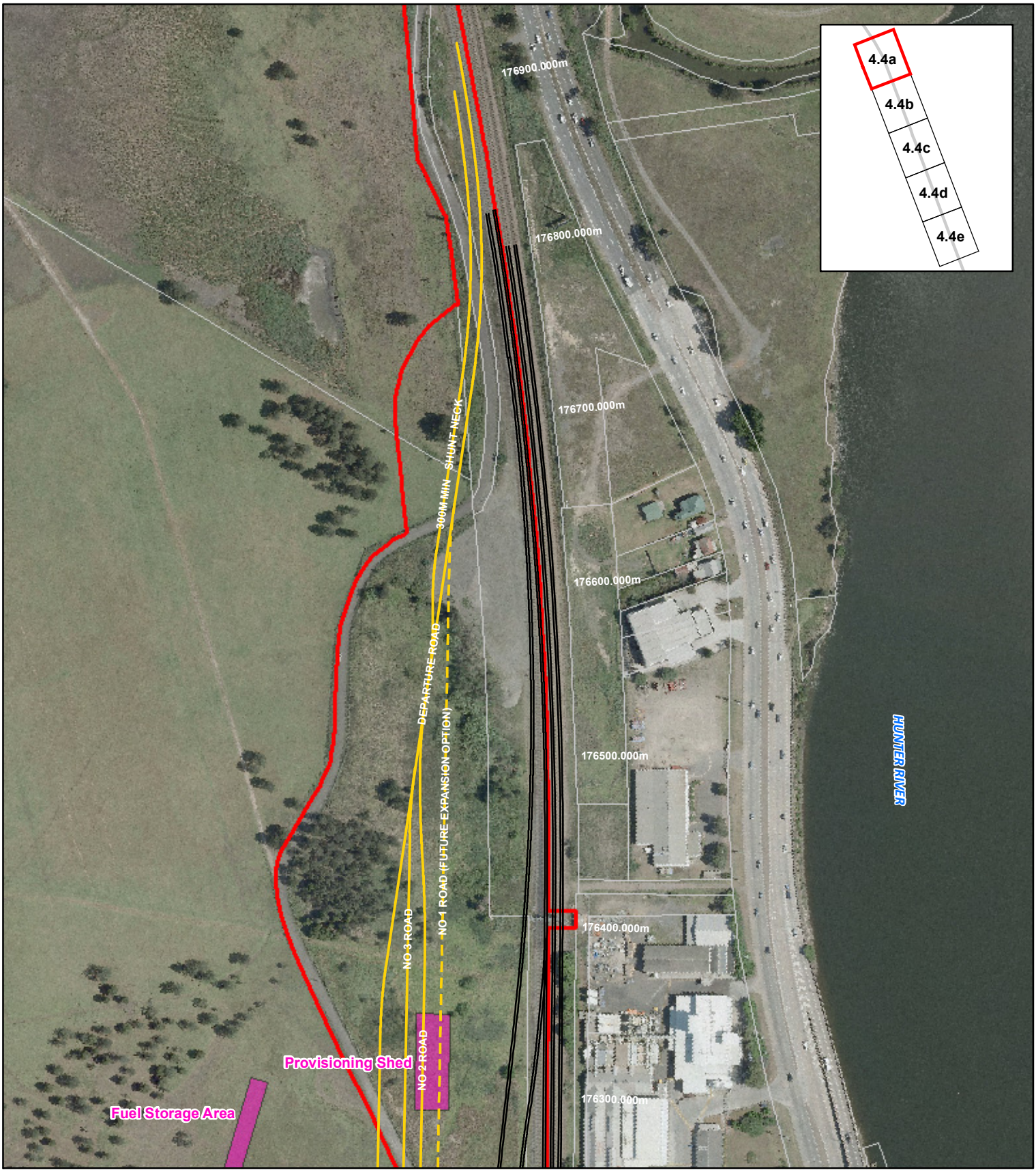
4.7.2. Inspections

Inspections of trains in the TSF would take place on a dedicated road with sufficient track centres to allow vehicular access. It would also include a mobile provisioning facility to allow train provisioning whilst undergoing inspections. Inspections would include:

- Wagon inspections, and scheduled and unscheduled servicing and repairs; and
- Inspection of locomotives and wagons for defects and minor repair, e.g. replacement of brake blocks, blown headlight bulbs, windscreen wipers, cabin blinds and other in cabin equipment.

4.7.3. Servicing/Repairs Facilities

Two custom designed buildings would be provided for rolling stock servicing, including a Wagon Maintenance Shed and a Locomotive Maintenance Shed. Both buildings would be equipped with



Relief Roads
Proposed QR National Track (May 2012)
Proposed QR National Track Future Option (May 2012)
QR National Train Support Facility Structure (May 2012)
Cadastre
Project Area

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Interrelation of the ARTC's and QR National's Proposed Projects

Job Number	2110501A
Revision	A3
Date	10.05.2012
Scale	1:3,000

Figure 4.4a

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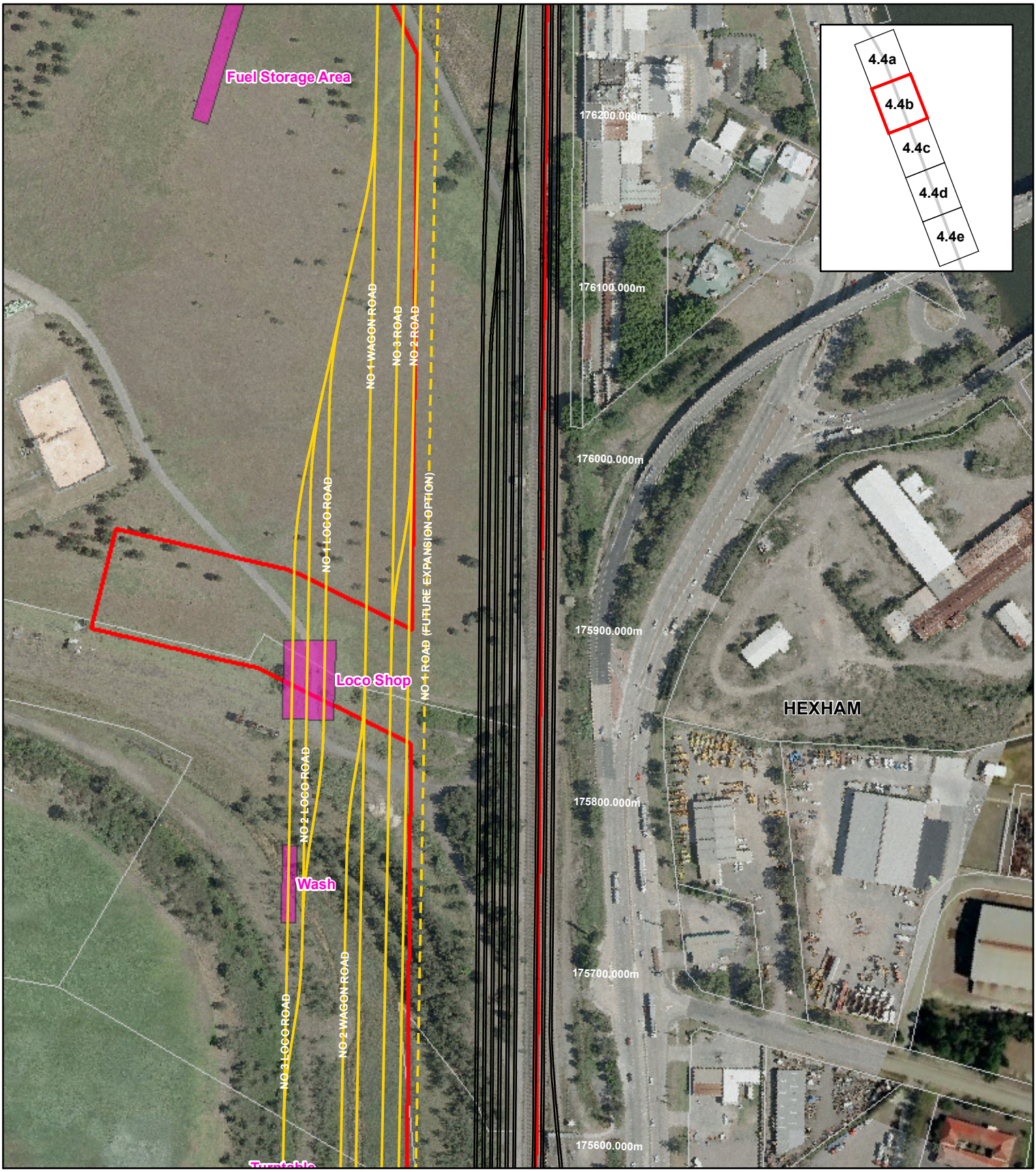

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Proposed QR National Track Future Option (May 2012)
QR National Train Support Facility Structure (May 2012)
Cadastre
Project Area

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

ARTC
Hexham Relief Roads

Interrelation of the ARTC's and QR National's Proposed Projects

Job Number	2110501A
Revision	A3
Date	10.05.2012
Scale	1:3,000

Figure 4.4b

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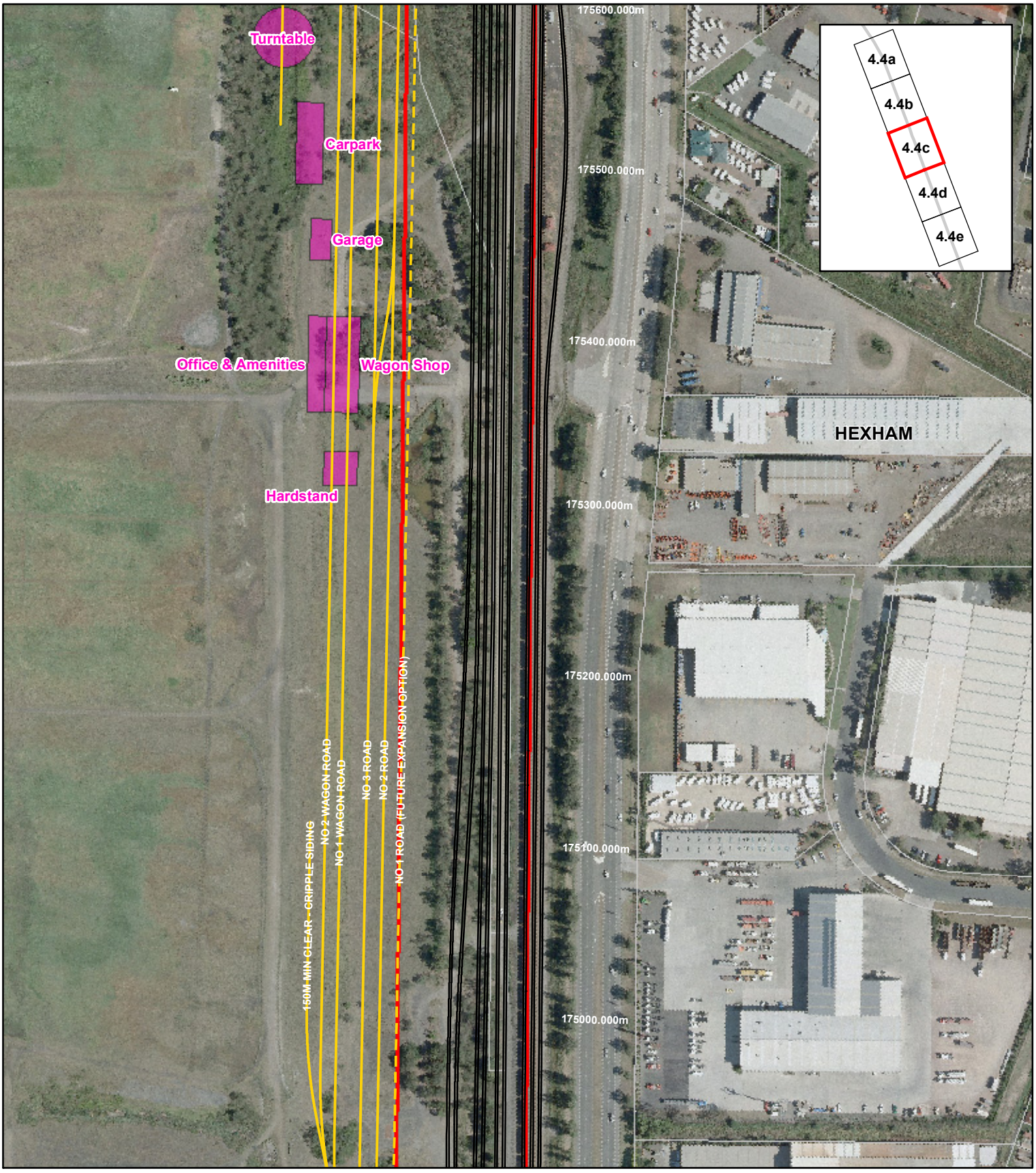

Relief Roads
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Proposed QR National Track Future Option (May 2012)
QR National Train Support Facility Structure (May 2012)
Cadastre
Project Area

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
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Interrelation of the ARTC's and QR National's Proposed Projects

Job Number	2110501A
Revision	A3
Date	10.05.2012
Scale	1:3,000

Figure 4.4c

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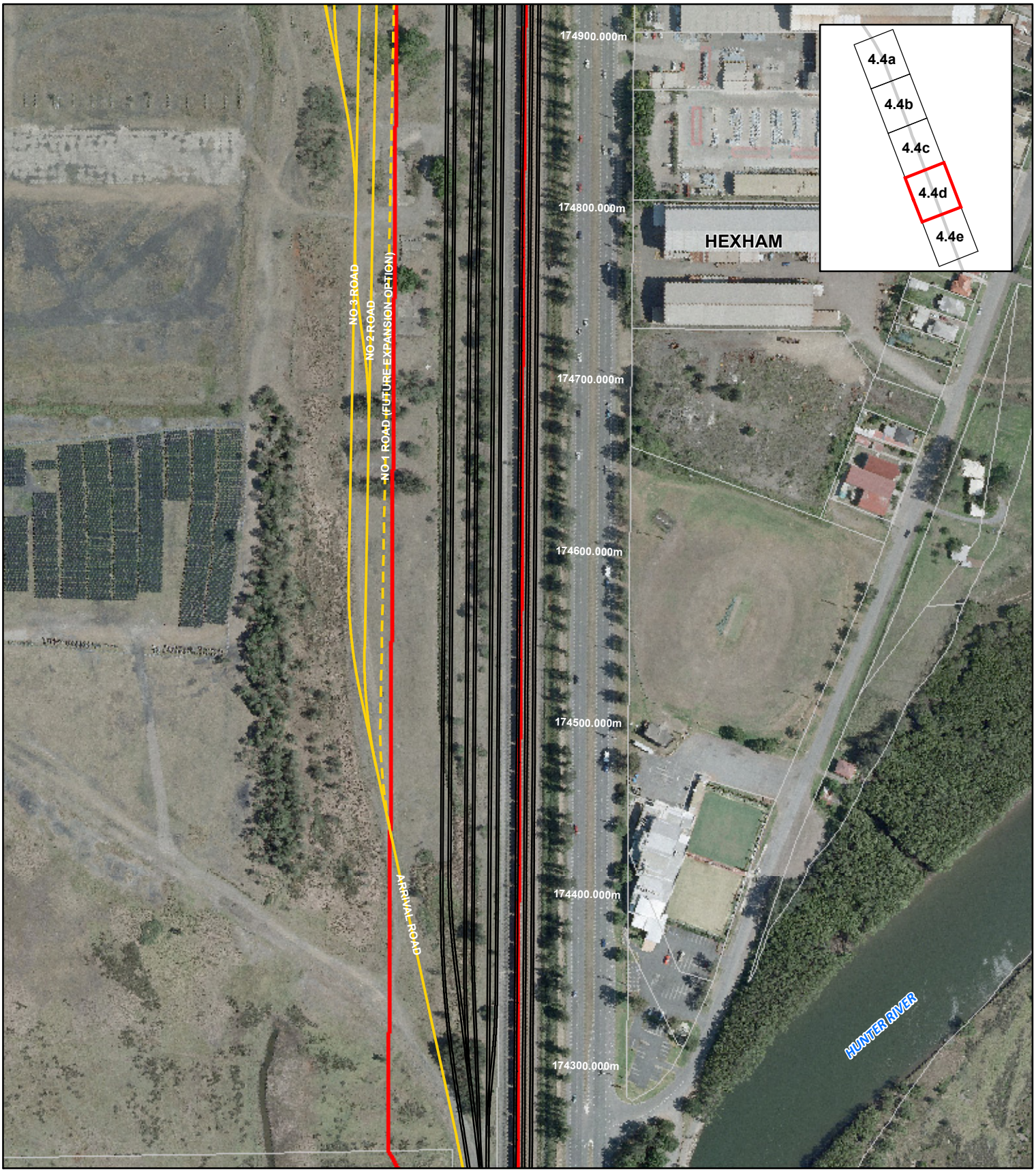

Relief Roads
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Proposed QR National Track Future Option (May 2012)
QR National Train Support Facility Structure (May 2012)
Cadastre
Project Area

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

ARTC
Hexham Relief Roads

Interrelation of the ARTC's and QR National's Proposed Projects

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Date	10.05.2012
Scale	1:3,000

Figure 4.4d

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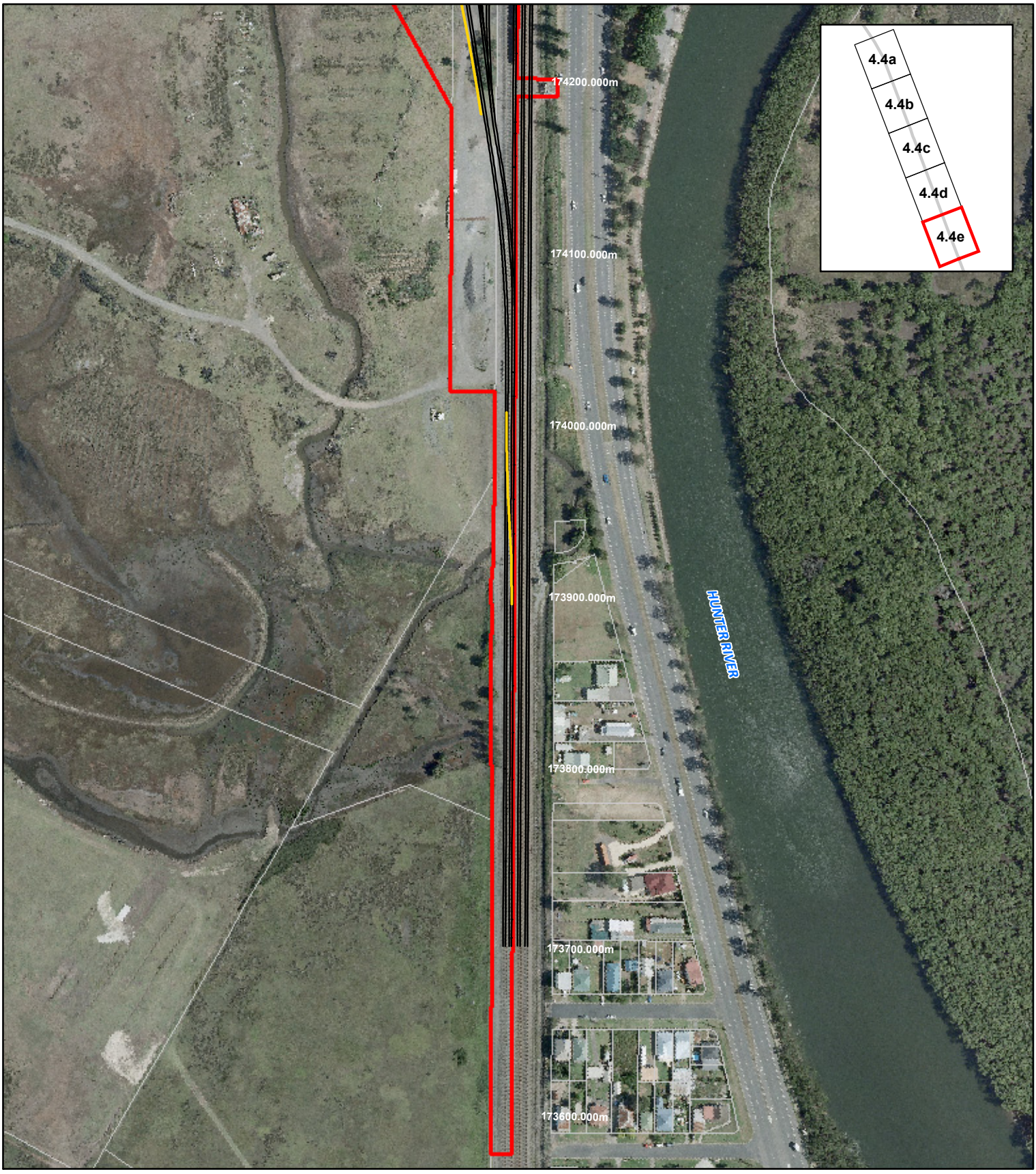

Relief Roads
Proposed QR National Track (May 2012)
Proposed QR National Track Future Option (May 2012)
QR National Train Support Facility Structure (May 2012)
Cadastre
Project Area

A4 Original

0 30 60 120

Metres

GDA 1994 MGA Zone 56

N

UHVA

ARTC

ARTC
Hexham Relief Roads

Interrelation of the ARTC's and QR National's Proposed Projects

Job Number	2110501A
Revision	A3
Date	10.05.2012
Scale	1:3,000

Figure 4.4e

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overhead travelling cranes and the Locomotive Maintenance Shed would have a wash-down bay on the approach.

Servicing/Repairs includes:

- Detachment and attachment of locomotives and wagons from/to trains;
- Locomotive inspections, and scheduled and unscheduled servicing and repairs;
- Component change-outs on locomotives (e.g. radiators, blowers, air conditioners, etc.) and on wagons (e.g. brake blocks, wheel sets, brake equipment etc.);
- Locomotive and wagon washing/cleaning; and
- Turning of locomotives.

4.7.4. Cumulative Impacts

QR National is liaising with ARTC to co-ordinate the design and approval processes. As part of each of the technical studies undertaken for this EIS, a cumulative assessment has been undertaken of the two projects. The cumulative assessments are contained within each of the technical studies. A summary is provided in **Chapter 24 Cumulative Impacts**.

4.7.5. Project Integration

ARTC and QR National have been in discussion throughout the preparation of the Hexham Relief Roads HRR Project (and EIS) and the TSF Project (and EIS) to identify operational and construction coordination, interactions between the facilities and as suitable establish joint planning for key facilities. ARTC and QR National are currently in the process of finalising the following joint infrastructure and management plans:

Access Planning: includes the identification and integration of the QR National and UHVA joint access track (road) entrance proposed off the Tarro Interchange. This access will be used for the construction phases, and in the case of the TSF Project also potentially operation phase. The integrated approach would reduce potential impacts on road safety and traffic congestion during construction works.

Joint Drainage Masterplan: summarises the key impacts of both projects having regard to future run-off behaviour as has been described in this EIS (refer to Section 7.3.4 of Chapter 7 Flood, and 24.1 of Chapter 24 Cumulative Impacts) and identifies the integration of drainage infrastructure. This joint drainage masterplan is being prepared to satisfy one of the flood mitigation measures (refer **Chapter 7 Flood**). This masterplan will allow for the integration of water management during the operation of each of the projects. Joint measures to manage run-off and sediment and erosion control would be identified in the HRR CEMP as necessary.

ARTC and QR National will continue in joint discussions in order to integrate the two projects.