6.0 The Proposal

6.1 INTRODUCTION

QR National currently hauls coal from the Hunter Valley to the Port of Newcastle. They have a secured and forecast growth that will increase train sets from 11 sets today (31 locomotives and 900 wagons) to 38 sets (96 locomotives and 2,856 wagons) by 2019. This will drive demand for additional train service capacity.

The increase in rollingstock will require new servicing and maintenance facilities. It is proposed to relocate the existing maintenance and provisioning operations on Kooragang Island to a site at Hexham, 16km northwest of the city of Newcastle. This also forms part of an overall strategy by ARTC and HVCCC to relieve congestion in and around the Newcastle Coal Terminals. Adjacent to the site at Hexham, ARTC are planning to construct the HRR Project to assist with relieving congestion within the HVCC.

QR National propose to develop a TSF on the site at Hexham to support its operations in the Hunter Valley.

6.2 THE PROJECT

The primary elements of the TSF project include:

- Construction of new connections to the GNR;
- Construction of 10 new train lines (tracks) parallel to the existing Mainline to accommodate QR National trains for provisioning, inspections, servicing and maintenance;
- Buildings for the provisioning of QR National locomotives and the maintenance of rollingstock;
- A bulk fuel storage area with capacity for up to 400,000L of diesel fuel;
- Construction of an intersection and a new access road from the Tarro Interchange;
- Civil earthworks of approximately 380,000m3 of import to fill for the construction of the railway formation, access road, drainage and building foundations;
- Construction of internal access roads; and
- The protection or diversion of existing utilities.

The estimated cost of the project is $130m and is planned to be constructed in two stages over approximately 24 months.

The building and track layout is identified within Figure 6 and 7. Detailed preliminary drawings of the proposed TSF are contained within Appendix V.

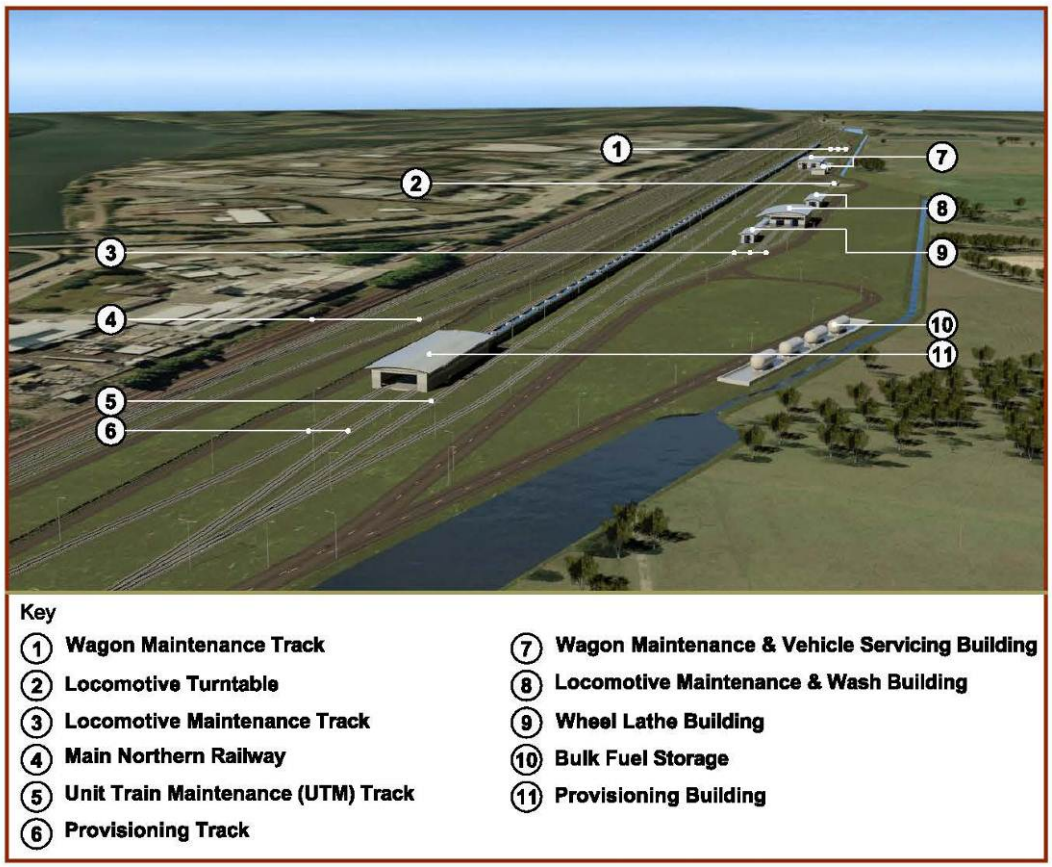


Figure 6: Building & Track Layout of Proposed Facility

6.3 PROPOSED OPERATION

6.3.1 Operational Components

The TSF will enable QR National's daily train running requirements and rollingstock maintenance needs to be undertaken in an efficient and cost effective method. The facility would provide QR National a service centre where:

- QR National trains can undergo statutory and routine maintenance inspections;
- Locomotives and wagons can be attached/detached to/from QR National trains;
- Locomotives can be provisioned (fuel, oil, water and sand) , inspected, serviced and maintained;
- Wagons can be inspected, serviced and maintained;
- Locomotives and wagons can be stabled; and
- Spare parts can be held for locomotives and wagons.

The TSF will be separated into three areas:

- Train provisioning and inspection;
- Wagon servicing and maintenance; and
- Locomotive servicing and maintenance.

These activities are described further in Section 6.3.2 below.

The facility is primarily designed to accommodate empty coal trains on their journey from the Newcastle Terminals to the mines. These trains will predominately enter and depart the facility in the down (north bound) direction only. A new crossover at the city end (south) of the TSF is proposed to enable locomotives and wagons requiring repair to return to Newcastle for major servicing and/or repairs.

6.3.2 Operational Activities

The TSF will allow QR National to improve train inspection, wagon maintenance and provisioning capabilities. The TSF will replace the existing fuelling facility at KCT.

The TSF will accommodate Hunter Valley trains up to 1550m in length and will provide full locomotive provisioning capability, including fuel, oil, water, sand, cab cleaning and light maintenance.

The building and track layout of the proposed TSF is identified in Figure 6. A schematic layout of the operation is identified within Figure 9.

The sequence of the proposed operation is outlined as follows:

- Trains will enter the QR National TSF from the city end only off the ARTC Down Coal at Hexham using a new turnout. Estimated turnout speed will be 45 km/h maximum;
- Trains that enter the site will be directed to provisioning or inspection:
    - Provisioning will occur on the provisioning tracks labelled as 6 (Figure 6), which run through the Provisioning Building. The provisioning process is addressed in Section 6.4.2;
    - Inspections of locomotives and wagons will be undertaken on the UTM tracks labelled as 5 (Figure 6). Locomotives or wagons requiring service of repairs will be removed (cut out) of the train and replaced with rollingstock on site. Further detail regarding servicing and repairs is detailed below.
- Locomotives or wagons requiring service will be shunted to the respective service area. Servicing will be undertaken as outlined in Section 6.4.2. Repaired locomotives and wagons will be held until required.
- Trains will be required at the TSF for up to 60 minutes for provisioning, crew change and the occasional locomotive change. Statutory inspections can take between 8 and 24 hours.
- A crossover will be provided between the Down Coal and the Up Coal to allow for the departure from the TSF city end for transfer of rollingstock to third party maintenance facilities at Carrington or Broadmeadow for major servicing or repairs.
- Access road at the northern end of the proposed TSF. There is no access from the Up Coal to admit loaded trains into the TSF.

The proposed TSF will not increase the number of train movements on the GNR.

Provisioning and Inspection

Full provisioning capabilities will be provided on two tracks, with light provisioning and inspection capabilities on the Unit Train Maintenance (UTM) track. Allowance is made for vehicular access between each track to facilitate the inspection process. Provisioning, inspections and unscheduled rollingstock maintenance on the provisioning and UTM tracks will be performed on a 24 hour, 7 days per week basis.

Provisioning includes:

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

Servicing & Maintenance

- Two custom designed buildings will be provided for rollingstock servicing, including a wagon maintenance building and a locomotive maintenance building. Both buildings will be equipped with overhead travelling cranes and the Locomotive maintenance shed will have a wash-down bay on the approach. The wagon maintenance facility will be capable of performing most of QR National's wagon maintenance requirements.

Wagon maintenance will be performed on a 2 shift, 5 days per week basis, between 06:00 and 22:00 hours, with hours of operation driven by demand. This could increase to a 7 day and 24 hour operation when and if required. Wagon maintenance activities will include:

- Replace break blocks;
- Replace wheels/wheel sets;
- Replace bogie containers; and
- Routine repairs.

The locomotive maintenance building will be capable of performing most of QR National's locomotive maintenance requirements. The following A, B and C service inspections will be carried out in this building:

- An "A" service will occur approximately every 122 days (4 monthly service/inspection) and will generally comprise of the following activities:
    - Inbound inspection, shunting, load testing, brake testing, oil change, filter change, locomotive wash, underframe inspection, inspection of all components, and an outbound inspection, load test and brake test.
- A "B" service will occur approximately every 366 days (yearly service) which comprises activities the same as the "A" Service plus:
    - Brake rack filter changes, alternator slip ring brushes changed, grease all blowers, alternator cab (traction motor & exhauster blower), clean and lubricate all compressor components, crankshaft thrust measurement, valve timing, grid blower brushes, engine torque checks, engine coalescer filter, gearcase oil changed, and wiper blades changed.

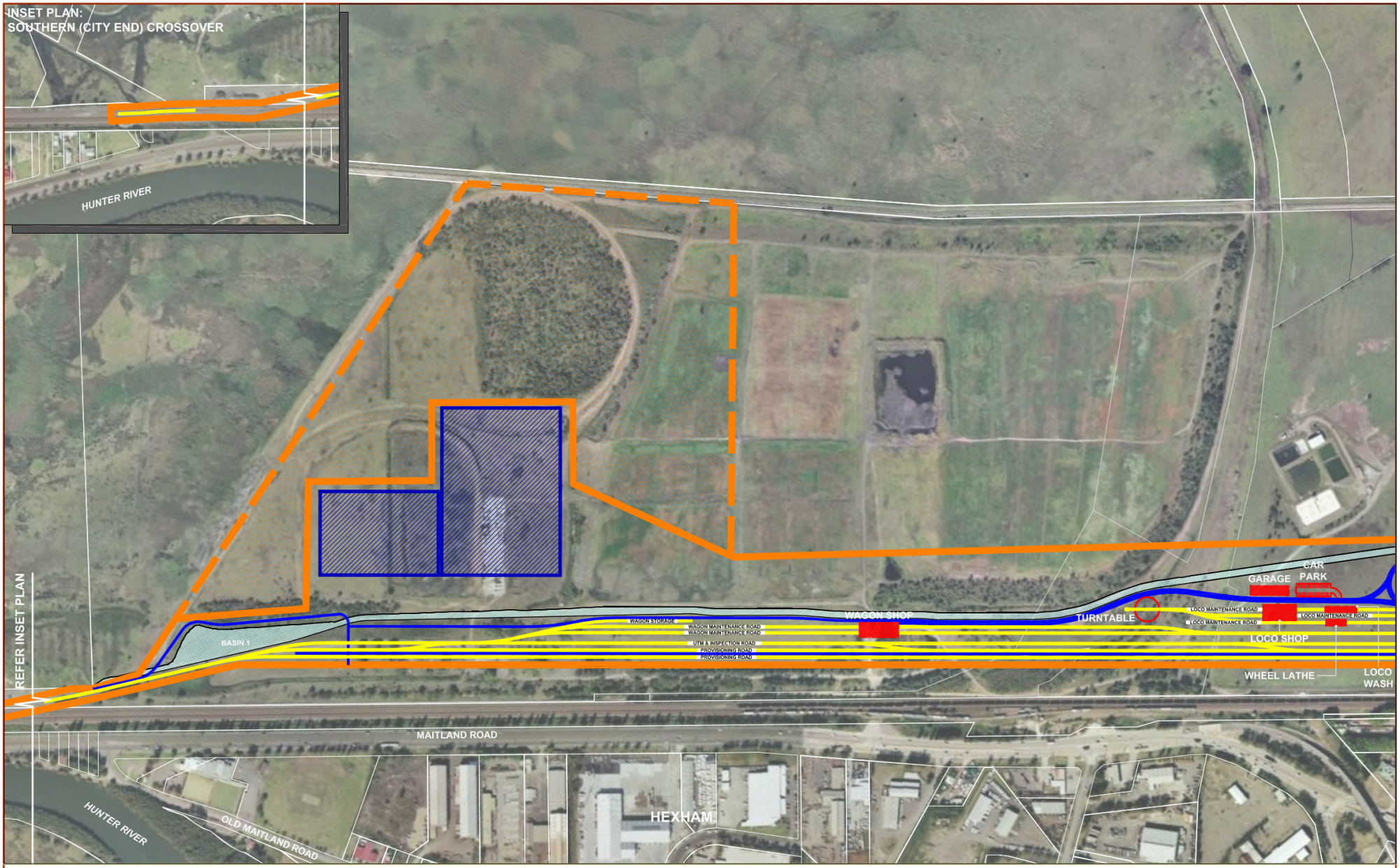
- A "C" service will occur approximately every 732 days (2 year service, that includes the same activities as for the "B" Service plus:
    - Clean auto drain valves and replace gaskets, replace radiator cap, replace compressor breather, check valve timing, replace air dryer desiccant and eye, high pressure fuel line removal and installation.

Locomotive and wagon maintenance will be performed on a 2 shift, 5 day per week basis between 06:00 and 22:00 hours, with hours of operation driven by demand. This could increase to a 7 day per week operation when and if required.

Both the wagon and locomotive maintenance operations will be subject to QR National's Noise Management Practices.

It is envisaged that the operational staff will number approximately 30 in total and be dispersed over the shift times outlined above.

It is estimated that by 2014/15 provisioning and servicing is likely to occur at a frequency of approximately 12.5 trains per day which equates to 62.5 per week, 250 per month and over 3,000 per year based on a five day week operation. Due to an expected increase in the growth of the coal industry, the frequency is likely to increase to approximately 24 trains per day by 2020.



A3 Original

0m 50 100 200

Scale 1: 5000 (A3)

KEY

- Project Outline
- Future Investigation Area
- Cadastre
- Proposed Vehicular Access
- Temporary Construction Access
- Proposed Vehicular Circulation
- Proposed TSF Track
- Proposed TSF Buildings
- Proposed Drainage
- Effluent Irrigation Areas

N

QR NATIONAL

QR National
Train Support Facility

Date: September 2012

Figure 7. Sheet 1 of 2
Project Components Figure


TARRO INTERCHANGE
HUNTER WATER CHICHESTER TRUNK GRAVITATION MAIN
PURGATORY CREEK
BRIDGE
WOODLANDS CLOSE
MAIN NORTHERN RAILWAY
NEW ENGLAND HIGHWAY
FUEL FARM
BASIN 2
BASIN 3
PROVISIONING SHED
LOCO WASH
A3 Original
0m 50 100 200
Scale 1: 5000 (A3)
KEY
Project Outline
Future Investigation Area
Cadastre
Proposed Vehicular Access
Temporary Construction Access
Proposed Vehicular Circulation
Proposed TSF Track
Proposed TSF Buildings
Proposed Drainage
N
QR NATIONAL
QR National
Train Support Facility
Date: September 2012
Figure 7. Sheet 2 of 2
Project Components Figure

6.4 LAYOUT AND DESIGN

There are four primary components associated with the proposed TSF project:

- Track & Signalling;
- Buildings & Infrastructure;
- Road Infrastructure; and
- Utilities.

These are described in further detail below.

6.4.1 Track & Signalling

Three options were considered for the track layout of the TSF, these being:

1. Parallel -Track located directly adjacent to the existing GNR;
2. Extended – large radius curves occupying full extent of site; and
3. Compressed – small radius curves occupying minimal extent of site.

These three options were developed once a number of site constraints were established, including:

- Extent of QR National land ownership;
- Existing site zoning;
- Extent of existing coal tailings stockpile;
- Interface with ARTC's HRR Project;
- Extent of SEPP14 Wetland; and
- ARTC entry/exit speed requirements.

Figure 8 illustrates the three layouts explored. The compressed option was designed to fit entirely within the IN3 heavy industry zone.

The economic and environmental considerations are detailed within Section 5.9. Additional detail relating to selection of the Hexham site is included within Section 5.

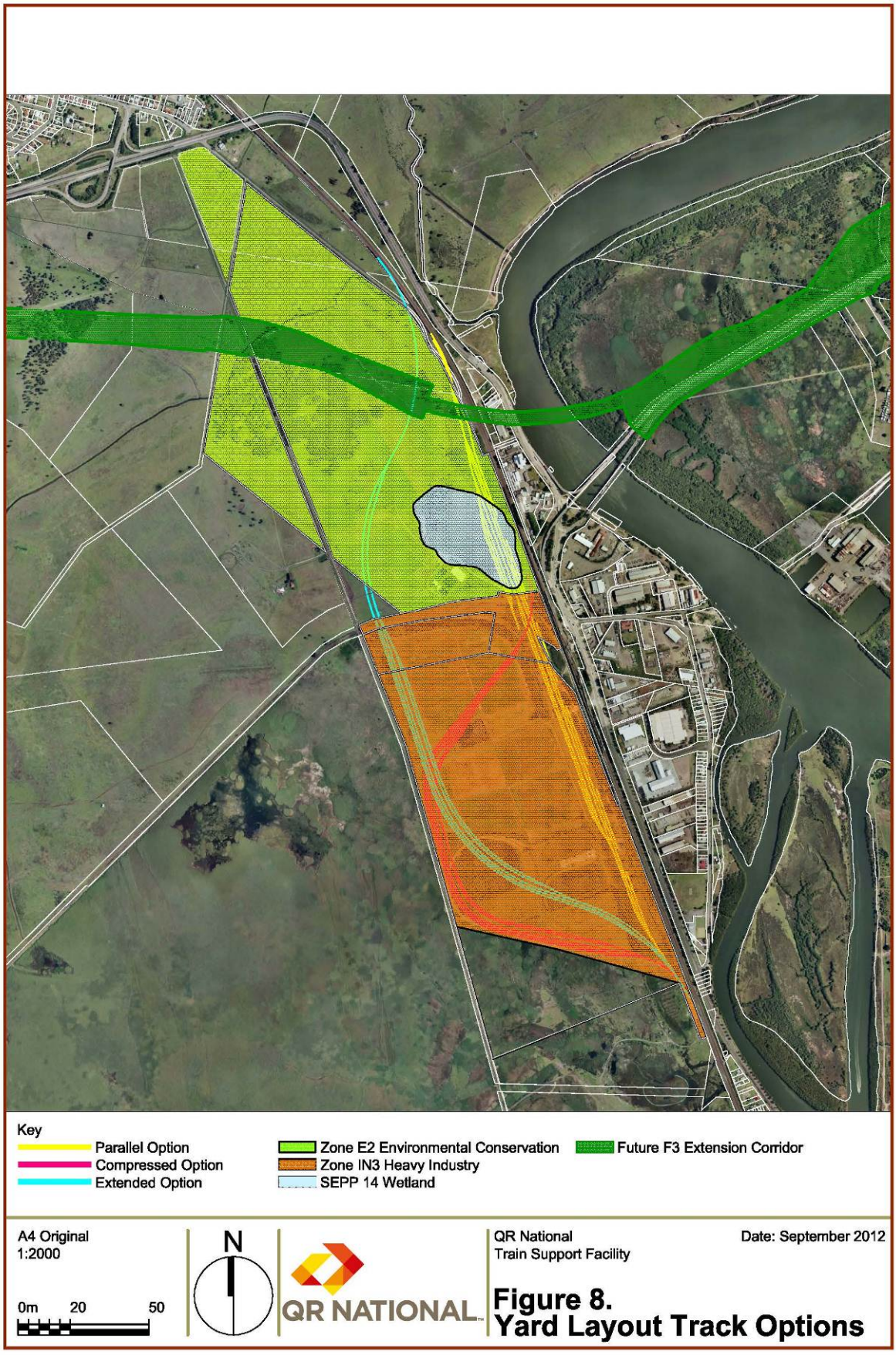


Figure 8: Layout Options including Zoning

The parallel option is the most widely used layout option throughout the rail industry. The compressed option was developed to ascertain whether or not it would be possible to fit the facility within the portion of the QR National site appropriately zoned for the proposed usage. The extended option was developed to cater for high speed entry and exit. Figure 8 shows the location of the SEPP 14 Coastal Wetlands in relation to the yard layout options.

After careful consideration of the relationship between the site constraints and the track layout options for the facility, it was decided to progress the parallel option as:

- The parallel option eliminates the need for remediation work associated with the coal tailings stockpile;
- The parallel option facilitates future expansion while the extended and compressed option hindered future expansion;
- While the parallel option requires the use of land subject to SEPP 14, there are offsets on site which will mitigate this;
- The parallel option is the least likely to impact on the connection of the possible future Fassifern to Hexham Rail Link;
- Trains stationed on curves hinder inspections; and
- The parallel option will have the least amount of track therefore should be the lowest cost to construct.

Track Layout Details

The layout of the TSF track runs parallel to the existing GNR and requires the construction of approximately 11kms of new track. It is proposed that the entry track for the TSF will connect to the Down Coal and exit further north on the same line.

The major components of the new track within the facility include:

- 2 x 1580m provisioning tracks;
- 1 x 1580m inspection UTM track;
- 2 x wagon maintenance tracks;
- 1 x 150m wagon storage tracks;
- 2 x locomotive maintenance tracks;
- 1 x locomotive storage and run round track;
- 1 x Locomotive turntable; and
- 1 x wheel lathe.

Below is a schematic diagram illustrating the proposed layout of the TSF.

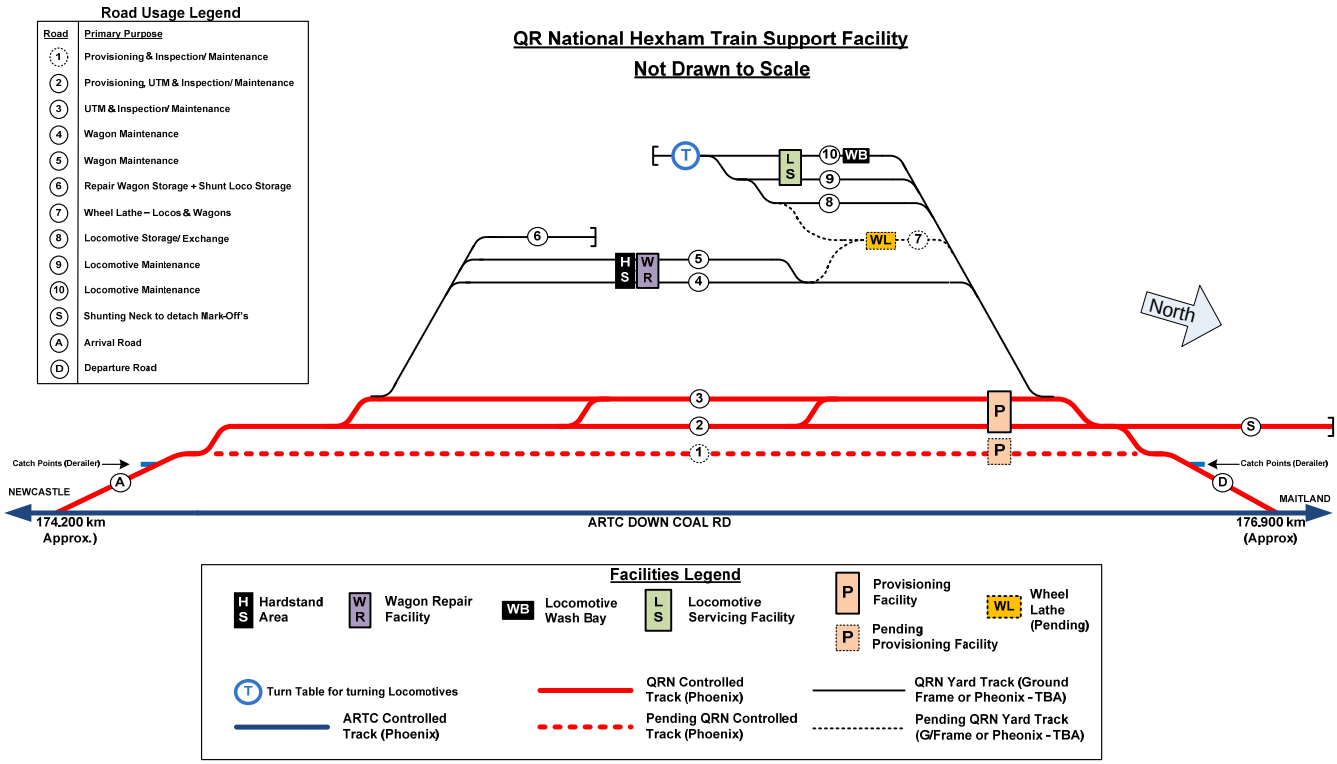


Figure 9: Schematic Layout of Proposed TSF

Signalling

ARTC, being the regulator of the above ground rail network, have stipulated that trains entering or departing the TSF must not impact on Network capacity. ARTC use the Phoenix Train Control System to remotely control all signals and points throughout the Hunter Valley Rail Network. The optimal way of ensuring the TSF integrates with ARTC network operations is to implement the Phoenix system within the TSF.

Several signalling and yard control options are available to the project however the most appropriate in terms of cost and efficiency is to install the Phoenix system to control the signals and points for the first three roads adjacent the Mainline (two provisioning roads and the UTM tracks).

Access to the wagon and locomotive facilities section of the yard will be controlled through an electric release system. Once in the un-signalled part of the facility, all movements would be manually controlled using manual point machines and hand signals/ radio commands.

6.4.2 Buildings & Infrastructure

All buildings are to be designed with the intended purpose and function clearly defined. This process has already commenced with design workshops at the preliminary design phase that included all internal relevant stakeholders. Building designs will comply with relevant Australian Standards (AS) but in particular with the Building Code of Australia.

Provisioning & Inspection Facilities

There will be two provisioning facilities provided at the Hexham TSF as follows:

1. Dedicated Provisioning Building

A custom designed permanent provisioning building will be constructed over the two provisioning tracks and will enable full provisioning capabilities, simultaneously on both tracks. The Provisioning Building will have a total area of 1,390m^2 with dimensions; 79m x 17.6m and 6m in height.

The building foundations will be piled with a steel portal framed structure with a relatively flat roof pitch. Wall cladding will be a combination of corrugated steel sheeting, clear fiberglass sheeting for light entry and a fixed louvre system for ventilation. The roof will also be corrugated steel sheeting. It is intended that both ends of the building will be open.

The building will be designed so that three locomotives will be able to be provisioned simultaneously on each provisioning track. Elevated platforms within the building will provide personnel access to the walkway levels on the locomotives.

Two remote 100,000 litre above ground, self-bunded fuel storage tanks will be installed initially, with allowance for an additional two 100,000 litre tanks (maximum) as the demand for fuel increases, to support the provisioning process. Fuel delivery rates of at least 800 litres/ minute/ locomotive are required.

The self-bunded tanks will be enclosed within a concrete bunded area to provide an additional level of environmental protection, considering the proximity to sensitive wetland areas, in the event of an accidental spill.

A 5,000 litre oil storage tank is required, along with town water hoses to deliver water to all three locomotives. Three 10 tonne sand bins are to be mounted adjacent to the shed, sand, water, oil and fuel will be reticulated using piping systems to all the provisioning points within the shed.

2. Light Provisioning Facility

Light provisioning is to be provided for the inspection track to provide provisioning capabilities for trains undergoing inspections and/or UTM. This would be of similar specification to the existing QR National operations at KCT.

This facility consists of:

- A nominal 100,000 litre self-bunded portable fuel storage tank with attached pumping unit and fuelling booms. Fuel delivery rate for this unit is 500 litres/ minute;
- Provision for the storing and distribution of 2000 litres of new oil; and
- A 27 tonne sand storage, distribution and delivery system.

The facility is to be placed on bunded concrete apron slabs with in-ground runoff collection pits to control contaminated runoff due to minor accidental spills. An awning is proposed to be built over this provisioning location for all weather operation.

Servicing & Repairs

There are to be two separate servicing & repair buildings:

- A wagon maintenance building; and
- A locomotive maintenance building.

Wagon Maintenance and Administration Building

The primary function of the wagon maintenance building is to allow for the routine inspection, scheduled and unscheduled servicing and repairs of wagons. This will be the first maintenance building to be built at the facility.

The Wagon Maintenance Building (including administration) will have a total area of 2,232m^2 with dimensions as follows:

- Shed - 56m x 28m and 12m in height;
- Office – 25m x 12 and 2.7m ceiling height; and
- Store – 17m x 12m and 5.2m in height.

The proposed wagon maintenance building will be built over the two proposed wagon maintenance tracks. The foundations will be piled with a steel portal framed structure with a relatively flat roof pitch. Wall cladding will be a combination of corrugated steel sheeting, clear fiberglass sheeting for light entry and a fixed louvre system for ventilation. The roof will be sheeted in corrugated steel. Doors are to be provided at either end of the shed for security and weather protection purposes. An overhead travelling crane to lift the wagon bodies from wheel sets will be installed within the building. The maintenance access platforms and access stairs for the crane will be constructed entirely within the building

The main body of the building will accommodate two coupled wagons on each of the tracks within the building. The building will be approximately 54m in length to provide adequate space around the wagons to perform maintenance. Off the side of the building will be the ancillary support spaces for storage of wagon spares, support workshop, lunchroom, male and female amenities including showers. Office space is included for the Facility Manager, Yard Controller and three Administration Staff. The floor level of the administration area will be raised to above the 1% AEP flood level.

As a part of the construction of the wagon maintenance building, a wheel set storage bay will be constructed, consisting of a hardstand area with rails set in for the storage of wheel sets in rows. The slab will be appropriately drained and allow for stormwater flow to the overall site stormwater collection and disposal system.

Locomotive Maintenance Building

The primary function of the locomotive maintenance building is to allow for the routine inspection, scheduled and unscheduled servicing and repairs of locomotives.

The Locomotive Maintenance Building will have a total area of 2,440m^2 with dimensions as follows:

- Shed - 66.5m x 20.5m and 12m on height;
- Office – 21m x 12m x 2.7m ceiling height; and
- Store – 33m x 25m x 5.2m ceiling height.

The locomotive maintenance building will have two incoming tracks and will accommodate four locomotives (two on each of the tracks) within the building. The foundations will be piled with a steel portal framed structure, and relatively flat roof pitch. Wall cladding will be a combination of corrugated steel sheeting, clear fiberglass sheeting for light entry and a fixed louvre system for ventilation. The roof will be sheeted in corrugated steel. The floor will be depressed around each of the four maintenance bays with pedestrian access from the building floor level by stairs with handrail protection. Inspection pits will extend below the area of depressed floor for inspection under the locomotives. Elevated steel access and work platforms will be provided on either side of each locomotive to provide safe work access to the servicing door level of the locomotives. There will be provision for future wheel management for the maintenance of locomotive and wagon wheels.

Doors are to be provided at either end of the shed for security and weather protection purposes. An overhead travelling crane will be installed within the building. The maintenance access platforms and access stairs for the crane will be constructed entirely within the building.

The main body of building will be approximately 56m in length. This includes an allowance for a 2m gap in between each locomotive, with an additional 5m clear at the far end of each locomotive. Off the side of the building will be the ancillary support spaces including storage for locomotive spares, workshop, lunchroom, male and female amenities including showers and supervisor's office.

Locomotive Wash Bay

Located on the approach to the locomotive maintenance building is a wash bay for cleaning of locomotives prior to service. The Locomotive Wash Bay will have a total area of 551m^2 with dimensions; 31.5m x 17.5m and 11m in height.

This will remove grime from the exterior of the locomotives, but mainly to remove oil, grease and dirt build-up from the bogies, engine compartments and undercarriage prior to entry to the workshop. The principal cleaning method will be steam cleaning with hand held high pressure water washing as a backup and for cleaning the locomotive exterior panels and roof.

There will be a depressed floor that will facilitate low level cleaning and as well high level and mid-level (locomotive walkway level) access platforms for the full length of the building to allow access to the engine bay and to the top of the locomotives. The locomotive wash will have precast concrete walls to prevent water mist drift and will be roofed over so that rainfall runoff

does not enter the return wash water system. Entry to the depressed floor of the locomotive wash will be by steps protected by handrails.

Reuse of wash-down water is an important ESD philosophy that will be adopted in the design of this facility. Runoff from the wash bay will enter a coarse waste coal trap, followed by treatment by flocculating and adjustment of the pH level. Water will then flow through an oil/grease separator to a wash down water storage. From the wash down water storage the water will be chlorinated and pumped to a reuse header tank where it can be topped up with mains water or harvested rainwater. The water would then be recycled through the locomotive wash system.

Service Vehicle Garage Building

A prefabricated steel framed and clad building (sized to house the permanent onsite maintenance vehicles) will be provided for the breakdown truck and quad bikes used to transport maintenance people around the yard. The Service Vehicle Garage Building will have a total area of 288m^2 with dimensions; 24m x 12m and 5m in height.

The building will have three bays each with a panel tilt door for access. A minor amount of fuel (200 litre drum) and emergency response equipment and quad bike servicing equipment will be kept in this shed.

Wheel Lathe Building

The wheel lathe building will house an underfloor wheel lathe specifically designed to machine wheel profiles for all rollingstock (coupled or uncoupled) and locomotive wheel sets. The building will have a total area of 480m^2 with dimensions; 40m x 12m and 6.5m in height.

6.4.3 Road Infrastructure

The TSF includes three major components of road infrastructure:

- Intersection with the Tarro Interchange;
- Access road from the Tarro Interchange to the facility; and
- Internal access roads.

Extensive consultation with RMS has been undertaken with regard to providing safe access to the site.

Tarro Interchange

Given the proximity to one another, the TSF and HRR projects have agreed to work collaboratively towards developing road access options. Currently the only access to the site is via Woodlands Close which does not meet Austroads standards. The RMS have indicated that the use of Woodlands Close would not be an appropriate access for the projects except for the initial site preparation works and under an approved Traffic Management Plan.

QR National and ARTC have examined the permanent and construction site access options to provide for safe access and egress from the site. The access is designed to accommodate a maximum vehicle size of a B-double configuration.

Initially eight options were assessed on the basis of the following criteria:

- Road Safety (double weighting);
- Property Acquisition;
- Constructability;
- Cost;
- Utility Diversions;
- Construction Timeframe / Staging; and
- Environmental Impacts.

Following the assessment of the eight options, two options were eliminated on the basis of having poor safety performance and being difficult to construct. A further two major infrastructure options were discounted as they were assessed to be difficult to construct, expensive and would not improve road safety.

The four remaining options all involve access from the Tarro Interchange. They all achieve good safety performance; they do not require significant adjustment to public utilities and have minimal impacts to property.

The preferred option is for a right turn in and left turn out intersection located on the existing Tarro Interchange and is illustrated in Figure 10 below.

The land required for this option is owned by RMS and QR National. The preferred option is much smaller and easier to construct than a roundabout on the interchange. Although a roundabout offers a long-term solution there is not the volume of traffic on the road to justify the option.

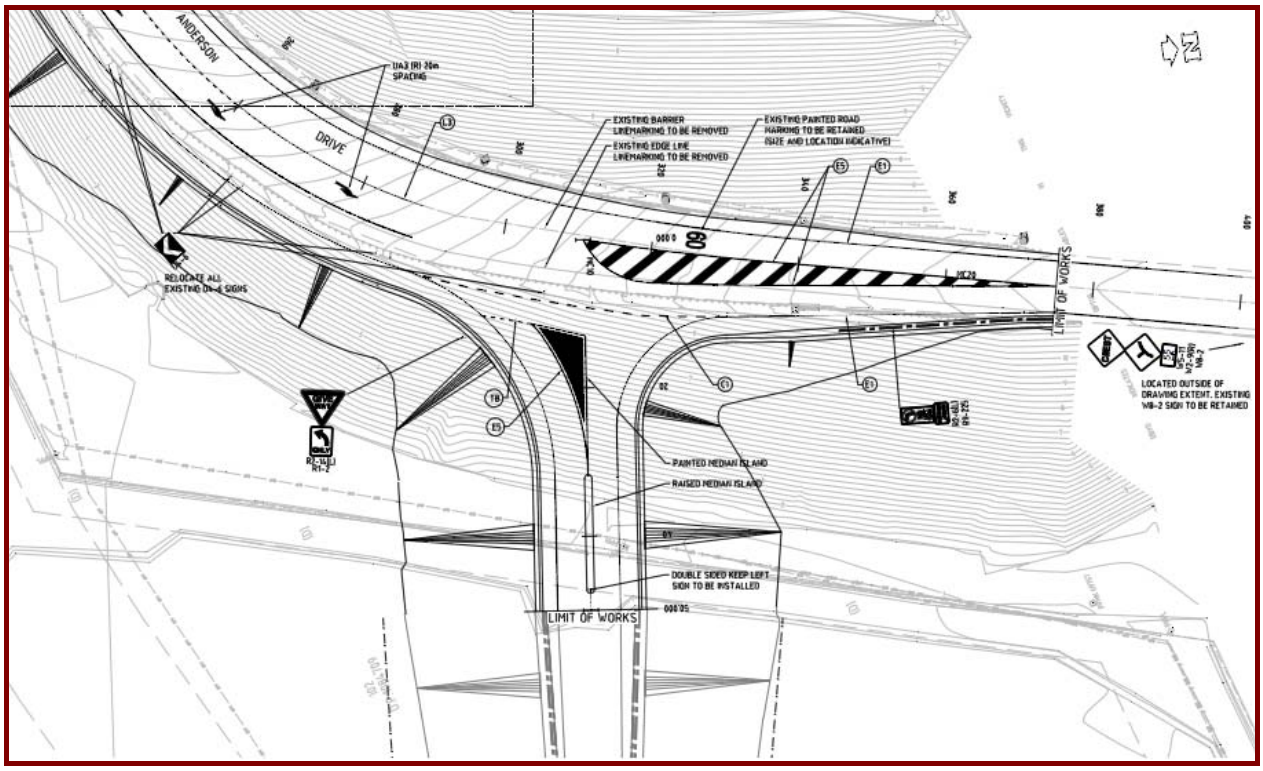


Figure 10: Tarro Interchange Concept

Approval for this access requires the proponent to enter into a Works Authorisation Deed (WAD) with the RMS to cover the legal requirements. ARTC will manage the WAD process with RMS for construction of the intersection off the Tarro Interchange. The approval for the proposed intersection and access road to the TSF is sought within this EA. The access will be shared by ARTC and QR National.

Site Access Road

A site access road from the Tarro junction to the main site will be comprised of two 3.0m wide travelling lanes with 2.0m wide shoulders. The road construction is envisaged as a flexible pavement with 40mm of asphalt surfacing. The current alignment of the site access road follows the alignment of a redundant Hunter Water pipeline, avoiding environmental constraints as well as the future F3 Freeway easement. Part of the proposed access road has been identified as temporary and the option to adjust the road alignment upon development of the future F3 Freeway has been provided (Figure 3).

At a point approximately 600m along the site access, the road diverges to provide access to the QR National TSF and the ARTC HRR Project.

The QR National portion of the site access road will have a bridge constructed over Purgatory Creek and finish about 150m from the southern end of existing Woodlands Close, where it will connect to the internal access road network of the TSF. The site access road will be designed to NCC standards, allowing for the road ownership to be transferred at a later point in time if required.

Internal Access Road

The principal internal roads will provide vehicular access to all buildings within facility and a loop road enabling adequate access for the B-double tankers delivering fuel to the facility. Two secondary access roads will extend for the entire length of the site to provide full circulating site access.

In addition to the sealed internal access roads, the area between ballasted tracks will be brought up to the track level in gravel and will be used by light vehicles transporting personnel undertaking rollingstock inspections or other maintenance activities.

Car Parking

Dedicated onsite parking will be provided adjacent to the offices and amenities as identified within Figure 6 (Project Components) and on hardstand areas adjacent to main work areas. The facility car park would have 38 parking spaces including two disabled spaces.

6.4.4 Utilities

Details of the major utilities and infrastructure and proposed measures for the provision of services are set out in the Services Investigation Report, Appendix M.

There are two elements to the utilities works to the project. First, the protection or relocation of existing services infrastructure traversing the site. Preliminary advice is being sought from the relevant provider for the protection or potential relocation of existing utility services over or

adjacent to the TSF. The second aspect of the utilities component is the provision of services to enable the TSF facility to function.

The services located on site are illustrated in Figure 11 and are listed below and include:

- Chichester Trunk Gravity Main pipeline;
- 500 & 350mm diameter gas mains;
- High voltage transmission lines;
- 33kV sub transmission lines (adjacent to Tarro Interchange);
- 33kV and 11kV electricity (Woodlands Close); and
- Optus telecommunication service.

Water

HWC operates the Chichester Trunk Gravity Main pipeline that supplies water to the Maitland, Cessnock and Newcastle water systems. The pipe is constructed on the western boundary of the site. The CTGM is made up of a single 900mm pipeline. In 2011 the original above ground pipeline was removed and replaced with a new below ground structure. A 200mm branch line from CTGM crosses the TSF project. As part of 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.

It is proposed to connect to the 200mm HWC main to provide potable water to the TSF. In terms of water usage, the total average daily demand for the TSF is 2.6kL/day for Stage 1 and an ultimate demand of 7.4kL/day at Stage 2. Preliminary investigations into the capacity of the existing 200mm water main indicate that the TSF demand could be sufficiently supplied without an upgrade. A 150mm ring main will reticulate water to service the TSF and provide necessary access for fire fighting. The reticulation main will be located outside road and rail routes.

Gas Service

A 500mm diameter high pressure gas pipeline supply from Sydney to Newcastle and the Hunter Valley crosses the TSF (and HRR) site. A 350mm diameter high pressure gas distribution main is situated on the western side of Woodlands Close and is the supply for the Hunter Valley.

A Safety Management System workshop has been held with Jemena to determine the protection system to be used or whether the pipeline should be diverted. It is anticipated that a cover slab will be required over the pipeline, supported on concrete piles.

Jemena has advised that it will need to fully uncover the pipeline over the affected length to inspect the condition of the pipeline and its protective coating prior to construction of the TSF.

Power

There are substantial existing electrical assets on site including eight high voltage transmission line and Ausgrid 33kV/11kV lines. At the proposed access road and Tarro Interchange intersection there is a 33kV transmission line that is almost level with the proposed intersection. In order for the intersection to be constructed the existing 33kV power poles are to be removed and replaced

with taller concrete poles. These works will need to be conducted as enabling works for the proposed access road. All construction works are to be carried out in the existing road reserve to mitigate potential environmental issues. This work would be undertaken by Ausgrid under a separate approval.

The major areas and items that require electrical supply at the TSF include:

- Office & Amenities;
- Locomotive Turntable;
- Locomotive Wash Area;
- Wagon Maintenance Shed;
- Locomotive Maintenance Shed;
- Wheel Lathe;
- Provisioning Shed; and
- Yard Lighting and Road Lighting.

Based on the above, the maximum electrical load is estimated to be in the vicinity of 500kVA. This load will require the installation of a dedicated kiosk substation with the installation of at least two connection points from Ausgrid's existing 11kV network providing a ring feed.

Telecommunications

To enable the construction of the site access from the Tarro Interchange, protection of the existing Optus infrastructure may be required under Optus approval.

To provide data and telecom services to the TSF, preliminary investigations suggest that the installation of a 100 pair data cable to a central location with 50 pair data cable distributing communication services will be required as part of the development.

Local UHF receiver and transmitter bases would be required in the Provisioning, Locomotive and Wagon Maintenance buildings for direct communication with train crew and signalling personnel.

Conduits or service trenches/culverts will be provided as a part of Stage 1 construction to avoid disruption to operating rail line when installing services for later stages.

Wastewater Services

Brancourts have four waste pipes that traverse the TSF site. These pipes transport waste to an existing water treatment plant located approximately 300m to the south west of the Brancourts' facility. To construct the proposed tracks these pipes will need to be protected or replaced at a greater depth. As part of the detailed design phase, an appropriate means of protection would be reviewed and suitable protection measures provided. QR National is seeking approval for these works.

HWC have confirmed that there is currently no wastewater network system that is sufficiently close for connection to the TSF. As a result, two onsite wastewater systems are proposed:

- Wastewater treatment systems for sewage, requiring pipe reticulation, pump station(s), a package treatment plant and
- A designated irrigation area for onsite effluent disposal.

Runoff from the wash bay will enter a coarse waste coal trap, followed by treatment by flocculating and adjustment of the pH level. Water will then flow through an oil/grease separator to a wash down water storage. From the wash down water storage the water will be chlorinated and pumped to a reuse header tank where it can be topped up with mains water or harvested rainwater. The water would then be recycled through the locomotive wash system.

A diagram that explains water recycling and the waste water treatment can be found at Figure 23 in Section 9.5.

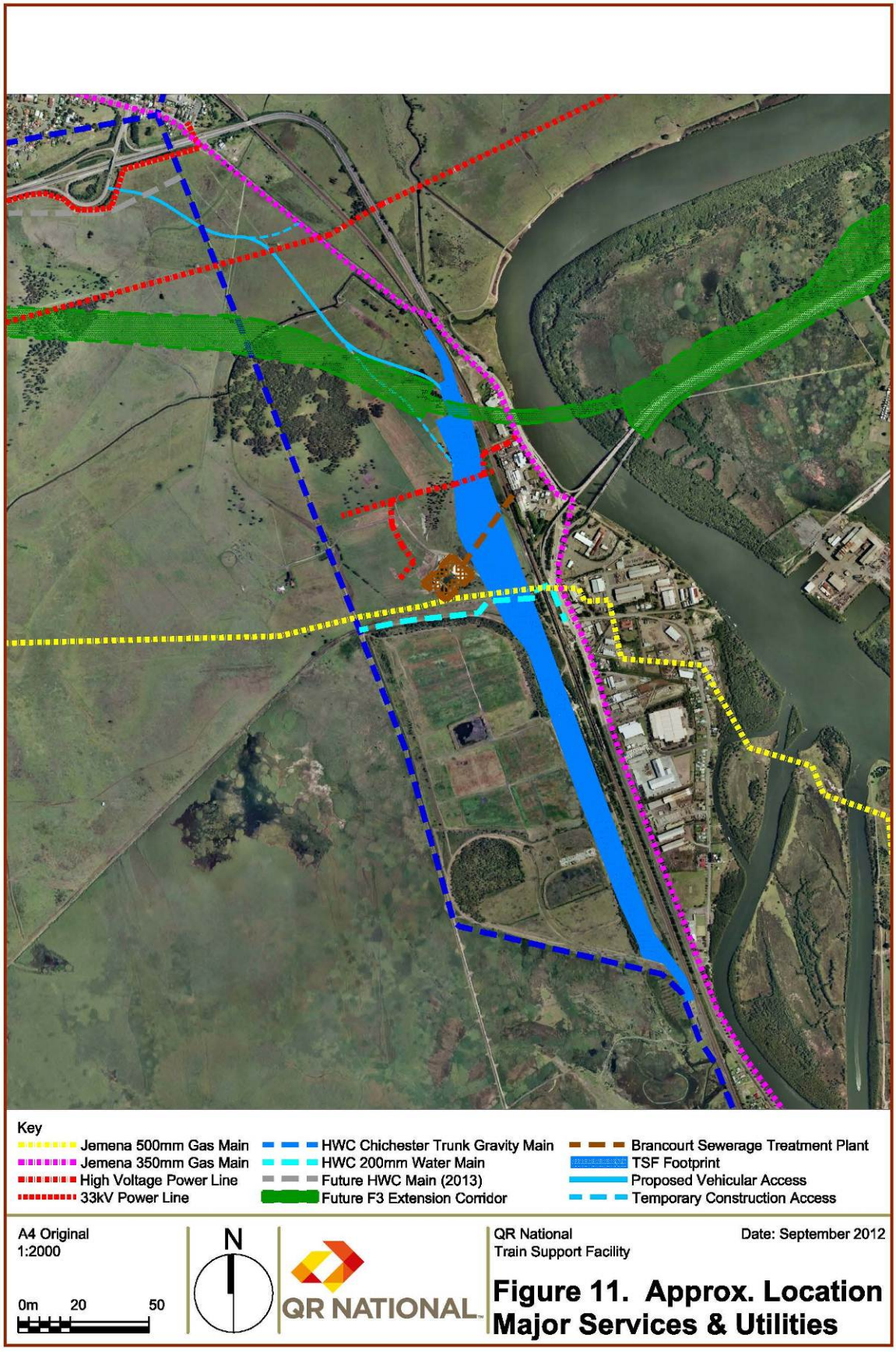


Figure 11: Approximate Location of Major Services & Utilities

6.5 CONSTRUCTION

Construction of the TSF would be undertaken in two stages to meet QR National's operational requirements. A summary of each Stage is included below and illustrated in Figure 12.

Stage 1

- Civil work (including works associated with Stage 2);
- Tarro Interchange, site access road and internal access roads;
- Mainline connections and crossover;
- Bulk Fuel Storage;
- Provisioning facility;
- Provisioning & UTM tracks;
- Wagon maintenance and Administration building;
- Wagon maintenance tracks;
- Car Parking; and
- Landscaping.

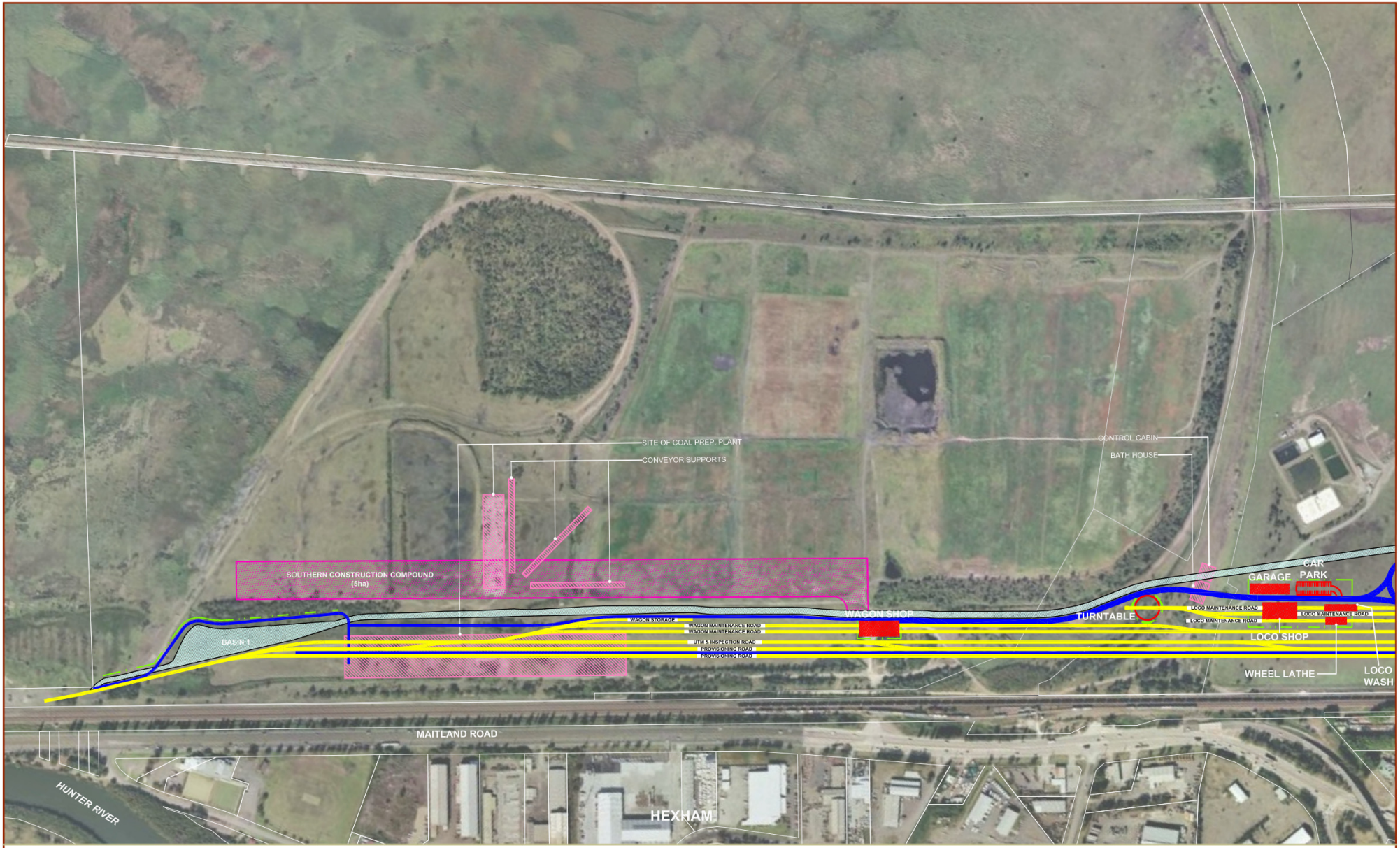
Stage 2

- Locomotive maintenance building;
- Locomotive wash building;
- Locomotive turntable; and
- Locomotive maintenance tracks; and
- Wheel lathe.

Demolition of several items associated with previous uses of the site will be undertaken where necessary during both phases of construction, these include:

- The dairy ruins;
- The control cabin and bath house;
- Remnant trackwork;
- Coal preparation plant footings; and
- Conveyor support footings.

The location of these items have been identified within Figure 12. The Statement of Heritage Impact revealed that these items have a very limited level of significance and their loss will not be detrimental.



A3 Original

0m 50 100 200

Scale 1: 5000 (A3)

KEY

- Temporary Construction Access
- Construction Compound
- Proposed Drainage
- Sediment Fencing
- Truck Shaker Bay
- Proposed Vehicular Circulation
- Proposed Vehicular Access
- Proposed TSF Track
- Proposed TSF Buildings
- Proposed Demolition

N

QR NATIONAL

QR National
Train Support Facility

Date: November 2012

Figure 12. Sheet 1 of 2
Construction Components

A3 Original

0m 50 100 200

Scale 1: 5000 (A3)

KEY

- Temporary Construction Access
- Construction Compound
- Proposed Drainage
- Sediment Fencing
- Truck Shaker Bay
- Proposed Vehicular Circulation
- Proposed Vehicular Access
- Proposed TSF Track
- Proposed TSF Buildings
- Proposed Demolition

N

QR NATIONAL

QR National
Train Support Facility

Date: November 2012

Figure 12. Sheet 2 of 2
Construction Components

6.5.1 Program

Construction Stage 1 will be delivered by July 2014. Delivery of Stage 2 will be driven by demand and anticipated business growth and is targeted for 2016.

Table 2: Outline Stage 1 Construction Program

Stage 1 Phase	1Q13	2Q13	3Q13	4Q13	1Q14	2Q14	3Q14	4Q14
Enabling Works								
Utilities								
Civil Works								
Track & Signalling								
Building								
Commissioning								

Table 3: Outline Stage 2 Construction Program

Stage 2 Phase	1Q16	2Q16	3Q16
Enabling Works			
Civil Works			
Track & Signalling			
Building			
Commissioning			

6.5.2 Methodology

Key construction activities within Stage 1 are outlined in the following table.

Table 4: Indicative Stage 1 Construction Activities

Stage 1 Phase	Activity	Indicative Schedule
Enabling Works	• Install environmental controls. • Construct site access from Tarro Interchange. • Protection or diversion of utilities. • Establish compound. • Clear & grub TSF footprint. • Survey set out for works.	June 2013 to September 2013
Civil Works	• Strip and stockpile topsoil. • Bulk earthworks (Import to fill). • Piling for buildings and track slabs. o Provisioning Building & Wagon Maintenance Building. • Excavate and place drainage & stormwater. • Construct new internal access roads.	June 2013 to February 2014
Track & Signalling	• Install city crossover. (Undertaken during ARTC possession) • Install Mainline connections. (Undertaken during ARTC possession) • Place ballast. • Install rail, sleepers and weld. o Provisioning, UTM & Wagon Maintenance. • Install rail within building. • Tamp & regulate track.	October 2013 to June 2014
Buildings	• Excavate and install foundations and footings for: o Provisioning Building &Wagon Maintenance, o Service Vehicle Garage &Administration Building. • Pour concrete slabs • Erect steel superstructure. • Install external cladding and roofing. • Installation of building services (mechanical, electrical & hydraulics) and specialist equipment. • Fit out.	October 2014 to June 2014
Commissioning	• Testing & commissioning of railway systems & signals. • Testing & commissioning of building services & equipment.	July 2014
Demobilisation	• Installation of road pavement. • Removal of site compound. • Landscaping. • Removal of temporary environmental controls.	July 2014 to December 2014

Key construction activities within the phases of Stage 2 are outlined in the following table.

Table 5: Indicative Stage 2 Construction Activities

Stage 2 Phase	Activity	Indicative Schedule
Enabling Works	• Survey set out for works.	January 2016
Civil Works	• Piling for buildings and track slabs. o Locomotive Maintenance Building.	February 2016 To March 2016
Track & Signalling	• Place ballast. • Install rail, sleepers and weld. o Locomotive Maintenance. • Install rail within building. • Tamp & regulate track.	February 2016 To July 2016
Building	• Excavate and install foundations and footings. o Locomotive Maintenance Building, o Locomotive Turntable. • Pour concrete slabs. • Erect steel superstructure. • Install external cladding and roofing. • Installation of building services (mechanical, electrical & hydraulics) and specialist equipment. • Fit out.	February 2016 To July 2016
Commissioning	• Testing & commissioning of railway systems & signals. • Testing & commissioning of building services & equipment.	August 2016
Demobilisation	• Removal of site compound.	September 2016

Enabling Works

To prepare the site for the commencement of construction the following activities will be undertaken:

- Construction of the proposed Tarro Interchange intersection and link road to provide site access would be completed;
- Dilapidation surveys would be undertaken on third party assets that the project may affect;
- Fencing would be constructed to delineate site boundaries and work areas;
- Any identified Aboriginal cultural sites and environmentally sensitive or contaminated areas will be suitably fenced prior to any enabling works;
- Utilities would be protected or diverted as required to allow construction to proceed; and
- Environmental and traffic management controls would be installed ahead of the commencement of civil works.

QR National has been in regular liaison with ARTC regarding HWC service connection and vehicle access to the site.

Construction Compound

A primary site construction compound is proposed to be established at the northern end of the site, and accessed from the site access road. It is anticipated that this compound will be shared with the ARTC HRR Project. The compound area is 29,450m^2 with a perimeter of 700m and is offset approximately 50m from Purgatory Creek.

The compound itself would be cleared and grubbed with a 300mm thick sub-base installed below a compacted 400mm thick road base. A security fence would be installed to the compound perimeter and the entry to the compound gated. Lighting would also be installed throughout the yard to provide security. There would be a collection of various temporary site buildings including offices, amenities and ablutions. Supporting the onsite accommodation, there would be an array of storage tanks, including wastewater, rainwater and diesel fuel (used to power the temporary genset). General storage would be provided for by a number of 40ft (approx. 12m x 2.5m) shipping containers, as well as a lay down area for the storage of any oversize items purchased direct by QR National, such as the railway turnouts.

A second compound is proposed to be established at the southern end of the site in close proximity to the majority of construction works in the south of the site. For further detail refer to the construction components drawing (Figure 12).

Civil Works

Civil works are the major construction component of the project. Due to the poor bearing capacity of the existing soils, a significant amount of engineered fill and potential subsoil treatment will be required. A typical cross section of the facility illustrating earthworks is shown in Figure 13 below. Overall the extent of cut and fill required for the proposed development generally ranges between plus and minus 1m from the existing site levels.

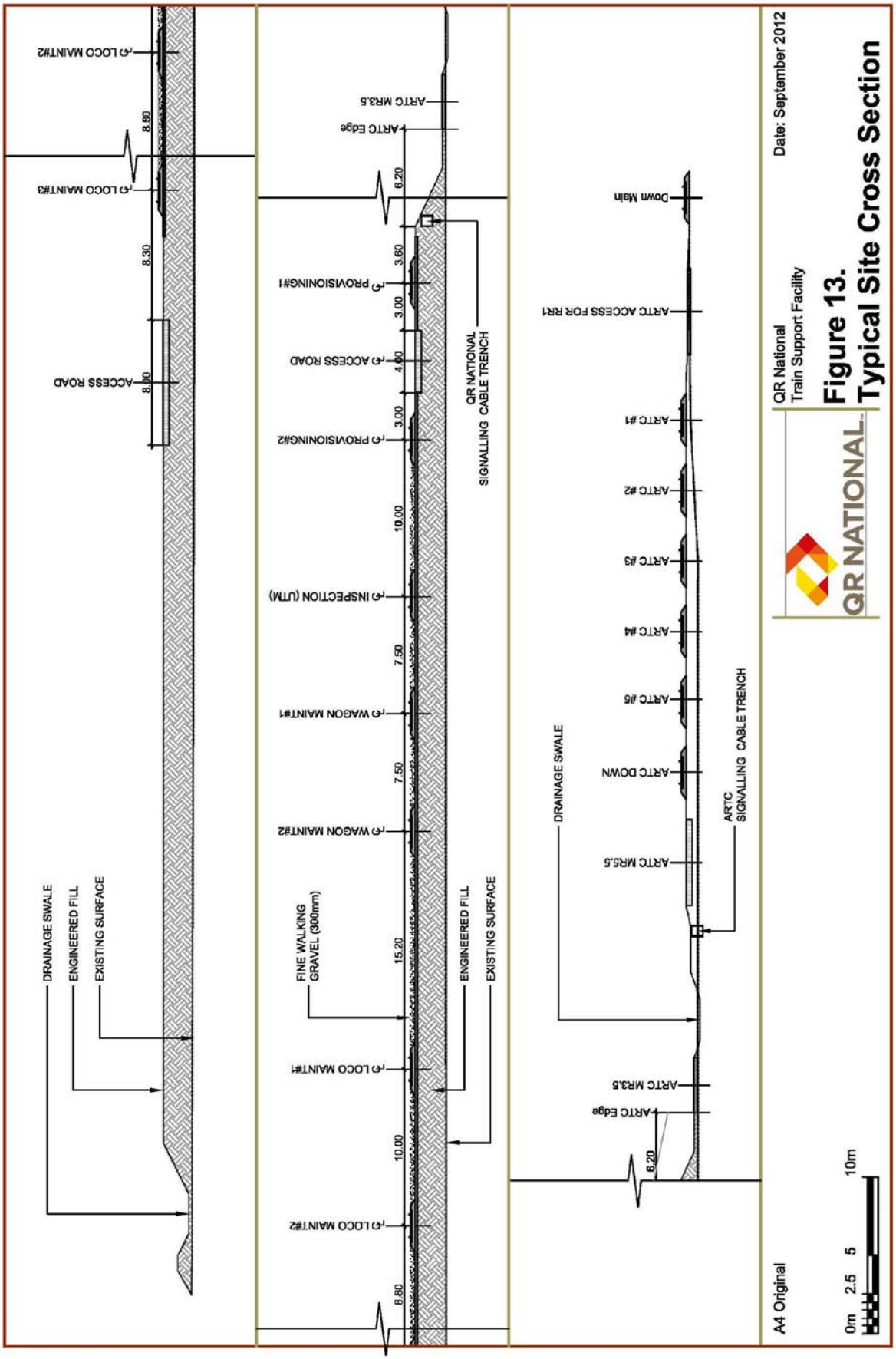


Figure 13: Typical Site Cross Section

It is estimated that approximately 180,000m^3 of engineered fill will be required to bring the site to required design levels and additional 30,000m^3 for the construction of the main access road. The final earthworks methodology will be determined by the Geotechnical Engineer in consultation with the design team, but there are a number of design alternatives to be considered to achieve the required loadings and long term serviceability.

At this stage it is envisaged that the imported material will be transported to site by truck and will be compacted in layers to achieve desired heights. An onsite stockpile will be developed to store excess material. The proposed stockpile location is to the west of the southern construction compound illustrated in Figure 12. Potential fill for the site is likely to be sourced from reputable quarries to the north and west of the site where suitable clean fill is available. The particular source of fill will be further investigated upon completion of the project design phase. Importing of material to the site has been assessed within the Traffic Impact Assessment contained within Appendix O.

Following the DP&I adequacy review, the TSF footprint has been revised and will have no impact on the coal tailings on the site and no coal tailings will be extracted/removed from the site as part of the proposed development (under the current proposal). An area has been identified for future investigations on the Project Components Plan (Figure 7), whereby, if suitable fill material is identified during investigations, it may be utilised on the site. If this strategy is to be implemented, details will be incorporated into the Preferred Project Report.

Drainage Structures such as culverts, drainage pits and pipes will be installed as part of the Civil Works. As there is limited elevation on the site for drainage grades, the larger of these structures will require additional foundation support such as ballast, earth rafts or timber mini piles, to avoid settlement.

All piling works associated with the buildings and track slabs for Stage 1 would be undertaken during a Civil Works phase of construction.

It is proposed to undertake all major civil works, compaction, engineered fill, drainage and services to the entire footprint of the site in one operation. As the site is linear in nature, greater efficiencies can be achieved in the excavation, hauling, placing and compaction operations. The approximate volume of earthworks for each material type is outlined in Table 6:

Table 6: Approximate Earthworks Volumes

Material	Approximate Volume (m^3)	Description
Import Select Fill	215,000	Import of fill and compacted to create a level site.
Ballast	30,500	Ballast would be placed on the compacted formation layer.
Import (Sandy) Loam	30,000	Wastewater disposal soak away.
Road Base	105,000	Granular material for formation of new road network.
Total	**380,500**	

Spoil Generation

Significant volumes of spoil are not expected to be generated by the project, if unsuitable materials require excavation and spoiling the material will be managed in accordance with the CEMP. Small quantities of contaminated materials may be removed from site for disposal to landfill as required. Contaminated spoil will be assessed and managed in accordance with the requirements of the RAP included in Appendix J.

Track & Signalling

Ballast would be sourced from quarries within the Hunter Valley. There is approximately 25km of rail, a portion of which is set into the concrete floor slabs of the proposed buildings. The remaining rail will be installed on approximately 17,900 precast concrete sleepers. Up to 21 new turnouts within the yard and two additional turnouts to connect with the Mainline will be installed as well as the new crossover at the city end to enable locomotives to leave the facility in the city direction.

The rail embankment will be constructed from fill brought to the site to create a level surface for the rail tracks at about 2.65m AHD. The width of the embankment varies over the proposed TSF footprint due to the track layout. The typical width of the embankment for the rail tracks ranges from 70m to a maximum of 150m.

Buildings

The Civil Works will provide the compacted formation, required earthworks levels and services. The construction of buildings may require deep foundation support for portal framed buildings and any proposed service pits within the locomotive and wagon maintenance buildings.

Demobilisation

Following the commissioning of the TSF, final works would be completed including, landscaping and installation of road pavements. As these works are completed the removal of the temporary construction facilities, including the site compound, fencing, signage and temporary environmental controls will be undertaken.

6.5.3 Construction Staff

Staff numbers are likely to range from between 10 to 75 during the construction phases of the project. Minimal staff would be present during the site establishment and pre-construction activities. The peak would be reached during Stage 1 of construction when the bulk earth works phase is underway. With bulk earthworks complete, the majority of track installed, road infrastructure complete and the wagon maintenance and provisioning buildings constructed, Stage 2, by comparison should represent a reduction in construction staff to approx. 50 people.

Work would be generally undertaken during standard construction work hours:

- 0700 to 1800 - Monday to Friday;
- 0800 to 1300 – Saturday;
- No work on Sundays or Public Holidays.

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

- Work undertaken during track possessions;
- Works undertaken by utility service providers; 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 relevant approvals for the project.

6.5.4 Construction Plant & Equipment

Table 7 below outlines the plant and equipment likely to be required for the various construction phases of the project.

Table 7: Construction Plant & Equipment

Plant / Equipment	Number	Application
Grader	2	Trimming & maintenance of access tracks, structural fill & capping layers.
30t Excavator	4	Loading trucks from stockpile area & digging of building foundations.
Bulldozer	2	Pushing / placing fill, structural fill & capping.
5t Excavator	2	Trenching for drainage and services.
Backhoe	1	Trenching & general works.
Elevated Work Platform	2	Installation of cladding to shed walls, roofs & high level services.
Bobcat	1	General site works.
Trucks	4	Hauling material.
Articulated Dump Truck	6	Hauling material.
Truck & dog	30+	Importation of structural fill, capping & ballast.
Water Cart	3	Dust suppression & compaction.
Franna Crane	2	Lifting precast culvert, turnouts & culverts.
Mobile Crane	1	Lifting railway turnouts & crossovers. Installation & lifting of structural steel frame.
Roller	4	Compaction of access track & formation material.
Concrete Trucks	4+	Delivery of concrete for culverts, foundations, ground floor slabs to buildings.
Tamper	1	Tamping of track ballast.
Regulator	1	Regulates & profiles ballast.
Front End Loader	2	Movement of material & loading.

6.5.5 *Construction Traffic & Access*

A number of access road options from the external road network for the construction of the project have been assessed. The preferred option involves the construction of an access road connecting to the existing Tarro Interchange.

The access road would be approximately 10m wide. The speed limit on this access road would be 40 km/h and will be unsealed during construction.

Construction of the access road and the new intersection off Tarro Interchange would take approximately three months to complete. During this time construction vehicles would enter the site via the New England Highway/Woodlands Close intersection under traffic control. Access would primarily be required for the purposes of construction of the new access road and intersection.

Following the construction of the access road, construction vehicles would access the site via the new intersection with the Tarro Interchange. Through traffic lanes would be provided in both directions at this intersection. The intersection on the Tarro Interchange would allow right-in, (left-in for light vehicles only) and left-out movements only, no right-out movement would be permitted at the intersection. 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, semi-trailers delivering construction plant and equipment, truck and dogs delivering quarry materials and mobile cranes. It is anticipated that fill will be sourced from local quarries.

The anticipated maximum number of light and heavy vehicles entering the construction site during different phases of construction is provided in Table 8.

Table 8: Anticipated Maximum Construction Traffic Volumes

Construction Traffic Type	Daily No. of Vehicles	Total Two-way Movement/day
Light Vehicles*	70	140
Heavy Vehicles**	120	240
Total Movements	190	380

* 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, capping and ballast).

Further details regarding traffic movements, potential impacts on surrounding land uses and mitigation measures are provided in Section 9.6 and potential impacts are addressed within Sections 9.14 and 9.15.

6.5.6 *Construction Water*

The majority of water to be used in the construction phase of the project will be for fill compaction and dust suppression. It is likely that the water supply would be obtained from HWC and be sourced from a suitable hydrant on or adjacent to the project area. If this is the case, no licence

would be required for the supply of water. Further investigation is being undertaken exploring the viability of water sources on and adjacent to site as a possible supplementary source of water. If this proves to be viable, the appropriate licence for the extraction of water would be obtained from the NSW Office of Water.

6.5.7 Construction Environmental Management Plan (CEMP)

A CEMP will be established based on the mitigation and management measures in the EA and the DP&I conditions of approval. The CEMP provides the framework for the management of all potential environmental impacts resulting from construction activities. The CEMP will outline the environmental mitigation measures to be implemented during the construction phase and will document mechanisms for ensuring compliance with the conditions of approval.

The CEMP will set out the auditing and inspection frameworks for the site (in coordination with ARTC) and will 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.

6.6 Hexham Relief Roads Project

ARTC proposes to develop the HRR Project adjacent to the TSF at Hexham. The HRR Project comprises five Up relief roads (train lines) to the west of the existing Up Main, Down Main and Up Coal.

Key components of the HRR Project are:

- 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 HRR;
- The construction of a new Down Coal to the west and outside of the proposed HRR;
- 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; and
- Vehicular tracks, land acquisition and upgrading of existing rail infrastructure and public utilities.

The HRR Project has been submitted to the DP&I and is currently being assessed.