Preferred Project Report and Response to Submissions

Project Application (MP07_0171)

Maitland Road, Hexham, PPR

NSW Train Support Facility

Submitted to NSW Department of Planning and Infrastructure
On Behalf of Aurizon Operations Limited (formerly QR National Limited)

Volume 1 of 2

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JBA Urban Planning Consultants Pty Ltd ABN 84 060 735 104 w jbaplanning.com.au
North Sydney t +61 2 9956 6962 ■ Wollongong t +61 2 4254 1025 ■ Newcastle t +61 2 4927 0980

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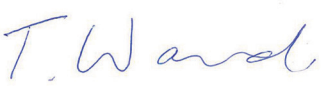
This report has been prepared by: Tim Ward



Date 28/06/13

This report has been reviewed by: Gordon Kirkby

Date 28/06/13

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1.0 Introduction

An Environmental Assessment Report (EAR) in support of a Project Application (MP07_0171) for the Aurizon Train Support Facility, at Hexham, was publicly exhibited for a period of one month from 21 November 2012 to 21 December 2012.

In total 30 submissions were received in response to the public exhibition of the Project Application. Of these:

- Ten were from Government agencies (including two submissions from Newcastle City Council and two from the Office of Environment and Heritage);
- Eight were from industry organisations or corporations;
- Five were from local community interest groups and organisations; and
- Five were from members of the general public.

The key issues identified in these submissions generally fell within the following categories:

- Cumulative impacts of the Aurizon and Hexham Relief Roads;
- Flooding;
- Ecological impacts;
- Traffic management;
- Noise;
- Air pollution;
- Site suitability; and
- Economic benefits and improvement of Newcastle Port operations;

The proponent Aurizon Operations Ltd (formerly known as QR Limited, trading as QR National) and its consultants have reviewed and considered the Department's comments and submissions received regarding the EAR and, in accordance with clause 75H(6) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), has prepared a Response to Submissions and Preferred Project Report (PPR).

The PPR sets out the proponent's response to the issues raised during the exhibition period, describes modifications made to the proposal (the Preferred Project), provides further environmental assessment and provides a revised Statement of Commitments for which development approval is now sought.

This report should be read in conjunction with the Environmental Assessment Report (EAR) prepared by ADW Johnson dated 15 November 2012 and accompanying documentation.

1.1 Project Background

1.1.1 Environmental Assessment Report

Section 6.0 of the EAR dated 15 November 2012 described in full the details of the Project Application, which are summarised in the EAR as follows:

- **Construction** – generally comprising:
  - construction of new connections to the main line;
  - construction of 10 new train lines (tracks) parallel to the existing Mainline to accommodate Aurizon trains for provisioning, inspections, servicing and maintenance;
  - buildings for the provisioning of Aurizon locomotives and the maintenance of rolling stock;
  - a bulk fuel storage area with capacity for up to 400,000L of diesel fuel;
  - construction of a vehicular intersection and a new access road from the Tarro Interchange;
  - civil earthworks with approximately 380,000m^3 of imported 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.
- **Operation** – Use of the facility for train provisioning and servicing, wagon servicing and maintenance and locomotive servicing and maintenance, generally comprising:
  - Statutory and routine maintenance inspections for Aurizon trains;
  - Attaching/detaching locomotives and wagons to and from Aurizon trains;
  - Provisioning of locomotives with fuel, oil, water and sand ,
  - Inspection, servicing and maintenance of locomotives;
  - Inspection, servicing and maintenance of wagons;
  - Stabling of wagons and locomotives; and
  - Storage of spare parts for locomotives and wagons.

The EAR also included a detailed site analysis, assessment of alternative sites and environmental assessment addressing the environmental, social and economic impacts of the proposed development.

Amendments to the project description arising from further design development and the response to submissions are detailed in the description of the Preferred Project at **Section 3.0** of this report.

1.1.2 Hexham Relief Roads

A Project Application (SSI_4992) was lodged with the NSW Department of Planning and Infrastructure (DP&I) in August 2012 for the development of five rail relief roads immediately to the east of the Aurizon site with access to the main line. This Project Application was publicly exhibited between 8 August 2012 and 10 September 2012.

Aurizon has consulted closely with the relief roads proponent, Australian Rail Track Corporation (ARTC), in the preparation of the PPR for the Aurizon Train Support Facility in order to address cumulative impacts of the two projects, in particular in relation to flooding issues.

1.2 Structure of the Report

The first part of this PPR provides a summary of the key issues raised by the DP&I and other Government agencies, industry organisations, local interest organisations and the general public (**Section 2.0**).

The following part of the report describes the Preferred Project, which has been developed by Aurizon to further address the environmental impacts of the proposed infrastructure development (**Section 3.0**).

Section 4.0 includes further environmental assessment of the Preferred Project, particularly with regard to the issues identified in the submissions. This environmental assessment informs the Final Statement of Commitments which are included at **Section 5.0**.

2.0 Summary of Submissions

The following section provides a summary of the key issues raised by government agencies, community interest groups, industry bodies and private companies, and members of the general public. A detailed summary and response to submissions made by government agencies is included at **Appendix A**, whilst a summary and response to all other submissions is included at **Appendix B**.

The proponent has been involved in ongoing discussions with Newcastle City Council, the DP&I and other government agencies throughout the course of the current Project Application. Eight submissions were received from government agencies during the public exhibition period, including:

- Newcastle City Council (NCC);
- Office of Environment and Heritage (OEH);
- Department of Primary Industries (DPI);
- Roads and Maritime Services (RMS);
- Environment Protection Agency;
- NSW Heritage Council; and
- Hunter-Central Rivers Catchment Management Authority (CMA).

2.1 Overview

The key issues raised by a number of agencies as well as members of the community related to flooding and ecology.

2.2 Flooding

Issues with the potential flooding impacts of the proposed development, and cumulative flooding impacts as a result of the adjoining ARTC proposal, were identified in a number of submissions from government agencies, community interest groups and neighbouring landowners.

A number of submissions, including those from OEH, DPI and NCC, identified issues with the impact of the proposed development on flood conditions within the site and surrounds. These flood impacts related largely to flood impacts on adjoining properties in Hexham to the east and on habitat within the Hexham Swamp to the west.

Issues raised in the submissions relating to flooding can be categorised into two overarching themes, being:

- Impact of earthworks and site filling for both the Aurizon TSF and the Hexham Relief Roads projects on flood levels and velocities within the Hunter River floodplain. These issues relate to flooding within the subject site, neighbouring properties and within the Hexham Swamp. The EAR for the TSF indicated that the proposed development would result in increased flood levels.
- Potential impacts of stormwater runoff and flooding from the TSF on local water quality and ecosystems.

Submissions relating to the first issue requested further design changes in order to minimise the impact of the proposed development on floodwaters across the Hunter River floodplain.

In general, submissions stated that the proposed development should not result in increased flood levels or velocities within adjoining sites. OEH and NCC both requested that flood modelling be revised and augmented to identify full impacts upon surrounding properties, and that design changes be made to reduce the overall flood impact.

Submissions relating to the second issue related to the potential for flooding during both the construction and operational phases to transport potential pollutants from the subject site and into adjoining sensitive ecological areas, including the Hexham Swamp.

Further environmental assessment of flooding with respect to the issues raised in the submissions, and with regard to the Preferred Project, is included at **Section 4** of this report. Specific issues identified in the agency and community submissions are addressed at **Appendices A** and **B** respectively.

2.3 Ecological

Submissions relating to the ecological impact generally fell within the following three categories:

- impact on Hexham Swamp;
- details of BioBanking offset arrangements; and
- impact of the proposal on the Watagan to Stockton Green Corridor;

The NSW Office of Environment and Heritage was generally satisfied with the information provided within the EAR regarding the ecological impacts of the proposed development. OEH did, however, request clarification of flora survey methodologies and additional clarification of the credits utilised in BioBanking calculations. Discussions between the proponent and OEH have since been commenced with regards to the proposed offset areas and credit calculation.

Several submissions, including Council's, raised concerns relating to potential water quality and other impacts upon flora and fauna.

2.4 Other issues raised by Government Agencies

2.4.1 Office of Environment and Heritage and NSW Heritage Council Submissions

Issues raised by OEH in regard to flooding and ecological issues are included in **Section 2.2** and **2.3** respectively and are addressed in **Section 4.0** of this report and in detail at **Appendix A**. In addition to these key issues, OEH's submission included comments on stormwater management, aboriginal cultural heritage and the interface with the adjoining Hunter Wetlands National Park (Hexham Swamp).

OEH's submission dated 21 December 2013 sought clarification of the results of further archaeological investigations of potential archaeological deposits (PADs) identified as Aboriginal sites to quantify the impact of the proposed access arrangements. The NSW Heritage Council submission found that the potential archaeological impacts of the proposed development could be appropriately managed through the final Statement of Commitments. The OEH submission also requested further information regarding the details and outcomes of further consultation with local Aboriginal stakeholder groups.

The NPWS comments within the OEH submission dated 21 December 2013 noted that the final development should give consideration to the restoration of flood flows to Middle Creek and ensure that access is maintained to the future Richmond Vale rail corridor.

The OEH submission dated 21 December 2013 raised issues relating to the level of design documentation and the adequacy of details provided in the submitted documentation.

OEH provided a further submission on 10 May 2013 that requested further clarification of project detail and issues relating to flooding, ecology, water quality and Aboriginal heritage.

The MUSIC modelling parameter information requested by OEH is provided at **Appendix O**.

The issues raised in these submissions are addressed in full at **Appendix A** and are reflected in the further environmental assessment of the Preferred Project at **Section 4**.

2.4.2 Department of Primary Industries Submissions

The Department of Primary Industries' submission (comprising Fisheries NSW and NSW Office of Water submissions) addressed ecological and flooding issues.

Fisheries NSW noted that the impact on SEPP14 wetlands would largely affect only impacted landscapes, and that there would be benefits to the proposed offset wetlands and saltmarsh as a result of the required management regimes.

The NSW Office of Water (NOW) made comments regarding surface water and groundwater impacts and generally identified design standards for riparian and stormwater management zones and included details of ongoing environmental management required following project approval.

The DPI submission raised issues relating to the level of design and the adequacy of details provided in the submitted documentation.

The issues raised in this submission is addressed in full at **Appendix A**, and reflected in the further environmental assessment of the Preferred Project at **Section 4**.

2.4.3 Newcastle City Council Submission

A detailed summary and response to the issues raised in Newcastle City Council's submissions is included at **Appendix A**. In addition to issues relating to flooding and ecology, which are addressed briefly above and in detail at **Section 4.0**, Council raised issues relating to noise emissions

In its submission dated 20 December 2012, Council requested additional discussion of the proposal's consistency with local environmental planning instruments and policies including permissibility under the *Newcastle Local Environmental Plan 2012* and the requirement for development contributions under the *Newcastle Section 94A Contributions Plan 2009*. The proponent has subsequently commenced discussions with Council regarding the need for a voluntary planning agreement (VPA).

Council also raised concerns that the proposed development would result in an increase in train movements along the main line and hence increase noise and vibration impacts on properties in the vicinity of the rail corridor.

Council noted constraints on the provision of appropriate sewage disposal within the subject site given the location of the site within the Hunter River floodplain and proximity to the Hexham Swamp, and requested that details of the proposed wastewater treatment be provided and assessed at the Project Application stage.

Council's submission of 20 December 2012 raised issues relating to the level of design documentation and the adequacy of details provided in the submitted documentation.

Council provided a further submission dated 15 May 2013 recommending the provision of clarification, additional detail or alternate design responses in regard to site remediation, sewerage, flooding, stormwater management, traffic, development contributions and design details.

The issues raised in both submissions are addressed in full at **Appendix A**, and reflected in the further environmental assessment of the Preferred Project at **Section 4.0**.

2.4.4 RMS

Aurizon and ARTC have been involved in ongoing consultation with RMS to negotiate both short-term construction vehicle access and long-term operational vehicle access from the New England Highway.

RMS's submission indicates that RMS is willing to support access to the site for up to 12 weeks from the New England Highway to Woodlands Close to permit the construction of the Tarro Interchange, subject to the preparation of a Construction Traffic Management Plan and a Traffic Control Plan. The RMS submission also includes further design recommendations and conditions for the construction of a long-term shared vehicular access for the Aurizon TSF and the ARTC site via the Tarro Interchange located to the north-west.

2.4.5 CMA

The Hunter-Central Rivers Catchment Management Authority raised issues relating to the clearing and offsetting of native vegetation and SEPP 14 wetlands, potential soil and groundwater contamination impacts, and flooding and stormwater issues. The matters are addressed at **Appendix B** and reflected in the further environmental assessment of the Preferred Project at **Section 4**.

2.4.6 Community Interest Group, Industry Groups, Business and General Public Submissions

In total, nine private submissions supported the proposed development, whilst 11 submissions objected. Key issues raised in private submissions were categorised into the following issues:

- flooding;
- ecology;
- traffic;
- noise and vibration;
- air pollution;
- economic benefits and impacts;
- impact on Newcastle Port operations;
- cumulative impacts;
- community consultation process; and
- land use and site suitability.

The matters raised in these submissions are addressed at **Appendix B** and reflected in the further environmental assessment of the Preferred Project at **Section 4**.

3.0 Preferred Project

In response to the issues raised in submissions and further design refinement since the Environmental Assessment Report was submitted and exhibited Aurizon has made a number of changes to the Hexham Train Support Facility.

3.1 Description of Preferred Project

Taking into account of the changes made to the design of the Hexham TSF, the project for which approval is now being sought includes the following (except where described differently below, or in Section 3.2.3, the buildings and structures will be generally as described in Section 4 of the EAR):

- Construction of new connections to the Great Northern Railway;
- Construction of seven new train lines (tracks) parallel to the existing Mainline to provide for provisioning, inspections, servicing and maintenance of Aurizon trains, as well as a Shunt Neck at the northern part of the facility providing in total 10.5km of railway track;
- A Provisioning Building generally as described in Section 6.4.2 of the EAR to provide provisioning, inspections and unscheduled rolling stock maintenance on a 24 hour, 7 days per week basis. Provisioning includes replenishing locomotives with fuel, sand, water, oil and other consumables as well as general cleaning and cab preparation;
- A Combined Maintenance Building located generally where the Wagon Maintenance Building was originally proposed in the EAR. The Combined Wagon Maintenance Building would generally be operated between 06:00 and 22:00 hours weekdays – however, with hours of operation driven by demand this could increase to a 7 day per week operation when and if required and approval is being sought for 7 day per week maintenance operations;
- The Combined Maintenance Building would include the TSF's main administration centre;
- A Service Vehicle Garage, car park, truck unloading and wheel set storage area located within the internal road turning loop, adjacent to the Combined Maintenance Building and Administration Centre. Car parking will be provided for up to 50 cars and light vehicles in the main car park, with a five space carpark also located near to the provisioning building for occasional parking of vehicles;
- A bulk fuel storage area with capacity for up to 630,000L of diesel fuel in seven 90,000 litre above ground, self-bunded fuel storage tanks. Bulk storage of sand would be located adjacent to the fuel storage area;
- At the completion of construction the facility will have a maximum of 30 personnel on-site over a 24-hour period;
- Construction of an intersection and a new access road from the Tarro Interchange;
- Construction of internal access roads comprising of sealed single carriage way road;
- The protection or diversion of existing utilities, and connection of the site to utilities for construction and operation. **Appendix C** includes an indicative plan of utility connections that are likely to be required;
- Permanent stockpiling of up to approximately 150,000m^3 of Potential Acid Sulfate Soils or acid generating materials. Areas where PASS are proposed to be stockpiled are shown in Sketch 80 in **Appendix C**; and

- Installation of a package Waste Water Treatment Plant with on-site effluent irrigation to be located within the internal road turning loop, adjacent to the Combined Maintenance Building and Administration Centre.

The estimated cost of the project is $126m and is planned to be constructed continuously over approximately 18 months. It is planned to commence provisioning of locomotives once the Provisioning Building and associated rail infrastructure has been constructed and commissioned. Provisioning would be carried out whilst construction of the maintenance facilities and associated railway track infrastructure is being constructed.

The building and track layout is identified within **Figure 1**. Detailed preliminary drawings, plans and figures of the proposed TSF are contained within **Appendix C**.

3.2 Key Changes to Exhibited Project Application

3.2.1 Vertical Alignment (Lowering the Tracks)

The revised design includes a 'lowering' of the project area landform for an 800m section to the east of the Brancourts wastewater treatment. The purpose of this design change is to reduce and mitigate adverse off site flood impacts as discussed further in Section 4 of this PPR.

The EA design included the development of an embankment to create a formation level for the site railway tracks to be up to 2.5m above natural ground surface, being 3.25m AHD.

The revised design includes removing the embankment for a section of railway track and lowering the landform in this location to prevent the flood obstruction that the embankment was creating. The modified vertical alignment of the railway tracks comprises four sections:

- A falling grade of 1% between chainage 175.700km and 175.860km to lower the track to a rail level of 1.97m rail in the floodway;
- A level grade at RL 1.97m in the floodway between 175.860km and 176.160km;
- At the northern end of the floodway a rising grade of 1% to a rail level of 2.03m at the Provisioning Building. The track through the Provisioning Building is then level for the length of the building and;
- A rising grade of 0.170% to join the previous vertical alignment in the vicinity of 176.720km.

This is shown in detail in the design plans provided at **Appendix C** and is shown schematically in **Figure 2**. The vertical alignment outside of the area mentioned above remains as shown in the EAR. It is highlighted that even in the areas where the track is lowered, the top of the rail formation (i.e. the level of railway track) will still be above the existing natural ground level, generally by at least 1m.

3.2.2 Horizontal Alignment

A number of changes have been made to the horizontal tracks layout, generally to reflect the revised building layout and internal site road layouts as described below:

- The mainline cross-over at the southern end of the TSF has been removed.

- The shunt-neck has been relocated to take into account the internal site access road and third-party access road.
- The turntable has been removed.

The general arrangement of site is shown in **Figure 1**.

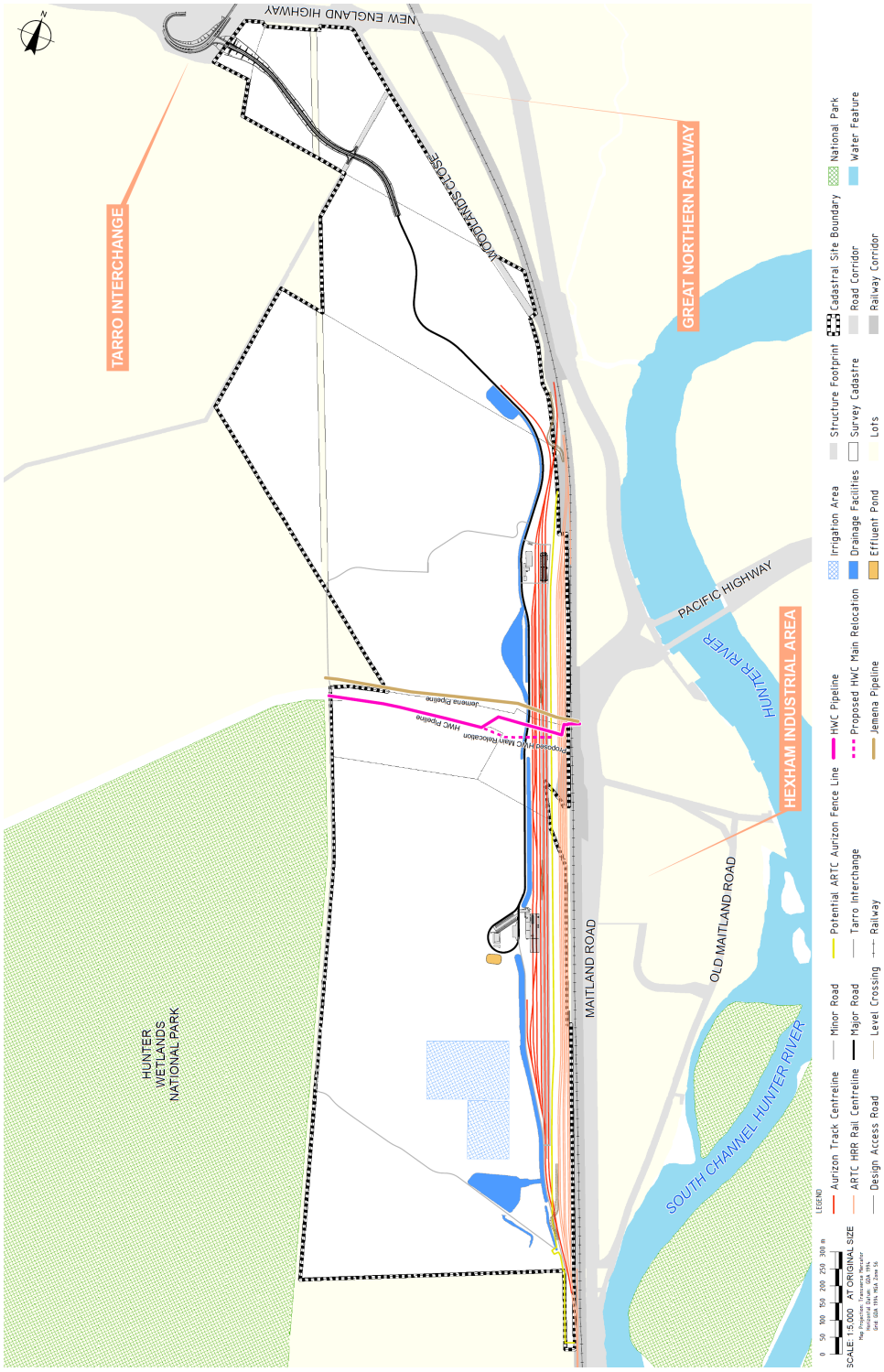

Figure 1 – General Layout of Hexham Train Support Facility

(Source: GHD, refer **Appendix C** for detail)

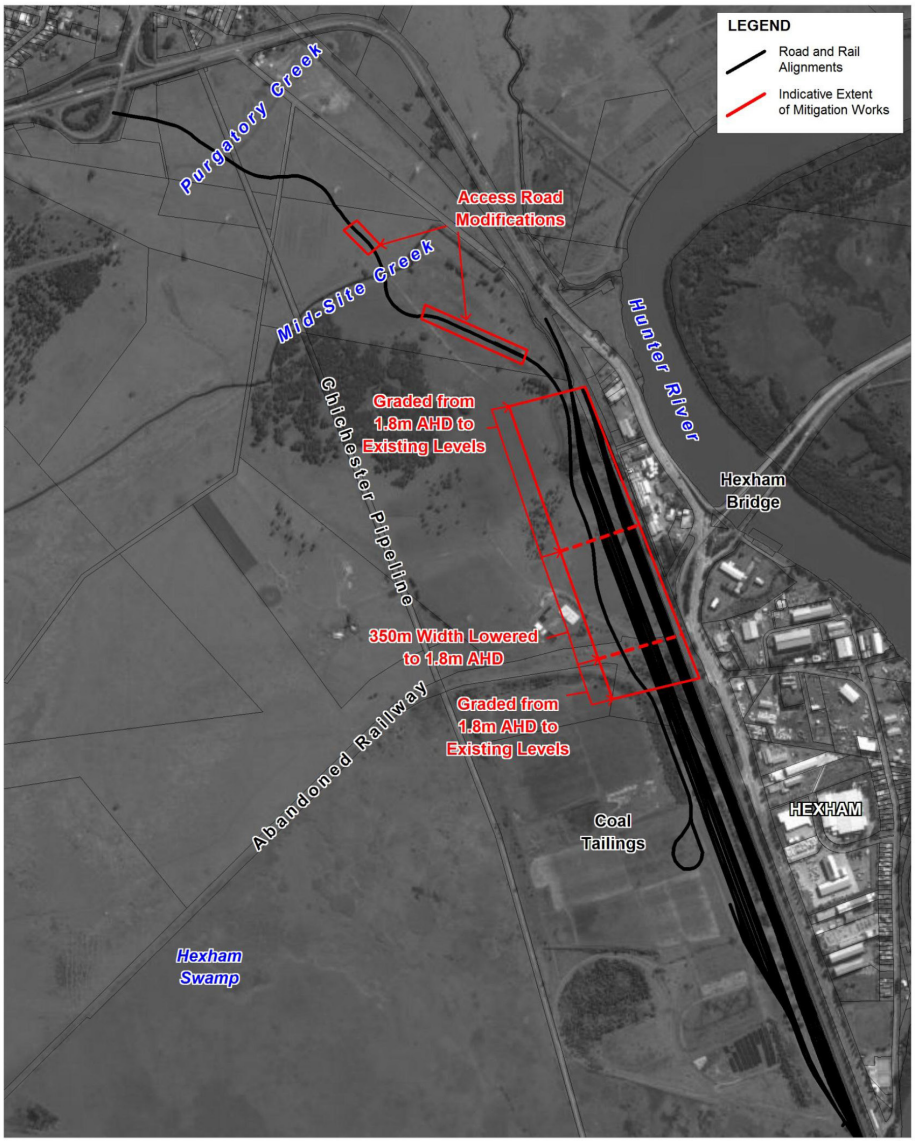

Figure 2 – Extent of Track Lowering

(Source: BMT WBM, refer **Appendix D** for detail)

3.2.3 Railway Formation and Drainage System

The formation for the rail tracks varies across the site, depending on the ground conditions and track levels. The railway formation generally comprises low permeability capping and sub-capping over a permeable drainage blanket. In the southern part of the site, the overall thickness of these formations is 1.03 m and 0.75 m. Ballast and road pavement are then constructed over the formation level. The primary drainage system in these areas is a network of subsoil drain and surface collection pits routed to a drainage channel to the west of the tracks. The subsoil drains are proposed to be installed in trenches containing permeable backfill. The invert level of these drains will vary and may typically sit within the formation level or be cut into the underlying ground surface.

In the northern part of the site, the thickness of the overall formation varies from 1.05 m to 1.15m. The formation in this location is cut into the ground surface, which on the northern sections of the site is a generally natural clay soil. In this part of the site the water is proposed to infiltrate the permeable capping and flow above the low permeability clay subgrade to the adjacent open channel.

Where required (for example in the vicinity of the Combined Maintenance Facility and the Provisioning Facility) Concrete Injected Columns (CIC) ground improvement is proposed with geo-grid reinforcement to spread load across the cast in-situ CIC.

The location of the water control basins has been modified as part of the overall changes to the layout of the development, as shown in **Figure 1**.

3.2.4 Building and Structures

A number of buildings and structures at the site have been relocated – in part to take into account the need to remove structures from the floodway facilitated by the removal of the embankment and the lowered section of track, and in part to accommodate further refinement of the design. In particular, a number of buildings and structures were located in what is now designed to be the floodway – including the Fuel Farm, the Locomotive Maintenance Building, the Service Vehicle Garage and Carpark, and the internal road turning loop. These buildings and structures have been modified and are discussed below.

The Light Provisioning Facility and Wheel Lathe, as described in Section 6 of the EAR, have been removed from the project.

Provisioning Building and Fuel Farm

The Provisioning Building will be located in the same general location as originally proposed, and will carry out the same activities as originally proposed. The Provisioning Building will be approximately 9m high, with a floor area of approximately 1,310m^2. The external finish will be a metal roof colourbond sheeting, with pre-cast walls and translucent wall sheeting.

The building will include a rain water harvesting system to harvest water from the downpipes and stored in aboveground rainwater tanks, to supplement the potable water system. The tank capacities will be based on storing one month's average rainfall, assuming a capture rate of approximately 80% with the first 20% to discharge as a first flush. In the event of excess water discharging from the rainwater harvesting tank/s, the excess will overflow to the civil stormwater system, prior to discharge off-site.

Fuel farm has been relocated and the storage capacity of diesel has been increased from 400,000L to 630,000L, provided by seven self-bunded above ground horizontal storage tanks, each with a capacity of 90,000L.

The oil storage area will consist of self-bunded tanks of approximately 20,000L capacity in total.

The bulk sand storage area will consist of one 60 tonne (37.5 m^3) above ground vertical storage silo, with allowance for a second silo, for a total onsite bulk sand capacity of 120 tonnes. The sand storage and reticulation systems will comply with applicable Australian Standards.

The design of the provisioning facilities has progressed, and **Figure 3** shows the general arrangement of the provisioning and bulk fuel storage facilities. (Note: **Figure 3** indicates up to 1,000,000L of fuel storage, however only 630,000L is subject of the current application – any future expansion of bulk fuel storage capacity would be subject of a future application).

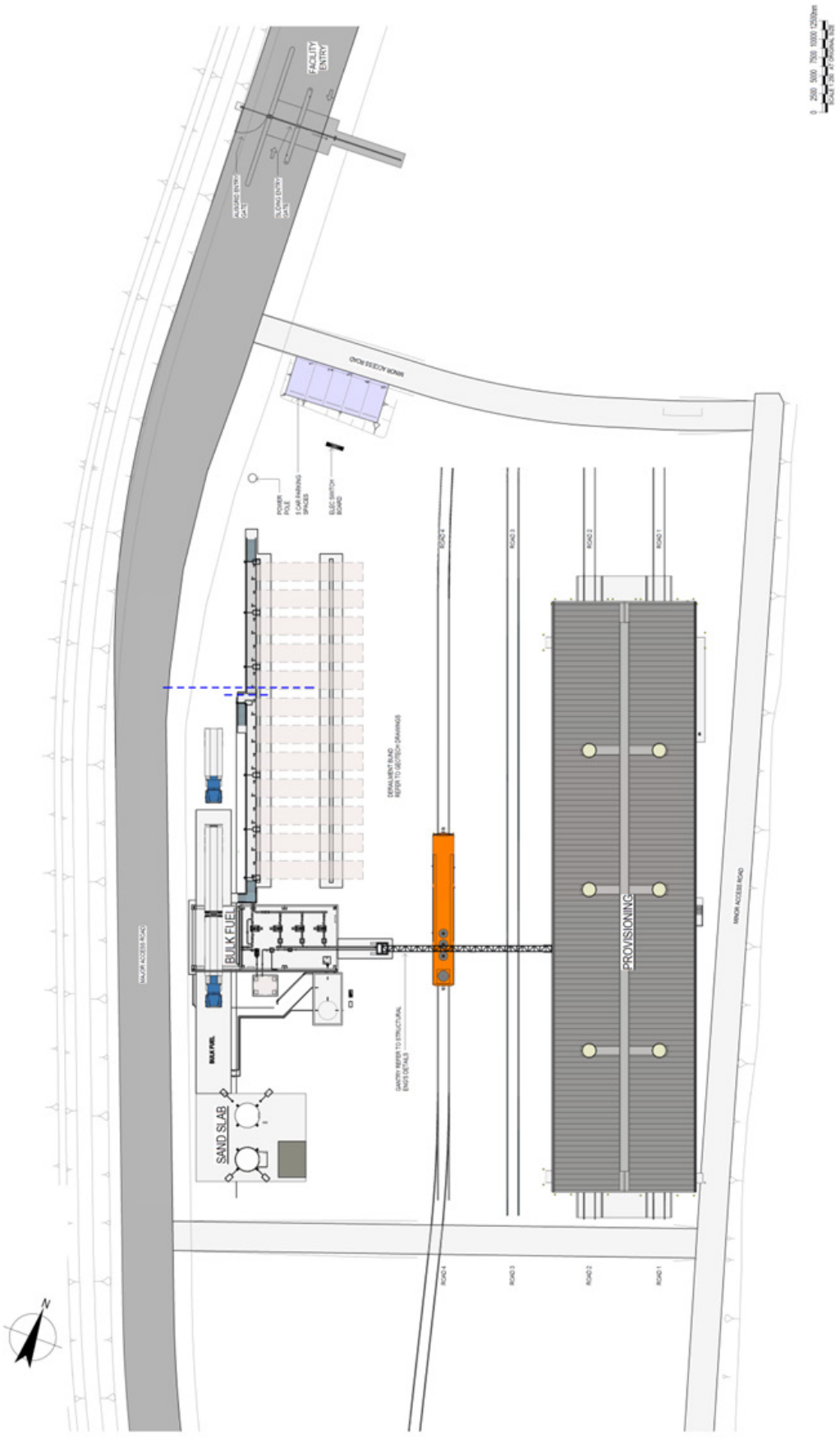

Figure 3 – General Arrangement of Provisioning Facility

(Source: GHD, refer **Appendix C** for detail)

Maintenance Buildings

The Locomotive Maintenance Building has been removed and the Wagon Maintenance Building has been modified.

Locomotive maintenance activities would take place into a modified Wagon Maintenance Building – which is now referred to as the Combined Maintenance Building. The Combined Maintenance Facility will be approximately 15m high with a floor area of approximately 2,750m^2, with similar roof and wall finishing as for the Provisioning Building.

The Administration Building will remain adjacent to the Combined Maintenance Building. The Administration Building will include amenities, office, office store room, communications room, yard controllers room, superintendents room, meeting rooms and the like. This building will have a floor space of approximately 250m^2.

The general arrangement of the maintenance building and administration centre is shown in **Figure 4**.

Service Vehicle Garage

The Service Vehicle Garage has been relocated to the new internal access road turning loop located adjacent to the Combined Maintenance Building and Administration Centre. The Service Vehicle Garage will house all the support vehicles required on this TSF. It will be approximately 7m high with a floor area of approximately 288m^2. It will be finished in metal sheeting.

The general arrangement of the service vehicle garage and car park is shown in **Figure 5**.

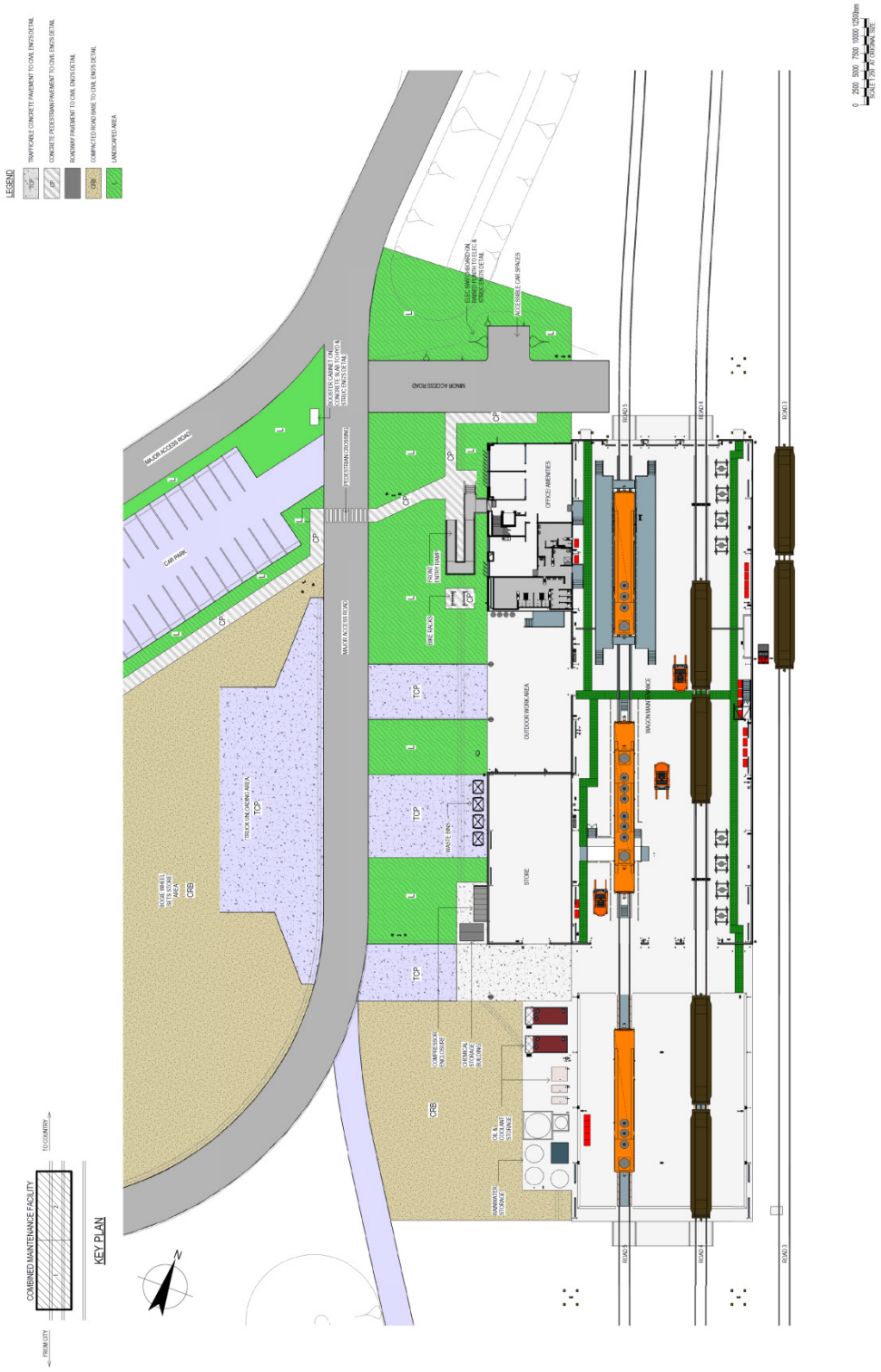

Figure 4 – General Arrangement of Combined Maintenance Facility

(Source: GHD, refer **Appendix C** for detail)

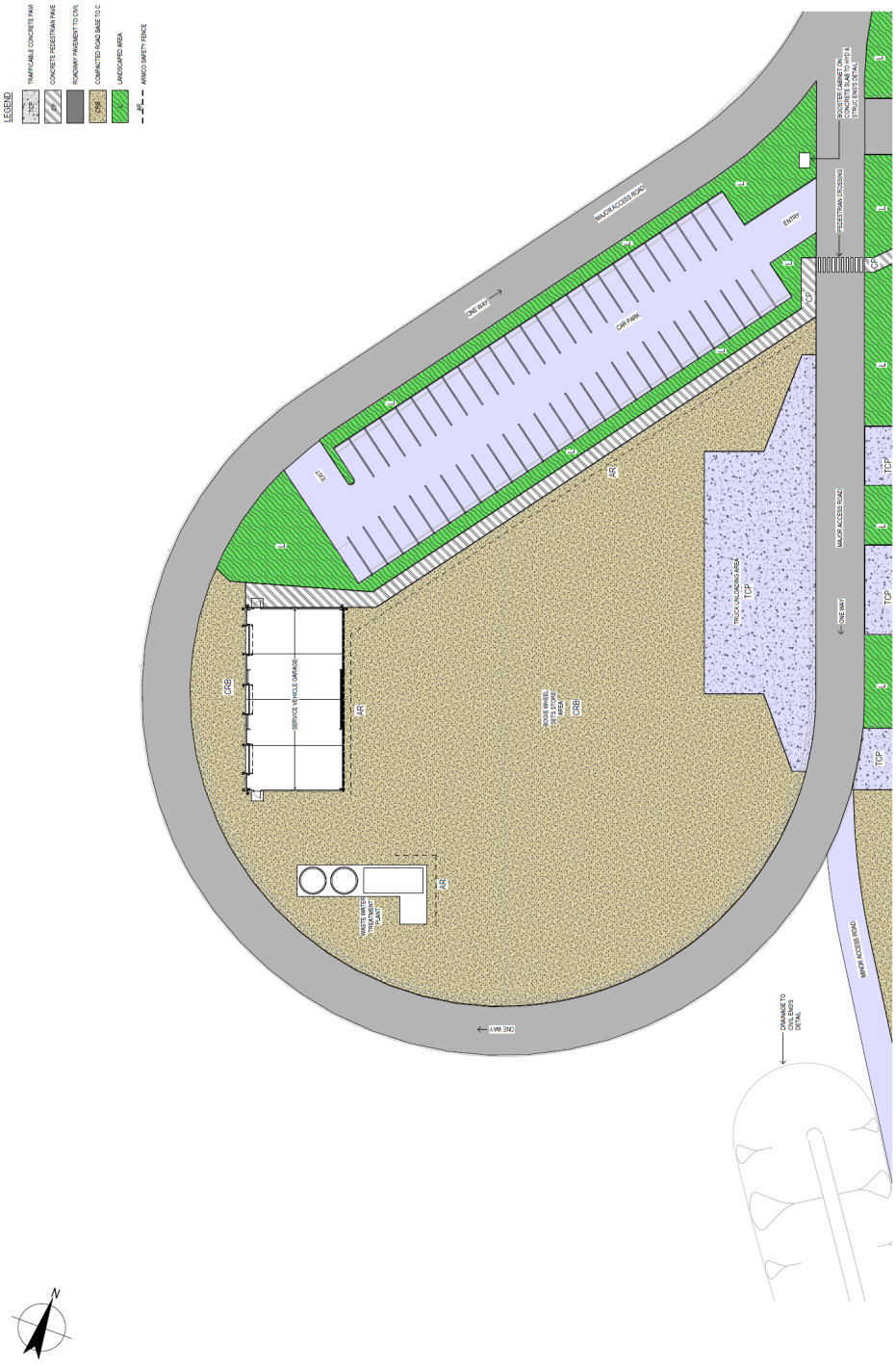

Figure 5 – General Arrangement of Access Road Turning Loop, Car Park and Wastewater Treatment Plant

(Source: GHD)

3.2.5 Tarro Access and Internal Access Roads

Tarro Interchange Intersection and Access Road

The design of the access road connecting in to a new intersection on the existing Tarro Interchange has been modified to accommodate the outcomes of the Flood Report (See **Appendix C**). Specifically, the vertical alignment of the access road has been modified to ensure it is not cut in a flood event where the main rail line remains open, but that it provides for adequate conveyance so that flood water level increases on adjacent properties are minimised.

A road bridge will be constructed over Middle Creek. The bridge will maintain the minimum lane widths, however the shoulders are to be reduced from 2m each side to 1m to reduce the cost of the bridge. To reduce the bridge cost, the road has been aligned to create a perpendicular crossing of the creek. To achieve this slight bend in the road has been included on each of the approaches.

Internal Site Access Road and Turning Loop

The internal road is located adjacent to the drainage channel for the majority of its length and is situated on the overall site pad. In this regard the pad is flat and as such, the longitudinal grade of the road is also flat.

The removal of the Locomotive Maintenance Building and the Fuel Farm, has led to a revised internal access road design. The access road has been moved to the east to take into account the relocation of the Fuel Farm, the Service Vehicle Garage and the Carpark and the removal of the Locomotive Maintenance Building.

The turning loop has been relocated to the southern extent of the road adjacent to the Combined Maintenance Building and Administration Building. The Service Vehicle Garage, car park, truck unloading, wheel set storage area and wastewater treatment plant will be located within the internal road turning loop.

Third Party Access

Existing road access to adjoining land holders must be maintained for one property located immediately to the west of the site.

Access to Lot 302 DP 583724 located at the southern end of the facility is the responsibility of ARTC. However, the Aurizon site includes a proposed easement to permit ARTC to provide access to Lot 302 DP 583724 through the Aurizon site.

The new third party access road will connect to the existing third party access road off Woodlands Close just to the north of the Bulk Fuel Storage area, as well as connecting to the new internal site access road for the facility in a similar location. From this connection, the new third party access road would traverse the site to the west, connecting to the existing third party access road which carries on to the western boundary of the site and beyond.

Shortly after the third part access take-off, the internal site access road will have a security gate to control access into the site.

The road access provided is 4m wide and shall be constructed to a similar standard as the site's internal access road, with the exception that it shall not be paved as the existing access is not paved.

The location of third party access arrangements that will be provided are shown in **Figure 1**.

3.3 Revised Construction Details

The revised project design has resulted in a review and amendment of the proposed approach to construction. The driving force behind the need to change the approach to construction has been from the need to lower the tracks to address off-site flooding impacts predicted in the EAR. This design change requires a substantial increase in the amount of excavation required for the project, resulting in implications for the storage, handling and management of excavated materials, including Potential Acid Sulfate Soils.

A revised description of the proposed approach to construction is described below.

3.3.1 Construction Program and Phasing

Construction of the TSF is expected to be undertaken in a single stage. However, this will be dependent on the contractor's construction methodology and Aurizon's operational requirements.

Whilst the construction period is expected to be continuous, the facility is likely to commence operations in a sequential manner. The phases of construction will be as follows:

Stage 1

- Tarro Interchange, site access road and internal access roads;
- Demolition of structures (including the dairy ruins; the control cabin and bath house; remnant trackwork; the coal preparation plant footings; and conveyor support footings);
- Remediation in accordance with the Remediation Action Plan.
- Civil work (including bulk earthworks, excavations and roads);
- Mainline connections and crossover;
- Bulk Fuel Storage;
- Provisioning facility;
- Related railway tracks including the locomotive turntable.

Stage 2

- Maintenance (Wagon and Locomotive) and Administration building;
- Car Parking and landscaping around the Administration building;
- Sewage management system (including establishment of irrigation area);
- Railways tracks related to maintenance facility; and
- Locomotive wash building.

At the completion of Stage 1 works Aurizon will commence refuelling activities for trains. Stage 2 construction works will continue during this time. Once the Stage 2 works are complete, the facility will commence full maintenance operations as described in the EAR.

During the Stage 2 construction works, the on-site workforce required for provisioning will be minimal. Services for on-site operational staff may be the same as for the construction workers – that is port-a-loos may be provided and the waste removed by specialist contractor if the wastewater system is not fully operational by that time.

Construction Stage 1 will be delivered by August 2014. Delivery of Stage 2 will carry on continuously from the Stage 1 construction works, and is expected to be complete in December 2014.

The construction program and staging has changed from that described in Section 6 of the EAR in that:

- Aurizon need to be able to provide provisioning (i.e. refuelling) for trains as soon as possible, so the construction methodology has been modified to ensure train provisioning can commence at the earliest possible time.
- Aurizon has committed to providing the facilities for locomotive maintenance as the same time as the wagon maintenance facilities and so removing the need to defer the construction of these locomotive maintenance facilities to a subsequent construction stage. This has also resulted in a modified design for the facility with the amalgamation of the wagon maintenance facilities and the locomotive maintenance facilities into a single structure/facility.

A summary of key construction activities including indicative sequencing and scheduling are outlined in **Table 1**. **Table 2** shows a summary of the indicative construction program. Key aspects of the proposed construction methodology are described in the following sections.

Sketch 81 in **Appendix C** shows the works that will complete prior to the commencement of commissioning of the Provisioning Facility. As can be seen in Sketch 81, the works required to be completed prior to the commencement of provisioning includes all major earth works and civil works as well as drainage and access arrangements across the site. The extent and nature of the works that will be carried out subsequently relate predominantly to the construction of the combined maintenance facility and the laying of ballast and track for the associated railway lines.

Table 1 – Summary of key construction activities

Construction Phase	Activity	Indicative Schedule
Enabling Works and Remediation	Install environmental and traffic management controls. Construct site access from Tarro Interchange. Protection or diversion of utilities. Establish compound. Remediation Clear & grub TSF footprint. Survey set out for works.	July 2013 to March 2014
Civil Works	Strip and stockpile topsoil. Bulk earthworks (Import to fill). Bulk excavation of materials for stockpiling and reconditioning for reuse (where appropriate). Piling for buildings and track slabs. Excavate and place drainage & stormwater. Construct new internal access roads.	September 2013 to September 2014 (civil works for provisioning complete by March 2014)
Track & Signalling (Provisioning)	Install city crossover. (Undertaken during ARTC possession) Install Mainline connections. (Undertaken during ARTC possession) Place ballast for provisioning tracks. Install rail, sleepers and weld for provisioning tracks.	January 2014 to June 2014

Construction Phase	Activity	Indicative Schedule
	Install rail associated with provisioning facility. Tamp & regulate provisioning track.	
Buildings (Provisioning)	Excavate and install foundations and footings for Provisioning Building and fuel storage facilities. Pour concrete slabs for provisioning and fuel storage facilities. Erect steel superstructure for provisioning and fuel storage facilities. Install external cladding and roofing for provisioning facilities. Installation of building services (mechanical, electrical & hydraulics) and specialist equipment for provisioning facilities. Fit out.	January 2014 to June 2014
Commissioning (Provisioning)	Testing & commissioning of railway systems & signals. Testing & commissioning of building services & equipment.	August 2014
Track & Signalling (Maintenance)	Place ballast for maintenance tracks. Install rail, sleepers and weld for maintenance facilities and shunt neck. Install rail within maintenance building. Tamp & regulate track for maintenance facilities.	July 2014 To March 2015
Buildings (Maintenance)	Excavate and install foundations and footings for: Maintenance Building, Service Vehicle Garage &Administration Building. 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.	July 2014 To December 2014
Commissioning (Maintenance)	Testing & commissioning of railway systems & signals. Testing & commissioning of building services & equipment.	December 2014
Demobilisation	Removal of site compound.	January 2015

Table 2 – Indicative construction program

Construction Phase	3Q13	4Q13	1Q14	2Q14	3Q14	4Q14
Enabling Works						
Utilities, Demolition and Remediation						
Civil Works						
Track & Signalling (Provisioning)						
Building (Provisioning)						
Commissioning (Provisioning)						
Track & Signalling (Maintenance)						
Building (Maintenance)						
Commissioning (Maintenance)						

3.3.2 Enabling Works, Utilities and Remediation

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;
- Protection or diversion of existing utilities as required to allow construction to proceed;
- Connection of the site to utilities for construction and operation as shown indicatively in **Appendix C;** and
- Environmental and traffic management controls would be installed ahead of the commencement of civil works.

Aurizon has been in regular liaison with ARTC regarding Hunter Water Corporation (HWC) service connection and vehicle access to the site.

Tarro Interchange and Site Access Road

The sealed access road has not changed substantially from that detailed in the EAR. The road has now been designed to support flood mitigation by lowering of the vertical alignment in two sections to allow floodwaters to spill over the road. ARTC will construct the road with a sealed finish for joint use by Aurizon and ARTC for the adjacent Hexham Relief Roads Project. ARTC will be responsible for constructing the road from the Tarro Interchange Intersection to the shared construction compound – approximately 490m. Aurizon will be responsible for extending the construction of the access road into the Aurizon site, including a bridge over Middle Creek. Aurizon's section of road will be constructed to the same standard as the section constructed by ARTC, that is it will be 10m wide (reduced to 8m at the Middle Creek bridge) with a two coat seal.

Whilst it is the intention for ARTC to construct the proposed Tarro Interchange Intersection, Aurizon are also seeking approval for these works in case the Hexham Relief Roads Project is delayed or cancelled.

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, and approval for this construction compound has also been sought by ARTC for the HRR Project. The compound area is 29,450m^2 with a perimeter of 700m and is offset approximately 50m from Middle Creek.

A second compound is proposed to be established to the south of Middle Creek. This construction compound will be used exclusively for the Aurizon Train Support Facility project, and will include a concrete batching plant for preparation of mixed concrete for project construction. The use of on-site concrete batching will result in up to approximately 25% fewer heavy vehicles requiring access the site during the construction period.

At the southern end of the site, to the immediate west of the main project footprint in the south of the site, another construction compound will be established. This construction compound will include facilities for the handling and treatment of Acid Sulfate Soils and contaminated materials, and will include equipment (including a crusher and a screen) for the reconditioning of soils for on-site re-use, where appropriate.

Sketch 80 in **Appendix C** shows the location of construction compounds. Each construction compound will have a 300mm thick sub-base installed below a compacted 400mm thick road base. A security fence would be installed to the compound perimeters and the entry to the compounds 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 in each compound. Supporting the onsite accommodation, there would be an array of storage tanks, including wastewater, rainwater and diesel fuel. General storage would be provided for by a number of 40ft (approx. 12m x 2.5m) shipping containers, as well as lay down areas for the storage of oversize items such as the railway turnouts.

Remediation

Remediation will be carried out in accordance with the Remedial Action Plan (see **Appendix G**). Remediation activities will include:

- Additional sampling and testing of soils and stockpiles throughout the site to more accurately determine the extent of contamination.
- Removal of stockpiles for disposal in appropriate licenced landfill facilities.
- Removal of asbestos from within buildings to be demolished, and removal of asbestos containing soils, for disposal in appropriate licenced landfill facilities. Asbestos to be removed by a suitably licenced contractor in accordance with WorkCover requirements.
- Excavation of hydrocarbon impacted soils for landfarming (where appropriate) or disposal to a suitably licenced landfill facility. Where remediated soils can comply with the relevant soil criteria they will be reconditioned and reused as fill onsite.

It is expected that the following volumes of excavated soils will be treated as contaminated:

- 2,000m^3 of asbestos impacted materials (to be removed off-site to a suitably licenced disposal facility).
- 20,500m^3 of hydrocarbon impacted soil, which will either be landfarmed for beneficial reuse of disposed of-off-site at a suitably licenced facility.

Utilities Diversion, Protection and Connection

The EAR included a description of the utilities diversion, protection works and improvements that were required. To provide clarity as to what is proposed under this application, planning approval for the following utilities works are being sought in addition to the utilities works specified in the EAR:

- Protection of the Jemena 500mm gas main which passes beneath the proposed railway lines.
- Protection of Optus infrastructure in and around the Tarro Interchange.
- Protection of Hunter Water Corporation's Chichester Trunk Gravity Main, which will be crossed by the site access road off the new Tarro Interchange Intersection.
- Relocation of Hunter Water Corporation's 200mm water main which will be crossed by the project footprint, and which is located immediately adjacent to the area of excavation to provide for track lowering. Details of the relocation to be agreed with HWC.
- Connection to Hunter Water Corporation's 200mm water main.
- Provision for 1200mm Hunter Water Corporation pipe underneath access road.
- Protection of Telstra telecommunications infrastructure within the Aurizon site and relocation of existing cable in the vicinity of the southern end of Woodlands Close;
- Construction of a temporary Telstra telecommunications pit for use during construction and connection to existing Telstra communications infrastructure for construction and operations;
- Connection to existing electricity infrastructure including installation of onsite poles or underground trenches for electrical cabling; and
- Protection (or possible relocation) of the Brancourts effluent disposal pipeline.

Appendix C includes plans that show indicatively the utility connections required for construction and operation of the TSF.

In addition, the waste water treatment plant and effluent disposal by irrigation will require approval from Newcastle City Council under Section 68 of the *Local Government Act 1998*.

3.3.3 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. Overall the extent of cut and fill required for the proposed development generally ranges between plus and minus 1m from the existing site levels. Where possible material won through excavation will be reconditioned at the site for reuse.

In total it is expected that the revised design, which includes for the lowering of approximately 1km of track, will require excavation of up to approximately 50,000m^3 from this lowered section of track. It is expected that a substantive component of this is likely to be natural materials that area Potential Acid Sulfate

Soils. The majority of this material will be stockpiled at the Aurizon site in the area specified in Sketch 80 in **Appendix C**, immediately adjacent to the effluent irrigation area.

In addition to the excavation required for the lowering of the tracks there is likely to be bulk earthworks that will require the grading of the site with a cut across the remainder of the site of some 100,000m^3. This will mostly be located to the south of the track-lowered area, and constitute fill material that is potentially acid generating.

It is estimated that approximately 180,000m^3 of engineered fill will be required to be imported onto the site to achieve the required design levels and an additional 30,000m^3 for the construction of the main access road.

The final earthworks methodology will be determined by the Contractor, 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 the desired levels. An onsite stockpile will be developed to store excess material. Fill for the site will 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 the EAR, however due to the revised design (i.e. lowering of the tracks) there is a lower demand for fill, and so impacts associated with haulage of fill will be less.

Construction of the internal road turning loop, car park and service vehicle store will be located on the edge of the coal tailings stockpiles. However, the works will not cut into the coal tailings stockpile, but rather will cut into the cap above the stockpiled coal tailings. The hardstand associated with the new facilities will form a new cap over the coal tailings stockpile.

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 would be undertaken during the 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.

Excavation, Spoil Generation and Reuse

Volumes of spoil are estimated as follows:

- Approximately 150,000m^3 of excavated spoil in total is expected to be generated. Where possible this material will be reconditioned for reuse on site (subject to being able to meet engineering standards as well as site specific treatment criteria for contamination set out in the RAP) – thereby reducing the demand for imported fill.
- Of the total amount, approximately 50,000m^3 is expected to be natural materials that are Potential Acid Sulfate Soils (PASS). The remaining 100,000m^3 will predominantly be fill material, which is potentially acid generating. PASS and potentially acid generating materials will be stockpiled

in a specially designated storage and treatment area where they will be treated with lime in accordance with the Acid Sulfate Soils Management Plan (see **Appendix H**). Where ASS materials cannot be treated, reconditioned and reused at the site they will be permanently stockpiled in the area shown in Sketch 80 in **Appendix C**. The permanent stockpile area is approximately 9ha in area and is located in part of the Aurizon site formerly used for coal handling and preparation. If the full 150,000m^3 is required to be stored in this area, then the land in this area would be raised by some 1.6m above the current level. With consideration of material that might be able to be reused and contaminated materials that will be required to be disposed of off-site it is highly unlikely that the full 150,000m^3 would be stockpiled on-site.

- Approximately 22,500m^3 of contaminated materials is expected to be excavated. All excavated materials will be assessed and managed in accordance with the requirements of the RAP. Where non-ASS materials cannot be treated, reconditioned and reused at the site they will be classified in accordance with the Waste Classification Guidelines and disposed of to a suitably licenced landfill facility.
- It is expected that up to a maximum of 30,000m^3 of spoil may be won from emplaced fill material located east of the balloon loop, to be re-conditioned for on-site re-use.

Excavation and Groundwater Management

For the part of the site where the track design level has been lowered excavations will extend below the current groundwater level. As such, dewatering of the excavation will be required in order to ensure that construction of the track and infrastructure can occur.

Whilst the excavations will be carried out with the objective of minimising the extent and duration of exposed excavations (and so minimising the total amount of dewatering that will be required), it is expected that the excavations will be exposed for approximately 12 months.

ARTC have limited the amount of exposed excavation at any one time to 250m in length. This results in up to 170m^3 per day of extracted groundwater being required to be dealt with. It is expected that a similar volume of groundwater will need to be managed through the Aurizon excavation. Similar to the Hexham Relief Roads Project Aurizon may manage the groundwater ingressing into the excavation through de-watering of the excavation and the use of a controlled re-charge, whereby the groundwater is stored in a storage area immediately adjacent to the excavation (or part of the excavation area) which is hydraulically connected with the groundwater system.

The proposed permanent stormwater basins will be constructed and used as sediment basins during construction. These basins will be available for management of groundwater extracted from excavation areas.

As the excavation is being completed, excess groundwater that needs to be removed from the excavation will be diverted to the stormwater basins, where it will be tested and treated prior to discharge into the surface water system.

It is highlighted that the Douglas Partners Assessment of Potential Groundwater Level Impacts Report in **Appendix F** identifies that detailed design of the excavation dewatering methods may substantially reduce the level of dewatering required and that such excavations can be managed to limit the extent of drawdowns outside the site. It is also noted that, with the exception of some locally deeper excavations, the depth of required drawdown is generally within the depth of observed climatic fluctuation in groundwater levels and therefore

provided that the drawdown is temporary, would be expected to have limited effect on groundwater levels.

Where appropriate, stormwater collected in the detention basins during construction, including excess groundwater stored in the detention basins, will be used for fill compaction and dust suppression.

A Stormwater Management Plan (**Appendix D**) has been prepared which sets out in detail the management of water during the construction period.

3.3.4 Track & Signalling, Buildings and Decommissioning

There are no changes to the construction activities associated with laying of tracks or the construction of buildings compared to what was described in Section 6 of the EAR.

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.

3.3.5 Construction Staff and Working Hours

There is no proposed change to the level of construction staff and hours for construction activities. That is, staff numbers will 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 the bulk earth works phase.

Work would be generally undertaken during standard construction work hours:

- 0700 to 1800 - Monday to Friday;
- 0800 to 1300 – Saturday; and
- 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, including any notification requirements.

3.3.6 Construction Plant & Equipment

In addition to the plant and equipment specified in the EAR, the project will include the following plant and equipment for construction activities:

- Concrete batching plant.
- Soil re-conditioning plant (such as crushing and screening equipment) to provide for the reconditioning of excavated material for on-site re-use where appropriate.

3.3.7 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.

3.3.8 Coordination with Hexham Relief Roads Project

Aurizon has been coordinating with ARTC in relation to the construction of the TSF and the adjacent Hexham Relief Roads Project. Key points of coordination include:

- The construction of a single shared access road by way of a new intersection off the Tarro Road Interchange. ARTC will use this road for temporary access during construction. Aurizon will use this road for temporary access during construction as well as permanent ongoing access during operations.
- The use of a shared construction compound.

3.4 Project Footprint

As a result of the changes to the project described above, the footprint of the project has changed and is illustrated in **Figure 1**. The changes to the permanent infrastructure (i.e. the removal of the separate Locomotive Maintenance Facility, the relocation of the Bulk Fuel Storage facility and the changes to the access road layout) have resulted in an overall project footprint associated with the permanent building and infrastructure some 2ha less than original proposed. In total, when combined with the area required for effluent irrigation, the comparable project footprint is approximately 36 ha, compared with 38ha detailed in the EAR.

However, the changes required in the construction methodology result in a substantial amount of PASS (or other potentially acid generating materials) that may require treatment and permanent stockpiling on-site. A total of approximately 9ha has been set aside for this purpose, however it is expected that substantially less land will ultimately be required for this purpose once more detailed pre-construction investigations have been carried out to verify the extent of acid generation within fill materials.

Further refinement of the construction methodology has resulted in a more accurate construction footprint being identified. The construction footprint is shown in Sketch 80 in **Appendix C**. In total the construction footprint is approximately 65ha including:

- Area of the main (shared) site compound of approximately 3.0 ha.
- Area of the temporary storage area / batch plant of approximately 1.6 ha.
- Area of the main southern compound of approximately 5.0 ha.
- Area of the temporary soil conditioning area of approximately 2.2 ha.
- Area of the ASS treatment and storage area (located in the SE corner of the balloon loop) of approximately 2.2 ha.
- Area of the ASS storage area located on the stockpiles north of the balloon loop of approximately 8 ha.

Sketch 82 in **Appendix C** provides a comparison of the location of the main elements of the TSF (roads, rail, buildings and additional construction activities) between the EAR and the PPR.

Connection of site utilities may require minor works for short periods of time outside the project footprint in the immediate vicinity of existing utilities infrastructure.

4.0 Further Environmental Assessment

In some instances, the submissions have requested further environmental assessment, or more detailed environmental assessment for particular issues. Further, the design changes to the Hexham Train Support Facility have resulted in the need to update the environmental assessment presented in the EAR.

Table 3 below sets out an assessment for each issue to determine whether further environmental assessment is required in this PPR, due either to a specific request in a submission, or because of the design changes to the TSF. Where further assessment has been determined to be warranted, the following sections provide the appropriate environmental assessment.

Table 3 – Assessment of key environmental issues

Issue	Implications for Environmental Assessment	Further Environmental Assessment
Flooding	The TSF has been redesigned to mitigate flooding impacts. The OEH has requested a Project Risk Assessment of Flooding Impacts.	Section 4.1 and Appendix D, N, P and Q.
Stormwater and Water Quality	The redesigned facility has required modifications to the construction and operational surface water management system.	Section 4.2 and Appendix E and O.
Groundwater	The lowering of the tracks has resulted in excavations below the current groundwater level.	Section 4.3 and Appendix F.
Effluent Disposal	No change to the proposed design and operation of the effluent disposal system.	No further environmental assessment required.
Ecology	Additional assessment details requested by OEH. Changes to water quality and volumes of discharges have resulted due to the changed surface water management system.	Section 4.4 and Appendix G.
Contamination	The RAP has been updated to take into account of the additional excavations associated with the modified construction methodology.	Section 4.5 and Appendix H.
Acid Sulfate Soils	The additional excavations associated with the modified construction methodology	Section 4.6 and Appendix I.
Traffic Access and Car Parking	The revised construction methodology (including reuse of excavated materials and use of a concrete batching plant) will result in a lower construction traffic volumes.	No further environmental assessment required.
Infrastructure and Services	Changes to the project have not resulted in additional issues with	No further environmental

Issue	Implications for Environmental Assessment	Further Environmental Assessment
	utilities and services. Ongoing consultation with services providers has resulted in better understanding of requirements – and these are described in Section 4 and Appendix C.	assessment required.
Aboriginal Archaeology	Additional investigations have been carried out to further characterise the significance of Aboriginal heritage.	Appendices J and K.
European Heritage	The design changes have not resulted in any changes to the impacts or mitigation measures for European Heritage.	No further environmental assessment required.
Noise and Vibration	The revised construction methodology, and design changes will change the construction and operational noise emissions associated with the project.	Section 4.8 and Appendix L.
Air Quality	The revised construction methodology will result in additional contributing sources of dust emissions and the enlarged fuel farm (for diesel storage) will cause larger potential for emissions of VOCs.	Section 4.9 and Appendix M.
Social and Economic	The changes to the project will not affect the social and economic impacts of the project.	No further environmental assessment required
Waste Management	The changes to the project do not require any substantive revision of the waste management strategies set out in the EAR.	No further environmental assessment required.
Visual	The changes to the project will have a minimal impact on the nature, extent and visibility of the structures and infrastructure.	No further environmental assessment required.
Hazard and Risk	There is no change to the volume or storage arrangements of dangerous goods.	No further environmental assessment required.
Bushfire	The changes to the project will have a no impact to bushfire risk.	No further environmental assessment required.

4.1 Flooding

The Flood Impact Assessment carried out as part of the EAR identified impacts to surrounding land owners and businesses, and identified that mitigation measures would be identified during subsequent design phases of the project.

In order to better understand the nature and extent of flood impacts and to assist in the development of a suitable mitigation strategy a more detailed flood impact assessment has been carried out by BMT WBM (provided in **Appendix D**). Importantly, the detailed flood impact assessment was prepared as a joint report for both the Aurizon Hexham Train Support Facility and the ARTC Hexham Relief Roads Project.

4.1.1 Regional Flood Modelling

The revised flood impact assessment includes a regional flood impact investigation using an existing TUFLOW flood model to define existing flood conditions and quantify flooding impacts related to the proposed works.

The updated flood modelling identified that for events up to a magnitude of around the 10% AEP the Hunter River does not spill over the highway. Under such conditions the proposed works will have no impact on flooding, as the relevant flood flow paths are not active.

During flood events in the order of a 5% AEP or greater, extensive spilling of flood waters over the New England Highway and the existing railway will occur through Hexham Swamp and some significant localised flood impacts were identified upstream of the access road and in Hexham. Modelled flood level increases were in the order of 0.02m to 0.04m.

For flood events in the order of a 1% AEP or greater the Hunter River and Hexham Swamp floodplains are fully connected and the regional flood model provides an appropriate assessment of potential flood impacts. At a 1% AEP magnitude event, the site may be inundated for a period of three to four days. At a PMF event magnitude the site is likely to be inundated for a full week.

The flood modelling undertaken using the Hunter River flood model demonstrates that there are no significant impacts on regional flood behaviour. However, there are some localised flood impacts in the Hexham locality for events in the order of a 5% AEP and 2% AEP. Further investigation into requirements to mitigate these impacts identified complex local flood flow paths. The flood behaviour of these local flow paths is driven by topographic controls that are at a scale beyond the representation of the regional modelling.

The revised flood impact assessment therefore also contains a detailed local flood impact assessment for the Hexham area, to better understand the nature of existing flood behaviour and flood impacts in Hexham, and further refine the requirements for flood mitigation in respect of the proposed works.

4.1.2 Local Flood Modelling

In order to fully understand the complex nature of flood behaviour in the Hexham area a detailed local TUFLOW model was developed.

For events up to a 10% AEP magnitude the flow paths through the Hexham area are not active, with flooding being confined to the Hunter River and Hexham Swamp. The peak flood level of around 1.8m AHD is not sufficient to overtop the Pacific Highway, which has an elevation of around 2m AHD at this location.

For larger flood events, once the flood level in the Hunter River at Hexham Bridge exceeds 2.0m AHD, flood waters begin to spill over the highway, inundating the industrial and commercial properties located to the east of the railway.
The flood waters must overtop the existing railway (which is elevated above the natural ground surface) before discharging to Hexham Swamp.

For the 2% AEP event peak water levels the impacts are largely restricted to the area bounded by the Pacific and New England Highways to the east and by the rail alignment to the west. Based on the original project design the new rail alignments would have been set at a higher elevation than the existing tracks, which restricts the capacity for flood waters to spill over the existing rail alignment and into Hexham Swamp. Additional flood flows are pushed north around where the proposed works tie in with the existing rail and south along the road and rail corridor. This increases the typical peak flood conditions by around 0.02m.

For events of a 1% AEP magnitude or greater the Hunter River and Hexham Swamp system becomes fully connected and the regional flood model provides an appropriate representation of local peak flood conditions.

This local flood flow path through Hexham is minor in terms of regional flood behaviour and typically represents only around 1% of the total Hunter River flood flows. However, given the nature of the local topography, which consists of developed depressions situated behind a raised embankment, this relatively minor flood flow path presents both a complex and significant flood risk to the existing properties located within these lower-lying areas.

The construction of the site access road also introduces an additional topographic control, impacting on upstream flood levels by up to 0.04m for an event of around a 5%. For events in the order of a 2% AEP magnitude or greater, the northern section of Hexham Swamp fills to a substantial depth and overtops the abandoned railway, effectively drowning out the proposed access road. Accordingly, the proposed access road has the most significant impacts on local flood conditions for a relatively narrow window of flood event magnitude, the highest impacts at around the 5% AEP level AEP magnitude.

The modelling of the original road/rail designs as presented in the EAR provided for unacceptable flood impacts. The flood impacts were principally as a result of the blocking of existing flow paths through the construction of elevated road and rail embankments. These obstructions provide for local redistribution flows and associated increases in local peak flood water levels. The proposed works has limited impact on regional flood behaviour, however, the localised impacts were of sufficient magnitude to require specific flood mitigations works.

4.1.3 Options Assessed

A number of potential mitigation options were considered, including:

- Off-site flood mitigation works;
- Provision of cross-drainage culverts; and

Lowering of the proposed design elevations.
The off-site mitigation works principally would involve the construction of a levee on the right bank of the Hunter River in the Hexham locality to effectively block the flood flows that currently spill through the low point. Whilst this may provide an effective solution to the flooding and reduce the impact of the proposed works, there are inherent difficulties associated with the planning, design and construction on private land. With alternative solutions contained wholly within the project boundaries, the off-site flood mitigation were not considered further.

Given the volumes and flow rates of floodwater to be conveyed across both the access road and rail embankments of the Train Support Facility and Relief Roads, the scale of cross drainage works required to mitigate the flood impacts are such that the solution is very costly and has significant implications for both construction and ongoing maintenance and operations.

Of the two on-site mitigation options the lowering of design elevations was considered the most effective solution. The objective of the lowering selected sections of the both the access road and rail embankments is to effectively maintain the existing flow distributions without resulting in significant obstruction to the existing flow paths. Flood modelling was therefore undertaken to determine the extent of required lowering works and the residual flood impacts.

4.1.4 Mitigated Flood Impacts

To mitigate flood impacts in Hexham the design elevations of the proposed works were lowered below the level of the existing rail for around an 800m length. This included a 350m length lowered to around 0.2m below the existing rail, with a design fill level of around 1.8m AHD and a top of rail level of around 2.0m AHD. This design modification essentially maintains the flow width of the existing floodway north of the coal tailings. This ensures that the mitigation solution will accommodate the full range of potential flood events.

However, some residual impact remains. The regrading of the rail corridors still reduces the capacity to convey flood flows between the two areas of surrounding higher land. This results in a small redistribution of floodplain flows, pushing more water round to the west and through Hexham Swamp. However, the impact on flood levels in Hexham Swamp downstream of the access road alignment is relatively minor, at around 0.02m.

The greatest impact on modelled flood behaviour is for an event of the order of a 5% AEP, for which the peak flood level upstream of the road alignment is typically increased by 0.05m to 0.1m. The impact is locally as high as 0.4m, but this is restricted to the Aurizon owned land at the western end of the access road. For events in the order of a 2% AEP the flood level impact is reduced to around 0.02m to 0.03m, as the floodplain depths increase and the access road becomes drowned. At the 1% AEP event the impacts are typically around 0.05m and are locally as high as 0.08m. These impacts are driven principally by a minor flow redistribution rather than the influence of the access road.

There is a modelled increase in peak flood levels of 0.05m to 0.1m along the Pacific Highway between Hexham Bridge and Hexham Bowling Club for events in the order of a 5% AEP and 2% AEP. This is due to a small increase in flood flows along the road corridor as a result of the proposed works. In terms of impacts to the road infrastructure, changes in flood frequency and duration are more important than impacts on peak flood level. The proposed works will not have a significant impact on flood frequency or duration of either the Pacific or New England Highways and consultation with the RMS indicates that they are not concerned by this change in flood behaviour along the highway.

The flood impacts to local housing are restricted to a single property located upstream of the access road. Here there is a modelled peak flood level increase of under 0.05m at the 1% AEP event and a 0.02m increase at the 2% AEP event. At other residential locations in the vicinity of the proposed works, the flood impacts are negligible.

The flood impacts to local businesses located in Hexham are negligible. The businesses located along the Pacific Highway are elevated on ground raised above the 2% AEP flood level and accordingly local increase in flood level has no impact to the property.

The temporary works provide for similar impacts as the permanent access road, albeit slightly less in terms of absolute magnitude. Accordingly, the temporary works do not provide for any exacerbation of flood risk over and above the permanent works.

4.1.5 On-Site Flood Risks

Flood waters will begin to flow over the lowered sections of the proposed works at around the 5% AEP event. Flood depths across the site would then increase with event magnitude, being over 0.5m for events in the order of a 2% AEP and almost 2.0m for an event around a 1% AEP magnitude.

Modelled flood velocities across the lowered section of the proposed works are around 0.5m/s for a flood event in the order of a 2% AEP and may be locally as high as 1.0m/s. For an event in the order of a 1% AEP typical velocities across the site may be around 1.0m/s and locally as high as 1.5m/s.

The flood depths and velocities across the site have implications for the on-site rail and building infrastructure. It is recommended that critical infrastructure, such as electrical supply and equipment is elevated above the 1% AEP level and a suitable freeboard (typically 500mm), i.e. 4.2m AHD.

At the probable maximum flood (PMF) event flood waters would be over 5m deep. An event of this magnitude would likely result in extensive damage to on-site infrastructure.

A design review process will be implemented to ensure that the detailed design takes into account of risks associated with flooding at the site. See **Appendix D** for Flood Risk Assessment.

The treatment and storage of acid sulphate soils will occur in locations above the 2% AEP flood level, however a portion of the proposed stockpiling area is located below the 1% AEP flood level. An assessment of the potential flood impact of these stockpiles is included at **Appendix Q**. This assessment concludes that the proposed location of the stockpiles will have negligible impacts on regional flooding. Notwithstanding this, the proponent will ensure that stockpiling occurs within locations above the 1% AEP flood level where practical.

Flood Emergency Response Plan

Section 8 of **Appendix D** details the lag time in peak flood levels within the Hunter River Catchment. During the 2% AEP flood event there is a lag time in the flood peak between Maitland (Belmore Bridge) and Hexham of 21 hours, whilst in the 1% AEP flood event there is a lag time of 29 hours. These lag times allow sufficient time to coordinate the preparation and safe evacuation of the site ahead of flood waters.

In light of the above, Aurizon will prepare and implement a Flood Emergency Response Plan (FERP). The primary objective of a FERP is to reduce the threat that floods pose to the safety of people living and/or working on or adjacent to flood affected land. The flood emergency response plan will consist of the following distinct processes:

- Identification of areas at risk to flooding;
- Forecasting the time, arrival and height of the flood peak;
- Dissemination of warnings to flood prone property owners;
- Flood awareness and education of staff;
- Evacuation of people from areas at risk from flooding; and

- Recovery in the flood aftermath.

Section 8 of **Appendix D** outlines the principles and preliminary procedures that will be enacted within the FERP and confirms that the strategy can feasibly be implemented.

Flood Risk Assessment

A Flooding Risk Assessment Report has been prepared by Engenicom and is provided at **Appendix P**. This assessment considers the hazards and risks posed by potential flooding relating to construction and operation of the TSF, with regard to environmental, safety, operational, economic and community perception impacts. In this regard the assessment identified only one moderate risk and one significant risk, with the remaining activities being categorised as low risk.

The potential impact of damage to buildings during flooding was considered to be high, with the implementation of a Flood Evacuation Plan (discussed above) recommended as an appropriate mitigation measure for this risk.

Potential environmental risks associated with sediment and erosion of stockpiled is adequately mitigated through the implementation of erosion and sediment control plans. phase stormwater management in accordance with the requirements of DCP 2011. As discussed at Section 4.2.4, erosion and sediment control measures will be implemented within the site in accordance with the 'Blue Book', including the installation of temporary sediment fencing, basins and surface trenches.

In light of the above it is considered that the risks posed by flooding are low or can be appropriately mitigated, and therefore acceptable.

4.1.6 Climate Change and Seal Level Rise

The revised flood impact assessment includes consideration of the NSW Government's adopted sea level rise planning benchmarks and increased rainfall intensity to account for climate change and sea level rise.

In summary, the proposed works would broadly have similar impacts under future flood condition scenarios incorporating climate change. The design mitigation solutions are such that they effectively maintain the same flow distributions as existing conditions across the full range of design events. The broad flood behaviour locally in the Hexham area will be similar under climate change scenarios, though the frequency of particular magnitude events may change. Nevertheless, in effectively maintaining existing flow distributions, the performance of the mitigated design solution holds across the full range of design events, including future events incorporating potential climate change impacts.

4.1.7 Conclusions

Flood mitigation design solutions have been tested with the overall objective to minimise flood impacts, particularly to property external to the development area. The design mitigation solutions incorporated lowering significant sections of the proposed road and rail embankments in order to maintain as best as possible the existing flow distributions. The proposed development with the mitigation provided for a significant reduction in flood impacts, and significantly almost no adverse impact to existing property and businesses.

4.1.8 Peer Review

The Flood Impact Assessment provided in Appendix D has been subject of a peer review commissioned by the DP&I and conducted by UNSW Water Research

Laboratory. The UNSW Water Research Laboratory has requested more detailed model data to be provided as part of its peer review. The additional information responding to this request has been prepared by BMT WBM and is provided in **Appendix Q**.

4.2 Stormwater and Water Quality

The Stormwater Management Plan (SMP) prepared by Worley Parsons as part of the EAR identified existing site stormwater conditions and the potential impacts of the construction and operational phases of the TSF on stormwater quality and volumes. The SMP has been revised to address the Preferred Project detailed in **Section 3.0** and to further address issues identified in public and agency submissions, and is provided at **Appendix E**.

In considering the impact of the Preferred Project, the SMP considers the cumulative impact of the Hexham Relief Roads and the revised TSF generally comprising:

- seven parallel tracks up to three kilometres in length with some sealed pavements;
- buildings described at Section 3.0;
- access road to the Tarro Interchange; and
- revised stormwater controls detailed in the Stormwater Management Plan provided at **Appendix E**.

Importantly, operational activities identified as potentially generating significant contamination to surface and groundwaters will be isolated from the stormwater system. These areas include wagon and locomotive wash down bays, maintenance areas and refuelling/provisioning area. All water generated in these areas would be disposed of to the on-site treatment system or re-used.

4.2.1 Stormwater Management System

The basis of designing the system for controlling the discharge of stormwater from the site is to replicate the hydrologic flow conditions of the area prior to the development.

This approach focusses on collecting stormwater from the project footprint into a western drain and directing it to one of three stormwater detention basins for treatment through floating wetlands. The floating wetlands will provide nutrient and enhanced sediment removal from stormwater discharged from the site. The performance of floating wetlands as compared to a conventional wetland has been investigated with the results indicating improved nutrient removal as well as enhanced heavy metals uptake. Water discharged from the basins will be directed into the Hexham Swamp.

The design of the stormwater system for this site is based on the 1 in 10 year event because beyond this point, the Hexham Swamp will be inundated by flood waters. For larger storm events stormwater from the site will discharge to the swamp via overland flows, and lower portions of the site will be inundated.

The drainage for the project is divided into two distinct areas, one to the south utilising a pit and pipe system. The other to the track lowered north. In general, for both the south and north sections:

- Water in the drainage system will be controlled by the water levels in Hexham Swamp. A flooded Hexham swamp will result in water unable to drain out of the pipe system – but in most cases the system will drain up to the 1:20 ARI Hexham Swamp Flood event (Flood Level of 1.30 m AHD).

- The outlets to drain to the natural surface are above the groundwater level and so the system will be effectively free of water (ground and surface waters) between the design events.

Southern Section (non-lowered section of track)

Track areas drain to pipes falling to the west of the site. Stormwater pits are located between each set of rail lines within roadways. At the end of some culverts (those draining directly to the ponds) proprietary gross pollutant control units will be located within collection pits (including oil/grease separating capability). Preliminary design of cross drainage structures has confirmed that sufficient conveyance capacity is available despite expected standing water levels.

For the pit and pipe section to the south (non-lowered section of track) this area includes an imported and compacted capping layer (impervious) creating an effective separation barrier between surface waters and groundwater. Seepage rates of groundwater into the surface water collection system will be very slow due to the natural 'clay' material. This material in affect acts like a Geosynthetic Clay Liner (GCL).

Stormwater in this area will always drain preferentially to the pipe system, however groundwater and surface water interaction could occur after consolidation when water sits in the pipes for an extended period.

Where the western drain is parallel to the tailing mound in this area, the expectation is that when groundwater is above RL 1.0 it will seep into the drainage system.

Northern Section (lowered section of track)

The lower track level in the northern section has eliminated a traditional pit and pipe stormwater system as a viable option, as longitudinal grade on the system would be impossible to achieve relative to existing site discharge points. This has resulted in a permeable ballast layer within the rail formation, which will grade east to west, directing flows to the proposed cess drain that skirts the western edge of the TSF.

In this location, the formation will extend to a depth below the existing water table and so infiltration of groundwater into the surface water collection system is likely. However, the material underlying the rail formation will also consist of natural 'clay' materials and so seepage rates are expected to be low.

The Cess Drain

The pipes outlet via a headwall, to a cess drain which runs along the western edge of the TSF works. The Cess drain is approximately 2m in base width with slopes of 1V:2H and around 0.8m deep. The drain is level longitudinally (~0.1%) and will operate via hydraulic gradient. The cess drain capacity is sufficient despite standing water levels.

At the end of the outlets from the Cess Drain, gross pollutant traps will be provided to separate vegetative matter, litter, coarse sediment and oil/grease prior to discharge into the stormwater detention basins..

4.2.2 Surface Water Discharge

Surface water discharges from the site relate to five surrounding sub-catchments, being:

- Catchment 1 (Existing culvert to Hunter River north of the site);
- Catchment 2 (Swamp Oak Floodplain Forest located to the north-west);

- Catchment 3 (SEPP 14 northern zone);
- Catchment 4 (SEPP 14 southern zone); and
- Catchment 5 (Coastal saltmarsh located to the south).

These catchments as they are currently, and as they are proposed to be modified by the proposed TSF development are illustrated in **Appendix D**. The assessment carried out by Worley Parsons was to compare contributing catchment areas to key environmentally sensitive areas. That is, provided there is little change in the contributing catchment and the amount of impervious area, the expected hydrological changes should also be insignificant. The outcomes of this assessment are summarised below for each of the five identified receiving catchments.

Existing culvert to Hunter River north of the site

There is a negligible change in area discharging to this catchment. It is noted that the change to impervious area increases, however this still is a relatively negligible increase (<1%) compared to the overall catchment area. The increased impervious area will drain directly to the culvert to the Hunter River, therefore this will not impact the adjacent sensitive environments. This catchment receives overflows from Catchment 2 and will receive discharge from Basin 1.

Swamp Oak Floodplain Forest located to the north-west

The increase in impervious area will be offset by the smaller catchment draining to the swamp oak forest. Therefore, there will not be a significant change to low flow patterns discharging to this sensitive area. This catchment receives overflow from Catchment 3, and in turn overflows into Catchment 1. Because of the increased inflows this catchment fills and overflows into Catchment 1 during a 1 year ARI event instead of a 2 year ARI event. During larger events, there is a negligible change in inflows and outflows through this catchment.

However, as the percentage of the catchment that is impervious doesn't appreciably change, there will be a negligible change to existing wetting and drying periods.
The ongoing surface water monitoring plan will include monitoring of this sensitive area in order to confirm that no negative impacts to the Swamp Oak Forest occur.

SEPP 14 northern zone

There is an increase in impervious catchment area and total area draining to this location, with outflows of Basin 2 into this catchment. Flows through this area discharge along a defined channel and ultimately drain back to discharge point to the west of the site. During larger events the outflows under the Hunter Water pipeline to the west is constrained and the catchment spills into Catchment 2. The increase in flows from small rainfall events will be negligible, however during larger rainfall events there will be a minor increase in overflows into Catchment 2, contributing to the increased inundation and overflow of Catchment 2 from the 2 year ARI to the 1 year ARI event.

SEPP 14 southern zone

There is no increase in impervious catchment area or total area draining to this location to the west of the coal tailings stockpiles.

Coastal saltmarsh located to the south

There is an increase in impervious catchment area and an increase in total area draining to this location, including the discharge from Basin 3. Currently flows from this area drain to a Coastal Saltmarsh EEC, which is regularly flushed by tidal flows. Therefore the increase in runoff from minor storm events is not

considered significant. It is noted that there may be a minor impact in composition of flora communities as a result of increased low flows because Phragmites, a fresh water species, may colonise preferentially around the outlet of the site. More significant to species composition will be the conveyance of the main drainage lines on the adjoining site, which have recently been cleaned out. Following cleaning out, the Phragmites communities would be expected to recede and be replaced by the saltmarsh communities.

During minor storm events (1-year ARI) total runoff volumes from the site during the 9-hour storm increase from approximately 3,200m^3 to 11,814m^3 (269%). In a worst-case scenario where the Hunter River culvert was blocked, which is considered to be unlikely, this increase in stormwater runoff would result in an increase in water levels within the Hexham Swamp of less than 1mm, which is considered to be negligible in the context of the much greater rise in water levels during such storm events.

During larger storm events(10-year ARI), total runoff volumes from the site during the 9-hour storm increase from approximately 24,424m^3 to 34,694m^3 (42%). In a worst-case scenario where the Hunter River culvert may pond rather than drain, this increase in stormwater runoff would result in an increase in water levels within the Hexham Swamp of less than 1mm, which is considered to be negligible in the context of the much greater rise in water levels during such storm events. Further, floodwaters from the Hunter River start to spill into the Hexham Reserve during this flood event. Discharge velocities will generally be lower than those currently occurring on the site, with the exception of increased flows into the Phragmites complex located to the south-west of the site.

The ongoing surface water monitoring plan will include monitoring of this sensitive area in order to confirm that no negative impacts to the Swamp Oak Forest occur.

Conclusion

A water monitoring program for the TSF project will be developed to monitor changes in hydrological regime associate with discharges to catchment 2 (which contains the Swamp Oak Forest EEC) in the northwest and to Catchment 5 (which contains the Coastal Saltmarsh EEC) to the south.

Further opportunities will be investigated to manage stormwater flows on the site to assist in creating favourable water flows and levels that support rehabilitated and offset areas of significant ecological value.

4.2.3 Water Quality

Stormwater treatment and discharge systems are designed to achieve the following pollutant reduction targets:

- Suspended Solids (SS) by 85%;
- Total Phosphorous (TP) by 65%; and
- Total Nitrogen (TN) by 45%.

The above targets are consistent with those included within the Newcastle City Council Development Control Plan 2012.

Improvements to water quality will be achieved through a series of Gross Pollutant Traps (GPTs) installed at key system discharge points, three water quality control ponds (WQCPs) and the provision of side swales to site access roads. MUSIC modelling undertaken for the proposed post-development site catchments concludes that these measures will be sufficient to exceed all of the identified pollutant reduction targets and will reduce Gross Pollutants by 98%.

The parameters upon which modelling has been undertaken are provided in detail at **Appendix O**.

Maintenance of the proposed stormwater devices is critical in achieving the proposed water quality targets. The SMP establishes a framework for the future development of a maintenance plan to ensure that water quality treatment devices, and a Statement of Commitment requiring the preparation of this plan prior to the issue of an Occupation Certificate is included at **Section 5.0** of the PPR.

Ongoing monitoring of water quality from permanent basins, outfall and surface water will be undertaken by the proponent and reported annually, with the results to be made available to government agencies upon request. This monitoring will include physical parameters (including pH, electrical conductivity and SS), oil and grease, nutrients (including TP and TN) and a full suite of metals. A Statement of Commitment to this effect is included at **Section 5.0**. In addition to water sampling, Aurizon will include physical inspections and maintenance of stormwater infrastructure, and implement the contingency measures identified in the SMP if required to address adverse water quality conditions.

4.2.4 Construction Water Management

The SMP outlines a framework for construction-phase stormwater management in accordance with the requirements of DCP 2011. Erosion and sediment control measures will be implemented within the site in accordance with the 'Blue Book', including the installation of temporary sediment fencing, basins and surface trenches. A Statement of Commitment requiring the preparation of a Construction Stormwater Management Plan prior to the commencement of construction and detailing the required content of this plan is included at **Section 5.0**.

The stormwater detention basins will be installed before any other works take place and used for sediment basins during construction.

During the construction process specific stormwater runoff management and treatment systems will be required to be implemented for areas where Acid Sulphate Soils (ASS) are excavated and treated on-site in accordance with the ASSMP (**Appendix H**).

4.3 Groundwater

An Assessment of Potential Groundwater Level Impacts was undertaken for the Preferred Project by Douglas Partners (**Appendix F**) based on previous site investigations. This assessment identifies the key potential impacts of the Preferred Project as being on groundwater-dependent ecosystems (GDEs) located in the vicinity of the site, including the Hexham Swamp, as well as through limited groundwater flow to the Hunter River.

4.3.1 Groundwater Flow Impacts

Existing Conditions

In the southern part of the site there is a layer of fill materials approximately 1-2m depth, which comprises coal washery reject material, intermixed with sand and clays. This material is expected to have medium to high permeability. Underlying this fill layer is a layer of marine clays which is between 15m and 25m thick. In the northern part of the site, in particular where the tracks will be lowered, this layer is essentially at the surface. This clay material has a very low permeability.

In the southern part of the site, groundwater would radiate out from raised coal tailings stockpiles. Much of the groundwater flow from this area would be intercepted by perimeter drainage on the north, west and east of the stockpiles. This perimeter drainage system conveys this intercepted groundwater towards the Hexham Swamp to the west.

In the northern part of the site, which have not been filled, existing groundwater flows will be very limited. This is in part due to the very low permeability clays, but also because of the very flat grades that result in very little hydraulic gradients to drive groundwater flow. Groundwater in these areas is generally at or near the ground surface, with ground surface drainage providing a control on the upper groundwater levels that are possible on this part of the site.

Excavation

The lowered tracks proposed under the Preferred Project require excavation below the observed water table of up to 1.5m in some locations, whilst the combined maintenance facility buildings and fuel storage tanks may require excavation to as much as 5.8m below the water table. Excavation for lined stormwater detention and treatment basins will require excavation up to 2.1m below the observed water table.

This is dependent on the climatic conditions at the time of excavations. Dewatering is expected to be required for most excavations on site, unless particularly dry conditions prevail across the construction period.

With the exception of some locally deeper excavations, the depth of required drawdown is generally within the depth of observed climatic fluctuation in groundwater levels and therefore provided that the drawdown is temporary, would be expected to have limited effect on groundwater levels outside of the site.

Various measures can be put in place to limit potential drawdowns during construction, which include:

- Limiting extent of excavation open at any one time;
- Monitoring groundwater levels;
- Recirculating water from excavated section to drainage blanket system within adjacent completed system; and
- Use of sheet pile walls to cut-off flows into excavations, particularly for locally deeper excavations such as within the wetlands and maintenance buildings.

Design of appropriate dewatering methods to limit drawdowns will be carried out during detailed construction planning.

Filling above excavated levels will be comprised of free-draining gravels and fill materials containing extensive sub-soil drainage will limit the potential for groundwater mounding within the development area. Elevated groundwater levels may occur temporarily as a result of outflow from existing clay soils during the settlement of fill materials, however any increases in flow are likely to be masked by natural variability in rainfall and climactic conditions.

Groundwater Recharge

Low permeability capping beneath the proposed rail formations will include surface pits draining to the subsoil drainage system in order to minimise potential impacts on rainfall recharging of groundwater systems.

Areas of more extensive surface capping (i.e. the access road and buildings) are expected to have limited impacts on groundwater recharge. In particular, any

lost groundwater recharge from capping would be captured in the surface water management system, and would ultimately be discharged into the surface water system, where it would be available for recharge to the groundwater.

Overall, it is unlikely that a significant reduction in groundwater levels would occur before the development site due to capping.

Drainage and Detention Ponds

The stormwater drainage system has generally been sympathetically designed to the existing site hydrogeology, with the detention basins typically discharging to locations where surface water currently collects and seeps to groundwater. Whilst there will be some limited changes to the hydrogeology within the southern, eastern and northern portions of the site, impacts on groundwater levels in the vicinity of the western part of the site (which experience interaction with the Hexham Swamp) will be insignificant.

Effluent Irrigation

The proposed effluent disposal system within the south-west of the site will include design requirements to accommodate the expected irrigation rates. The majority of seepage from the irrigation zone will be directed to Basin 3 via the proposed drains and will therefore have minimal impact upon groundwater levels in the vicinity of this irrigation area.

Drainage System

The longitudinal drain will collect groundwater seepage from the rail formation and in the case of the unlined section of the drain it will intercept groundwater seepage from the elevated western parts of the site. Under typical groundwater levels, seepage can be expected to be entering the drainage system along much of the alignment.

The surface drainage system should have the capacity to transfer the relatively low groundwater seepage rates with limited head losses / gradient and therefore the water levels in the surface drainage are generally (with the exception of temporary rainfall events) likely to be controlled by the low flow outlet levels at the detention basins as follows:

- Basin 01 – 0.6 m AHD;
- Basin 02 – 1.0 m AHD; and
- Basin 03 – 1.0 m AHD.

The subsoil drainage system on the southern part of the site will initially mostly sit above typical groundwater levels, with the exception of where it grades down to meet the surface drain. In these areas drainage will be located within permeable fill or existing filling of variable permeability. Where and while the subsoil drainage system sits above the groundwater level, infiltration of stormwater can be expected to occur into the underlying filling, the proportion of which will depend on the magnitude of the flows in the pipes. The lower the flow the higher the proportion.

Following settlement of the formation, much of the subsoil drainage system may be below groundwater level. Although gravity drainage may be prevented, flow should still occur in storm events provided there is sufficient head difference between the inlet point on the rail formation and the water level in the surface water system. It is also possible that reversal of flow of water could occur in drier periods, whereby water seeping into the western sides of the drain could then infiltrate to the fill below the southern parts of the formation via the subsoil drainage system. This may have the effect of 'adjusting' groundwater levels below the formation to a similar level to the water levels in the surface water

drainage system i.e. slightly higher than RL 1.0. This level generally sits within the range of observed groundwater levels.

On the northern parts of the site, the base of the permeable rail formation/ drainage layers will be at a level below the adjacent longitudinal drain. This drainage system will therefore behave in a similar manner to the southern parts of the site following settlement, as described above. Most of this formation is founded in the natural clay soils, which are of relatively low permeability will therefore limit interaction with the groundwater in the clay. In times of higher flow, the majority of recharge may reach the adjacent drain. However, in times of low recharge, a higher proportion could be expected to infiltrate directly below the formation. Again, groundwater levels may tend to be 'adjusted' towards RL 1.0 below and in close proximity to the formation, however, the effect of this 'adjustment' will be limited by the relatively low permeability of the underlying soils.

The base of the formation on the northern parts of the site falls locally where the track has been lowered. However, the overall formation falls to the north as the northern end of the formation is lower than the central sections. Therefore, as the formation is permeable there may be a tendency for drainage to occur in a northerly direction along the alignment in preference to flowing laterally to the longitudinal rain which is at a higher level. This could lead to some drainage of groundwater on the more central northern parts of the site towards the northern end of the site. The potential for these northerly flows through the formation have been taken into account in the surface water management system. Such flows are not likely to be significant because the natural underlying clay soils will permit only a slow seepage. Further, the lowest area of the rail formation is at the SEPP 14 area, which is also the existing natural lowest point where natural seepage occurs currently. As such, the design mimics the existing groundwater seepage situation.

Conclusions

The proposed development may have some long-term impact on groundwater levels in close proximity to the development. This is likely to include:

- Draw-down of water levels on elevated ground immediately to the west of the southern section of the site due to the proposed longitudinal drain;
- Possible slight decrease in water levels adjacent to formation on northern parts of the site due to the draining effect of the formation and adjacent drain; and
- Locally increased run-off and therefore groundwater infiltration near the location of the basin outlets. The increased run-off will have little effect on groundwater levels during wet times as the water levels are controlled by surface water controls. In times of intermittent weather the increased run-off and may lead to certain areas staying wetter for longer than they may have prior to development. In dryer periods the proposed development will likely have little impact on groundwater levels. There would be some risk of localised pockets receiving less run-off than previously, however, the risk of this is limited as the ground is generally low lying with limited fall, encouraging spreading of the run-off.

There is limited beneficial use of groundwater in the vicinity of the site. It is understood that there are no wells registered for beneficial use within 3 km of the site. Therefore, no impacts to groundwater levels from the LTTSF development are expected to occur at such a proximity to the site. The implications for Groundwater Dependent Ecosystems are discussed below.

4.3.2 Impact on Groundwater-Dependent Ecosystems

The groundwater assessment finds that the Preferred Project will have some limited impacts on GDEs in close proximity to the development footprint:

- Saltmarsh on the southern part of the site may receive additional surface water from Basin 3 than would have occurred pre-development.
- There are some areas of Swamp Oak located within along the western edge of the proposed development on the southern portions of the site. The presence of the adjacent unlined drain may lead to a reduction in groundwater levels during wetter periods, however, may lead to some increase during drying periods.
- Impacts on groundwater levels by drainage through the permeable rail formation and drain in the vicinity of Swamp Oak Floodplain Forest and Coastal Floodplain Sedgelans located near Basin 2 and 1 respectively are expected to be offset by discharges from the basins provided that the design minimises longitudinal flow to reduce possible drainage from the northern end of the formation.

The assessment finds that, notwithstanding minor impacts in close proximity to the development footprint, the Preferred Project will result in negligible impacts upon water levels (and therefore GDEs) in the vicinity of the Hexham Swamp or the Hunter River.

The majority of groundwater and surface water interaction with Hexham Swamp and other GDEs on the western parts of the site occurs well away from the proposed TSF development area. There are no proposed changes to the hydrogeology on this side of the site and therefore impacts to groundwater levels on the western parts of the site are expected to be insignificant.

Monitoring of groundwater levels during and following construction to determine consistency with conceptual groundwater model is recommended by the groundwater assessment and is included as a Statement of Commitment at **Section 5.0**.

4.4 Ecological

An updated Ecological Investigation Report has been prepared by Eco Logical Australia (**Appendix G**) which responds to the issues identified in the agency and public submissions and also considers the Preferred Project. The EA identified the following potential ecological impacts of the proposed development:

- clearing of EEC and habitat for threatened species;
- fragmentation of habitat; and
- changes to the hydrological environment.

The updated Ecological Investigation Report addresses these issues with regard to the amended physical and operational parameters for the Preferred Project. This investigation concludes that the ecological impacts of the Preferred Project will generally affect disturbed vegetation and habitat and that the proposed on-site conservation outcome more than adequately mitigates these impacts.

The Ecological Investigation Report has also been amended to address the key issues identified in agency and public submissions on the Project Application, of which the key issues are discussed in the following sections.

4.4.1 Threatened Species and SEPP14 Wetlands

The Preferred Project results in a minor increase in the impact of the proposed development on native vegetation, with a total of 12 hectares of vegetation requiring removal compared to the 10.64 hectares that require removal in the exhibited project. Of this native vegetation, 7.74 hectares is categorised as endangered ecological community (EEC) compared with 7.48 hectares in the exhibited project. Notwithstanding this, the Ecological Investigation Report concludes that the impact of the Preferred Project will not be significant due to the degraded nature of the EECs and their distribution in the locality and the region.

Despite the above, the Preferred Project reduces the total area of disturbance to SEPP 14 wetland No.833 from a total of 5.71 hectares to a total of 4.63 hectares, which is considered to be a positive feature of the amended design.

Whilst there will be loss of native vegetation and habitat, no threatened species or communities are considered likely to be significantly affected by the project.

4.4.2 Offset Strategy

The NSW Office of Environment and Heritage (OEH) submission on the Environmental Assessment noted that the Ecological Investigations Report was adequate and that OEH could potentially be in a position to support the proposal subject to clarification of the targeted flora survey effort.

Additional details of the proposed offset strategy and identified credits, which have been determined in accordance with the *Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A Developments* (DECCW 2010) are included at **Appendix G**.

The Preferred Project generates a need to provide a total of 387 credits due to impacts on coastal floodplain, phragmites, saltmarsh and Swamp Oak forest. In response, Aurizon have committed to the protection and management of 53.58 hectares of native vegetation and habitat on-site, with existing Swamp Oak forest and phragmites communities being the key protected areas.

In total 447 credits are generated through this strategy, resulting in a positive balance of 60 credits which is consistent with the requirement to 'improve or maintain' standard which is required under the DGRs.

Security of the proposed offset area will be managed through a Conservation Management Plan implemented by a Conservation Agreement in accordance with the NP&W Act 1974. This agreement, or a suitable alternative to the satisfaction of the Director General, will be required to be put in place prior to the commencement of construction and is included as a Statement of Commitment at **Section 5.0**.

4.4.3 Water Quality and Hydrological Environment

Water quality and hydrological impacts of the proposed development are discussed at **Section 4.2** and addressed in detail in the Stormwater Management Plan (**Appendix H**) and the Ecological Investigations Report (**Appendix G**).

Of the five discharge points, two are discharging to endangered ecological communities:

- Discharge from Basin 2 to the Swamp Oak Forest.
- Discharge from Basin 3 to the Coastal Saltmarsh.

With regard to the Swamp Oak Forest a substantial increase in inundation times could have an impact on species composition, however the modelled increase of inundation from every two years to annual inundation is unlikely to result in such a change. As discussed in the following section, this area will be subject to a Vegetation Management Plan and Conservation Agreement that will improve the condition of this area by weed removal.

With regard to the saltmarsh community an increase in freshwater discharge to a saltmarsh environment has the potential to change species composition over time as those saltmarsh species that tolerate freshwater become more dominant. In this particular case the stormwater discharge is into a defined channel that leads into a broader saltmarsh area that receives tidal water as well as run-off from the much larger Hexham Swamp catchment. It is possible that the species composition of the drainage channel itself may change with the increase of freshwater from the site. However, it is unlikely that the increase in discharge from the Aurizon site will alter the species composition of the broader saltmarsh area given the relatively small contribution of the Aurizon catchment compared to the Hexham swamp catchment and the tidal movements from the Hunter River. ELA has assumed a small area of direct and indirect impact to the saltmarsh community (0.35 ha) at the discharge point when calculating impacts to this community. A much broader area of saltmarsh (7.48 ha) is to be protected and managed as part of the Offset Strategy.

4.4.4 Fragmentation of Habitat and Connectivity

A number of public submissions and the submission by Newcastle City Council requested further consideration of the potential impact of the proposed development on the Watagan to Stockton Green Corridor under the *Lower Hunter Regional Strategy*. This corridor is a strategic corridor rather than a fixed designation of land. The Preferred Project results in the removal of 12 hectares of vegetation and habitat that are already disturbed and highly fragmented by the existing railway line, urban development and the Pacific Highway. The Ecological Investigation Report concludes that the improvement of 53 hectares of habitat on-site in locations that provide greater connectivity to the Hexham Swamp and potential for ecological improvement will therefore support the long-term health and connectivity of the Green Corridor rather than hinder it.

4.4.5 Noise and Light Spill

A number of submissions, including the submission by Newcastle City Council, identified potential impacts from operational noise and light spill of the TSF as an aspect of concern. The Ecological Investigation Report finds that whilst noise and lighting impacts may locally modify the habits and movements of fauna around the site and site edges, the assessment considers that these changes are unlikely to result any negative impacts on fauna.

4.5 Contamination

An updated Remediation Action Plan has been prepared for the Preferred Project by GHD and is included at **Appendix H**. This plan identifies potential and known sources of site soil and groundwater contamination, details of additional site investigations, establishes site assessment criteria based on the proposed use and identifies an appropriate remediation strategy to achieve the regulatory requirements.

The proposed remediation for each identified area of contamination is summarised in **Table 4** below.

Table 4 – Proposed Remediation

Area (and Potential Pollutants of Concern)	Strategy
Former UST area (TPH)	Excavation and bioremediation (for re-use) or dispose offsite. The extent and depth of excavation can be guided by visual observations or delineation assisted by the use of a PID. Material excavated will require waste characterisation prior to re-use or off-site disposal.
Hot spot at TP532 (TPH and PAH)	Excavation and dispose off-site. The extent and depth of excavation can be guided by visual observations or delineation assisted by the use of a PID. Material excavated will require waste characterisation prior to off-site disposal.
Fill materials (TPH)	To be further defined during sampling works and updated based on the results of additional sampling.
Woodlands Close fill (TPH and PAH)	Manage in-situ or where material is to be disturbed in the FMA, excavate and contain or dispose off-site. Material excavated will require waste characterisation prior to off-site disposal.
Hazardous Building Materials (asbestos)	Off-site disposal or on-site containment by a licenced contractor. Once the final design for construction work is received, an appropriate method for asbestos management during works will be selected.
Miscellaneous stockpiles of waste	Characterise the material and dispose off-site, re-use onsite or manage in-situ depending on the waste classification results.

Based on the site investigations detailed in the RAP, contamination of the site generally consists of hydrocarbons (TPH and PAH) and asbestos. Contamination has generally been identified in hotspots located throughout the site in the vicinity of former refuelling areas, coal preparation areas and stockpiling areas.

As described at **Section 3.3.2**, the preferred remediation strategy consists of excavation of contaminated soil located within the development footprint and treatment of the excavated materials through one of the selected remediation methodologies. Soils will be excavated by an appropriately qualified contractor and will be characterised for either immediate backfilling or remediation.

Hydrocarbon contaminated material will be transported to an established bioremediation (landfarming) area within the Aurizon site for bioremediation, on-site remediation, on-site containment (capping) or offsite disposal at an appropriately accredited facility.

Asbestos from within buildings to be demolished, and asbestos containing soils, will be removed for disposal in appropriate licenced landfill facilities. Asbestos will be removed by a suitably licenced contractor in accordance with WorkCover requirements.

State Environmental Planning Policy No.55 – Remediation of Land (SEPP 55) requires the consent authority to be satisfied that the land is, or can be made, suitable for the proposed development. The RAP concludes that the site can be made suitable for the proposed development subject to the implementation of the remediation strategy.

Appropriate Statements of Commitment are included at **Section 5.0** which ensure that the Remediation Action Plan is implemented and that the site will be made suitable for the proposed industrial use.

4.6 Acid Sulphate Soils

A revised Acid Sulphate Soil Management Plan (ASSMP) has been prepared by Douglas Partners and is included at **Appendix I**. Previous site investigations have identified the presence of Potential Acid Sulphate Soils (PASS) at several

locations within the site. Preliminary testing of coal washery reject (CWR) indicates that this material has some propensity to generate acid upon oxidation.

4.6.1 Soil Volumes and Treatment

GHD has confirmed that the Preferred Project will generate the following volumes of excavated soils which will potentially require handling and treatment as PASS or potentially acid generating:

- Filling: (possible acid generating coal washery reject (CWR)) up to 100,000 m^3, predominantly obtained from the excavation in the southern part of the site; and
- Underlying Natural Soils: (potential ASS) up to 50,000m^3, predominantly obtained from the excavations in the northern part of the site.

As a result of the above, up to approximately 150,000m^3 of excess treated Acid Sulphate Soils (ASS) and possible acid-generating material (CWR) may be required to be permanently stockpiled within the subject site. It is highlighted that this represents a worst case scenario. A significant proportion of the underlying natural soils are, based on the ground investigations, expected to be PASS or ASS. However, the testing of CWR materials has been limited and by virtue of its source the qualities of this material are variable. As such, whilst the testing carried out to date does indicate that these CWR materials have some propensity to generate acid on oxidation, Douglas Partners consider it unlikely that the potential for such acid generation is extensive.

All excavated ASS/acid generating materials will be contained within a bunded area located in the southern portion of the site, as identified in the ASSMP and as shown in Sketch 80 in **Appendix C**, for treatment though the application of neutralising agent.

The bunded treatment area will be designed to minimise the potential for impact on nearby sensitive receptors. Any leachate produced in the bunded area will be contained for monitoring and treatment in accordance with the ASSMP in order to minimise the potential for impact on surrounding receptors, with leachate storage, treatment and discharge points designed with regard to weather conditions. Water quality within the site does not currently meet the ANZECC *Guidelines for Fresh and Marine Water Quality* (2000) for 'slightly to moderately disturbed ecosystems'. Discharge of water from the bunded soil treatment area and site dewatering will be treated and monitored to achieve compliance with these acceptance criteria, and therefore provide for an improvement in water quality.

Soils will be progressively neutralised with Grade 1 agricultural lime in accordance with the rates detailed in the ASSMP to ensure that the pH of soil in water is consistent with measured background levels. Depending on the results of initial testing, lime application rates may need to be adjusted to gain adequate soil neutralisation in accordance with the soil acceptance criteria specified in the ASSMP.

Treated soils will be re-used or stockpiled over areas within the site that are above the 10% annual exceedance probability flood level. Depending on the quantity of materials required to be stockpiled in this way, the stockpile area will include part of the existing CWR stockpile immediately to the north of the disused rail-balloon loop, as shown in Sketch 80 in **Appendix C**.

The final configuration of the stockpiles, including the ultimate extent and height of the stockpile, will be subject of detailed design and will depend on the final volume of materials excavated. Following completion of the stockpiling the

stockpile area will be appropriately contoured and vegetated to minimise erosion.

4.6.2 Environmental Management and Contingency Measures

Douglas Partners propose the following management and mitigation measures as part of the ASSMP in order to minimise potential adverse impacts resulting from excavation and dewatering of acid sulphate soils during construction:

- Minimise the dewatering depth required for installation (i.e. as close as practicable to the invert level of the excavation);
- Minimise the time and volume of exposed acid sulphate soils (i.e. stage excavation and dewatering);
- Collection of extracted groundwater for temporary storage and treatment as necessary prior to appropriate disposal / release;
- The extracted groundwater could then be appropriately discharged to designated area(s) away from the dewatering site (i.e. evaporation / infiltration), or discharged to stormwater subject to regulatory requirements. Controlled infiltration of waters could be considered within staged construction zones or for adjacent overland discharge (i.e. coal tailings area), subject to detailed design and regulatory approvals;
- The pH of the extracted water should be monitored prior to discharge. Neutralisation should be undertaken if discharge water pH falls below natural groundwater levels (evaporation / infiltration) or regulatory requirements (stormwater disposal);
- Dose the base of the excavation at a rate of approximately 1 kg/m^2 of agricultural lime in order to counteract the generation of acidic leachate following groundwater recovery; and
- Undertake monitoring as follows:
  - Daily inspection of liming operations and sampling/testing of treated soils after lime treatment.
  - Daily monitoring of leachate pH. Neutralisation to be carried out if required.
  - Temporary storage and twice daily monitoring of groundwater extracted from excavations. Neutralisation to be carried out if required.

The ASSMP details contingency measures to address any instances where the soil and water quality standards are not achieved, and outlines appropriate measures to rectify these issues. The ASSMP will be updated following further soil sampling and validation of ASS, and the confirmation of construction methodology. A Statement of Commitment is included at **Section 5.0** that requires the further refinement of the ASSMP for inclusion as part of the Construction Environmental Management Plan prior to the commencement of construction.

Subject to compliance with the acceptance criteria for soil and water identified in the ASSMP and the implementation of appropriate contingency measures in construction documentation, it is considered that the proposed development will not result in any adverse environmental impacts due to the excavation, treatment and storage of PASS and CWR materials within the site.

4.7 Aboriginal Heritage

The Aboriginal Heritage Impact Assessment, included in the EAR, identified the presence of a Potential Archaeological Deposit (PAD) and Site HS1 and a 'Cultural PAD'.

An Addendum to the Aboriginal Heritage Impact Assessment provide in the EAR has been prepared and is attached in **Appendix J**. This Addendum provides more information in relation to the following:

1. Additional test excavations carried out by Australian Museum Business Services (AMBS), including Aboriginal community stakeholder consultation in relation to the test excavation. The AMBS Report is provided attached at **Appendix K**.
2. Update management strategies and recommendations.

4.7.1 Additional Investigations

Archaeological test excavations were undertaken by AMBS on the alluvial plain, near the margins of Hexham Swamp and approximately 600m-1500m from the Hunter River. The proposed access road crosses a second order stream, Middle Creek which is the reliable water sources in the local area. The area has been cleared and maintained for grazing, and also contains numerous access tracks, pipelines and electrical transmission lines.

The results of the subsurface test excavation undertaken by AMBS and the registered Aboriginal stakeholders revealed the disturbed nature of the access track and alluvial plain (swamp). One artifact was recovered from Unit 2 of HHR29, and two artifacts were recovered from Unit 2 of HRR30 both situated approximately 160-180m from Middle Creek. These artifacts were recovered from disturbed contexts, and AMBS determined that they are likely to represent the background archaeology of the local area, rather than long-term cultural activities that would result in extensive in situ archaeological sites. No other archaeological or cultural materials were uncovered during the test excavation.

These results of the test excavation across the alluvial plain conform to the established local archaeological predictive model i.e. that the northern portion of the study area is a low lying water logged area, and as such it is unlikely that this landform would have been suitable for occupation due to regular flooding and it is the elevated landforms surrounding the study area may have been more suitable. Whilst the area would have contained resources suitable for hunting and/or gathering thus supporting long term camping of the swamps edges, the swamp plain itself would not contain evidence of occupation beyond isolated finds and possible very low density artifact scatters associated with hunting and/or gathering.

AMBS concluded that although background scatter of stone artifacts may occur across this landscape, long-term cultural activities that would result in extensive in situ archaeological sites are considered unlikely to occur in this landscape. The low-lying swamp area has been assessed as representing an unlikely occupation area.

Additionally, it has been confirmed that the Aboriginal heritage material at HS1 had been brought into the area from elsewhere and is therefore not representative of past activity in this area by local Aboriginal people. Therefore, although the area is widely recognised as a culturally sensitive resource area, the Potential Cultural Deposit is considered not to have evidence of past occupation. The Potential Cultural Deposit has been identified to have little to no potential for in situ cultural deposits.

Notwithstanding the results of the additional investigations, it is recognised that cultural heritage values of the site are still very important to the local Aboriginal stakeholders.

4.7.2 Consultation

The AMBS report has been provided to the registered Aboriginal parties. No response was received in relation to its results or conclusions prior to the end of the consultation period, and no response has been received since.

The McCardle Cultural Heritage Addendum (including an independent third party report prepared by Kelleher Nightingale) was sent to Registered Aboriginal Parties on 14 June 2013. No response has been received to date. Any responses received will be forwarded to OEH in due course.

4.7.3 Revised Mitigation Strategies

Given the results of the additional investigations McCardle Cultural Heritage has amended the recommended mitigation strategies in relation to Aboriginal heritage, as follows:

1. The persons responsible for the management of works on site will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the *National Parks and Wildlife Act 1974*;
2. The involvement of the registered Aboriginal stakeholders in the ongoing management of the Aboriginal cultural materials within the project study will be promoted and included in the Environmental Management Plan and the Aboriginal Heritage Management Plan; and
3. A cultural awareness program will be included as part of the site induction program and developed with the registered Aboriginal stakeholders (where appropriate) and form part of the Environmental Management Plan and/or the Aboriginal Heritage Management Plan.

These mitigation strategies have been incorporated within the Final Statement of Commitments included at **Section 5.0**.

4.8 Noise and Vibration

An updated Noise Impact Assessment has been prepared by SLR and is provided at **Appendix L**. The updated Noise Impact Assessment includes:

- A cumulative noise impact assessment for concurrent operations of the Hexham TSF with the adjacent Hexham Relief Roads Project.
- Revised construction noise impact assessment to take into account of additional construction phase activities being crushing and concrete batching.
- A revised cumulative noise impact assessment for concurrent construction activities for the Hexham TSF and the Hexham Relief Roads Project.

4.8.1 Relevant assessment criteria

The relevant assessment criteria for nearby sensitive receptors have not changed and remains as described in the EAR. The construction noise affected management noise level can be seen in **Table 5**.

4.8.2 Revised Construction Noise Impact Assessment

The revised construction noise impact assessment has been updated to include for crushing and concrete batching, and associated ancillary activities (such as conveyors and cement tanker unloading). These additional activities have been included into each of the main construction works scenarios modelled. **Table 5** shows the worst-case noise impact and the Noise Management Level for each receiver.

For each receiver the most significant impact arises during different construction scenarios as follows:

- For receivers to the north of the site, the largest construction noise impact is during the internal road construction works that are generally located in the northern part of the site.
- For receivers to the west and south of the site the most significant construction noise impact occurs during demolition, clearing and drainage works.
- For receivers to the east of the site the most significant construction noise impact occurs during railway construction works.

Table 5 – Construction Noise Impact

Receiver	Predicated Construction Noise Level (worst case)	Noise Management Level	Construction Scenario
R1 – Hain Property	49 dBA	51 dBA	Demolition, Clearing and Drainage
R2 – Lynch property	51 dBA	66 dBA	Road Construction
R3 – New England Hwy	61 dBA	66 dBA	Rail Works
R4 – Old Maitland Rd (North)	49 dBA	50 dBA	Rail Works
R5 – Old Maitland Rd	47 dBA	50 dBA	Rail Works
R6 – Old Maitland Rd (South)	**52 dBA**	50 dBA	Rail Works
R7 – Maitland Rd	41 dBA	66 dBA	Road Construction and Demolition, Clearing and Drainage
R8 – Church Old Maitland Rd	52 dBA *	45 dBA (internal)	Rail Works
R9 – Tarro Primary School	54 dBA *	45 dBA (internal)	Road Construction

Notes: These are external noise levels. As a conservative estimate, the difference between external to internal noise levels is 10 dBA. As a result, the internal noise level for receiver R8 would be 42 dBA during Rail Works and R9 would be 44 dBA during road construction. These internal noise levels comply with the internal construction noise criteria 45 dBA.

Noise predictions indicate that the construction of the TSF would comply with construction noise goals for the daytime period at all assessment locations. However, a marginal 2 dBA exceedance of the 'noise affected' management noise level is predicted at location R6 during Rail Works but is well below the 'highly noise affected' management noise level (which is 75 dBA). The exceedance is caused by the operation of the tamping machine.

Although noise levels are predicted to be below the relevant guidelines at the closest residential receivers during construction the following measures will be considered in the preparation of the Construction Noise Management Plan to reduce the construction noise impact:

- Site noisy equipment behind structures that act as barriers or at the greatest distance from the noise sensitive area or orient the equipment so that noise emissions are directed away from any sensitive areas.

- Keep equipment well maintained.
- Employ 'quiet' practices when operating equipment (eg positioning and unloading of trucks in appropriate areas).
- The Construction Noise Management Plan will include:
  - Construction noise goals.
  - Recommendations regarding specific physical and managerial measures for controlling noise, noise and vibration monitoring programs and reporting procedures.
  - Measures for dealing with exceedances and mechanisms to provide ongoing community liaison.

4.8.3 Revised Cumulative Construction Noise Impact Assessment

Cumulative noise predictions for the TSF and the Hexham Relief Roads Project are provided in the updated Noise Impact Assessment prepared by SLR (**Appendix L**). They indicate that the cumulative construction noise predictions for the TSF and Hexham Relief Roads project would comply with construction noise affected noise management levels for the daytime period at all assessment locations with the exception of:

- R2 during road construction for the Hexham Relief Roads project – by 4 dBA.
- R5 and R6 during demolition and clearing for the Hexham Relief Roads project – by 9-10 dBA.
- R5 and R6 during rail works (significant contribution by both projects) – by 4-6 dBA.
- R5 and R6 during building works (significant contribution by both projects) – by 1 dBA.

The potential cumulative construction works are below the 'highly noise affected' management noise level at all times.

Furthermore, the cumulative construction internal noise levels (internal) for assessment location R8 are predicted to comply with the construction noise management levels during road construction and building works. However, the construction noise levels are predicted to be above the noise affected management noise levels for demolition and clearing and during rail construction if both the Hexham Relief Roads Project and TSF were to occur simultaneously.

Since the church services at location R8 are predominantly on Sundays, and outside the proposed construction time periods, there will be no impact from simultaneous construction. However, if church services are required during construction time periods (7.00 am and 6.00 pm Monday to Friday, and 8.00 am to 1.00 pm Saturdays), it is recommended that Aurizon liaise with the church officials and coordinate the Aurizon and ARTC construction activities to avoid simultaneous construction during these time periods wherever possible. A protocol for minimising such impacts will be set out in the Construction Noise Management Plan.

4.8.4 Cumulative Operational Noise Impact Assessment

The Aurizon TSF project has been assessed in accordance with the EPA's Industrial Noise Policy (INP). The INP specifically does not deal with transportation corridors (roadways, railways and air corridors).

The proposed Hexham Relief Roads Project has been assessed to the Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (IGANRIP). The IGANRIP does not apply to *projects involving maintenance facilities for rolling stock which should be assessed in accordance with the INP.*

The INP and IGANRIP provide separate assessment methodology (including different project specific noise levels and different noise averaging periods) and are mutually exclusive. Notwithstanding, SLR has carried out a cumulative noise impact assessment for the concurrent operations of the TSF and the Hexham Relief Roads by assuming that the predicted impacts from the TSF project are indicative of continuous operation during a 24-hour period, and combining them with the noise levels predicted from the Parsons Brinckerhoff report '*Hexham Relief Roads – Noise and Vibration assessment*' (dated 9 May 2012).

Based on the predicted noise levels calculated by SLR the dominant influence on the cumulative noise levels at receiver locations is the operation of the Hexham Relief Roads. The influence of the Aurizon TSF operations is predicted not to result in an increase of cumulative noise levels above that of the proposed Hexham Relief Roads project alone except at receiver R5. A marginal increase of 1dBA is predicted at this location above that of Hexham Relief project which would not be noticeable by most people.

It is highlighted that the operational noise levels from the proposed TSF are predicted to meet the project specific noise criteria at all receiver locations under prevailing weather conditions (calm) during day, evening and night periods, and that sleep disturbance noise levels will comply with the sleep disturbance criteria at all assessment location.

4.8.5 Road Traffic Noise

There are no changes in the assessed impacts of road traffic noise since the submission of the EAR. That is, the additional traffic movements proposed by the operation and construction of the TSF would result in an insignificant change in traffic flow on the New England Highway given the existing traffic volume and a negligible change to the existing road traffic noise level generated from the New England Highway. Therefore, the project is expected to meet the requirements of the Road Noise Policy.

4.8.6 Vibration

There are no changes in the assessed impacts of vibration since the submission of the EAR. That is, due to the separation distance to this and other residential and commercial premises, the level of vibration caused by construction and operational activities at the Hexham site is predicted to be below the level of human perception at any of the nearest premises and therefore below the criteria for "minimal risk of cosmetic damage" at surrounding residential and commercial premises.

4.9 Air Quality

The EAR included an air quality impact assessment (AQIA) for both construction and operations. SLR has provided a supplementary air quality assessment, which is provided in **Appendix M**.

4.9.1 Construction

Key aspects of the project redesign that have the potential to impact on dust emissions during the construction phase are as follows:

- Excavation of some 125,000 m^3 – 150,000m^3 of soil.

- Crushing and screening during the bulk earthworks phase of the construction works in order to maximise the reuse of excavated material on-site.
- A concrete batching plant in order to minimise the number of agitator trucks required to deliver concrete to the site during the construction works.

As noted in the AQIA, due to the irregularity and short duration of the dust emission sources during the construction phase, the activities are not expected to have long-term health or ecological impacts beyond the proposed site boundaries and a quantitative assessment of these emissions was not performed. Rather, best practice controls were detailed in the AQIA such as watering, minimisation of disturbed areas, chemical stabilisation, wind sheltering and source activity management to be put in place during construction to prevent off-site impacts.

While the project redesign means that there is an increase in the amount of material to be excavated, and the crusher/screen and concrete batching plant have the potential to give rise to emissions of particulates to air, emissions from truck movements associated with delivering concrete to site will be significantly reduced. The potential impacts of fugitive dust emissions during the construction phase are still most appropriately managed through the implementation of best practice controls measures as detailed in the AQIA.

Additional recommendations regarding the concrete batching plant have been compiled by SLR, with particular consideration of the NSW EPA Environmental Best Management Practice Guideline for Concreting Contractors (DEC 2004/36). Control measures that will be applied to the concrete batching plant include:

- Location of the plant so that it is no closer than 50 m to an environmentally sensitive location and 100 m from any residential dwelling
- Sand and aggregates should be delivered in a damp condition, using covered trucks.
- Aggregate stored on site in stockpiles will be contained within three-sided storage bunkers with windshields that project 0.5 metre above the bunker wall. Drive-over in-ground aggregate storage bins will be shielded on at least two sides to 0.5 metre high for the full length and width of the bin. Overhead aggregate storage bins will be enclosed.
- Conveyors will be designed and constructed to prevent fugitive dust emissions, through covering with a roof, installing side protection barriers and equipping the conveyor with spill trays.
- A fabric filter incorporating a fabric-cleaning device will be installed on each cement storage silo to ensure that maximum concentration of solid particles in residual gases does not exceed 100 mg/m^3.
- Storage silos will be fitted with high-level audible and visual alarms in addition to an automatic delivery shut-down.

The key mitigation measures for the crushing and screening plant will be:

- Location of the plant so that it is no closer than 50 m to an environmentally sensitive location and 100 m from any residential dwelling
- Use of conveyor covers and skirts, enclosure/housing of crusher and screen;
- Good housekeeping, including clean-up of any spills; and
- Operation of the plant in accordance with the manufacturer's instructions and within the nominated capacity of the plant.

4.9.2 Operational Assessment

The project redesign includes an increase in the volume of diesel stored on-site during operations from 400,000 L to 630,000 L (seven 90,000 L tanks instead of four). The throughput is also projected to increase from 122,200 L/day to 320,000 L/day.

The assessment of emissions from fuel storage in the AQIA identified that the major source of VOC emissions from the site was identified to be the idling locomotives, and the estimated emissions from fuel oil storage and handling on site during operations were negligible. As such, an approximately 50% increase in the diesel storage volume, the projected increase in the diesel throughput and the change in the tank farm location will not give rise to any significant changes in the off-site hydrocarbon concentrations from those presented in the AQIA. No adverse impacts on off-site air quality would therefore be expected as a result of these design changes.

5.0 Final Statement of Commitments

Issue	Commitment
Plans, Documentation and Approvals	Construction and operation of the TSF will be undertaken in accordance with the submitted plans and the description of the proposed development provided in Environmental Assessment as amended by the Preferred Project Report.
	All licences, permits and approvals required by law to construct and operate the TSF will be obtained and maintained as required.
	Operation of the TSF will be undertaken in accordance with the Environmental Management Plan (EMP). The EMP will address all measures to be implemented to minimise and manage potential environmental impacts during the operation of the TSF. The EMP will include the following plans: a) Conservation Management Plan; b) Waste Management Plan; c) Traffic Management Plan; d) Stormwater Management Plan; e) Erosion and Sediment Control Plan; f) Flood Emergency Management Plan; g) Water Quality Management Plan; h) Acid Sulphate Soil Management Plan; and i) Aboriginal Cultural Heritage Management Plan.
Construction	Construction of the TSF will be undertaken in accordance with the Construction Environmental Management Plan (CEMP). The CEMP will outline the environmental mitigation measures to be implemented during the construction phase and will document mechanism for demonstrating compliance with the relevant approvals. The CEMP will include the plans that address the following: a) construction traffic management; b) construction noise and vibration management; c) construction stormwater management; d) water quality and soil management; e) groundwater management; f) flora, fauna and weed management; g) non-indigenous and indigenous heritage management; h) aboriginal heritage management; i) community liaison; j) hazards and risk management; k) acid sulphate soils management; l) spoil management; m) waste management; and

Issue	Commitment
	n) air quality management.
	Construction activities associated with the TSF will be undertaken during the following hours: a) Monday to Friday (inclusive) – 7:00am to 6:00pm b) Saturday – 8:00am to 1:00pm c) Sundays and public holidays – No works to be undertaken at any time
	Where construction works are required to be undertaken outside of the standard construction hours, the following measures will be implemented: a) works will be kept to a minimum; and b) where feasible noise generating works would be scheduled to be completed outside of the 10:00pm to 7:00am night time period.
Ecology	The Construction Environmental Management Plan will include the ecological management measures / procedures set out in the Ecological Investigations report, as follows: a) Site-specific environmental induction for all staff. b) Identification of clearing limits and avoiding the storage of materials and vehicles under the drip line of retained vegetation. c) Ecological surveys will be undertaken prior to clearing or filling of the wetland to minimise impacts on threatened and endangered species and ensure that direct impacts to flora and fauna are avoided. d) When clearing vegetation timber, particularly sections with hollows will be retained as Coarse Woody Debris for enhancement of the Northern Offset area. e) Cease work immediately if any previously unknown threatened flora or fauna species are encountered. WIRES should be consulted if any injured fauna are encountered. f) Provide appropriate controls to manage exposed soil surfaces and stockpiles to prevent erosion and subsequent sediment discharge into surrounding wetlands. g) Clearly identify stockpile and storage locations and provide erosion and sediment controls around stockpiles. h) Stockpiles of topsoil to be stored in windrows no higher than 2m and be maintained free of weeds. i) Undertake dust suppression where required in accordance with the Protection of the Environment Operations Act 1997 (POEO Act) where there is a risk of increased dust outside of acceptable levels j) Establish and implement a Hygiene Protocol for vehicles entering and leaving the site to minimise spread of weeds and other biological risks such as alligator weed. k) Develop a monitoring program during construction (including a weekly checklist) to ensure that all mitigation measures proposed have been undertaken. The checklist should include items such as fencing and sediment and erosion control.

Issue	Commitment
	A Conservation Management Plan will be prepared and implemented in accordance with the NP&W Act for management of the offset areas. The Conservation Management Plan will include: a) strategies to avoid or minimise impacts to flora and fauna; b) procedures to monitor and control weeds (with special methods for eradicating alligator weed); c) measures to prevent erosion and sediment control procedures, which will also be incorporated into the Erosion and Sediment Control Plan; d) monitoring of frog ponds; e) strategies to minimise the impact of the access route through Proposed Offset Area 2; and f) contingency procedures or corrective actions to be followed should monitoring indicate that the identified objectives and outcomes are not being achieved.
	The management of the Southern Offset Area will include: a) the establishment and fencing of the conservation area; b) entering into an appropriate arrangement for the security of the offset area such as a Voluntary Conservation Agreement; c) management of habitat for existing terrestrial and aquatic, flora and fauna species; and d) an annual monitoring program for the first five years.
	The management of the Northern Offset Area will include: a) improving the condition of the Swamp Oak Forest and the Coastal Floodplain Sedgelands; b) entering into an appropriate arrangement for the security of the offset area such as a Voluntary Conservation Agreement; and c) construction of the access route through the Northern Offset Area in a manner that minimises the impact on threatened and endangered species.
Traffic, Access and Car Parking	A Construction Traffic Management Plan will be prepared and implemented, which will outline: a) the safe access routes to and from site; b) vehicle parking areas during construction; c) appropriate signage requirements; d) construction activities that will result in the disruption of traffic and the arrangements for traffic management; and e) methods to minimise impacts associated with construction activities.
	A new T-intersection will be constructed on the Tarro Interchange with a sheltered right turn lane that will be able to accommodate the site access road.
	An access road connecting the Tarro Interchange with the TSF will be constructed.
	Road construction and associated drainage works will comply with relevant Newcastle City Council and Roads & Maritime Services standards.

Issue	Commitment
	Dedicated onsite parking will be provided adjacent to the offices and amenities and on hardstand areas adjacent to main work areas. The facility car park will have 38 parking spaces including two disabled spaces.
Flooding	A Flood Emergency Management Plan will be prepared which provides mitigation and management measures to be implemented in the event of a flood on site.
	The TSF will be constructed using flood compatible material and site power facilities will be place above the 1% AEP flood levels.
Surface and Groundwater Management	The Stormwater management Plan prepared by Worley Parson's forms part of this project and the management, monitoring and maintenance requirements set out in that plan will be implemented. The Plan will be reviewed and updated as part of the detailed design process.
	A Construction Water Quality Management Plan will be prepared and implemented as part of the CEMP once the final construction methodology is confirmed. The Plan will identify a range of preventative, treatment and contingency measures for the construction phase of the TSF project including further details regarding appropriate erosion and sediment controls to be implemented at discharge locations and spillways to prevent the discharge of sedimentation during construction. Stormwater management measures for the construction phase will be developed in accordance with the Landcom 'Blue Book' and incorporated in the Construction Environmental Management Plan prior to the commencement of construction.
	Surface water and groundwater monitoring will be undertaken prior to the commencement of construction to: a) establish existing water quality baselines; b) identify sources of potential impact from construction operations; and c) determine the potential for off-site migration of contaminants through water sources.
	Areas of high sediment, oil & grease and nutrient loads will be separated from the stormwater system (e.g. wash bays, provisioning sheds, servicing sheds). These areas will be treated separately and discharged to trade waste or for re-use in wash down.
	Gross Pollutant Traps (GPTs) will be utilised to provide primary screening of stormwater. A secondary system of GPTs will be located at the outlet of each Water Quality Control Pond as a final barrier to remove suspended solids, remaining floating debris and hydrocarbons.
	Access roads will be constructed with road side swales to provide treatment through flow attenuation and sedimentation of suspended sediments.
	Surface water and groundwater monitoring will be regularly undertaken during the ongoing operation of the TSF to: a) identify any change in water quality; and b) determine the appropriate treatment strategies to be implemented to maintain or improve water quality. The water monitoring program for the TSF project will include monitoring of changes in hydrological regime associate with discharges to catchment 2 (which contains the Swamp Oak Forest EEC) in the northwest and to Catchment 5 (which contains the Coastal Saltmarsh EEC) to the south. Further opportunities will be investigated to manage stormwater flows on the site to assist in creating favourable water flows and levels that support rehabilitated and offset areas of significant ecological value.

Issue	Commitment
Effluent Disposal	A wastewater system for effluent disposal will be established.
	A recycle system for wash down water will be established.
	An irrigation area with the following site improvements will be established: a) removal of the concrete hardstand and footings in the central portion of the site, or placement of 0.5m of suitable clay loam fill material over concrete; b) addition of lime to acidic soils to maintain plant growth; c) addition of gypsum to improve the soil structure and reduce dispersion/erosion; d) earthworks to recontour and fill drainage channels and redirect surface water flow around the proposed irrigation area (meeting buffer distance requirements); e) where required, placement of suitable fill or earthworks to raise site levels to at least 1m above the permanent groundwater table and/or at least 0.6m between the highest seasonal water table level and the base of the irrigation areas (whichever is the greater); f) importation and placement of a suitable clay loam fill to form the surface of the irrigation area to improve soil properties and minimise the potential for the groundwater pollution; and g) installation of catch drains/bunds upslope and downslope of the irrigation area to prevent rainfall run-on and runoff.
	Dewatering licences will be obtained in respect of the sewer installations where required.
	Rainwater tanks will be installed to top up the recycled water system.
Contamination	Remediation will be carried out in accordance with the Remedial Action Plan to: a) remediate hydrocarbon contamination present in fill material; b) remove by localised excavation those hydrocarbon impacted soil associated with former fuel tank (Pit 128) and the former refuelling area (Bore 102 and Pit 128); and c) Asbestos from within buildings to be demolished, and asbestos containing soils, will be removed for disposal in appropriate licenced landfill facilities. Asbestos will be removed by a suitably licenced contractor in accordance with WorkCover requirements.
Acid Sulphate Soils	The ASSMP prepared by Douglas Partners forms part of the project. The ASSMP will be updated following further soil sampling and validation of ASS, and the confirmation of construction methodology.
Aboriginal Archaeology	The persons responsible for the management of works on site will ensure that all staff, contractors and others involved in construction and maintenance related activities are made aware of the statutory legislation protecting sites and places of significance. Of particular importance is the National Parks and Wildlife Amendment (Aboriginal Objects and Aboriginal Places) Regulation 2010, under the National Parks and Wildlife Act 1974.
	The involvement of the registered Aboriginal stakeholders in the ongoing management of the Aboriginal cultural materials within the project study should be promoted and included in the Environmental Management Plan and the Aboriginal Heritage Management Plan.

Issue	Commitment
	A cultural awareness program will be included as part of the site induction program and developed with the registered Aboriginal stakeholders (where appropriate) and form part of the Environmental Management Plan and/or the Aboriginal Heritage Management Plan.
European Heritage	A Construction Non-Indigenous Cultural Heritage Management Plan will be prepared and implemented, which will set out the mitigation and management strategies to be implemented to minimise potential impacts to European heritage items.
	Serviceable bricks from the Control Box will be salvaged and appropriately reused in a symbolic linkage of the past and proposed uses of the place.
	A plaque providing details of the site's heritage will to be located on the site.
	An Excavation Director, with appropriate experience will be appointed prior to any excavation within the vicinity of the junction of the Minmi to Hexham Railway and the Great Northern Railway.
	The Excavation Director will advise on archaeological matters associated with the excavation and will ensure compliance with procedures to be adopted in the event of unexpected finds and measures for protecting heritage items that are to be conserved.
	All archaeological deposits, features and relics that are exposed during the works associated with the proposed TSF will be recorded in accordance with Heritage Branch guidelines.
Noise and Vibration	A Construction Noise Management Plan (CNMP) will be prepared and implemented prior to commencement of construction works at the site. The CNMP will include the following: a) construction noise goals; b) specific practical, feasible and reasonable measures for controlling noise, noise and vibration monitoring programs and reporting procedures; and c) mechanisms to provide ongoing community liaison.
	Equipment will be kept well maintained to prevent unnecessary noise and vibration.
	When noisy operations associated with construction activities must be carried out: a) Australian Standard 2436-1981 'Guide to noise control on construction, maintenance and demolition sites' will be followed when relevant; b) where reasonable and feasible, noisy equipment will be sited behind structures that act as barriers or at the greatest distance from the noise-sensitive areas; and c) a responsible person will maintain liaison between the neighbouring community and the contractor.
Air Quality and Greenhouse Gas	Activities carried out on site will be undertaken in a manner that will ensure that all equipment used, and all facilities erected, are designed and operated to control the emission of smoke, dust, fumes and other pollutants into the atmosphere.

Issue	Commitment
	Measures to minimise the impact of dust generated in association with the proposed development will be implemented including: a) watering of roads and sealing of roads if required; b) stabilisation of disturbed areas as soon as possible; c) wind breaks composed of earth banks and other screens to protect areas by reducing capacity of the wind to raise dust; d) trucks entering and leaving the site will be well maintained in accordance with the manufacturer's specification to comply with all relevant regulations; e) fines may be imposed on vehicles which do not comply with smoke emission standards; f) truck movement will be controlled on site and restricted to designated roadways; g) truck wheel washes or other dust removal procedures (including covering of loads) will be installed to minimise transport of dust offsite if necessary; h) during construction if there are periods of high winds, stockpiles and exposed areas will be covered, or watered, or revegetated; i) procedures to control dust and other emissions from construction operations and on-site equipment will be implemented; j) stockpiles and handling areas will be maintained in a condition which minimises windblown or traffic generated dust; k) construction equipment and transport vehicles will be properly maintained to ensure exhaust emissions comply with relevant regulatory requirements, and to minimise emissions; l) cleared vegetation, demolition, materials and other combustible waste material will not be burnt on site; m) silt will be removed from behind filter fences and other erosion control structures on a regular basis, to prevent it becoming a source of dust; n) non-essential idling of locomotives will be minimised, and locomotives with excessive smoke will be expeditiously repaired; and o) low sulphur diesel fuel will be used where available.
Social and Economic	The following information will be available for community enquiries and complaints prior to and during the construction and operation of the TSF: a) a contact number on which complaints and enquiries about construction and operational activities may be registered; b) a postal address to which written complaints and enquiries may be sent; and c) an email address to which electronic complaints and enquiries may be sent.
	A Near Neighbour Consultation Strategy will be implemented for ongoing proactive engagement and communication with surrounding and adjoining residents. This strategy will include: a) policies which aim to increase project knowledge and develop community-staff relations; and b) processes to inform neighbours about access arrangements to the development site and changes to property access that may affect them.
	Employment of local and regional workers will be promoted to retain and develop the local skills base. Local businesses will be utilised where possible for resources and materials for construction and operations.
	Appropriate security protocols will be established to ensure unauthorised persons do not access the TSF site.

Issue	Commitment
	Open and direct communications will be maintained with Australian Rail Track Corporation and the Hunter Valley Coal Chain Coordinator, to ensure that potential benefits of the project are maximised and negative impacts minimised.
Waste Management	A Construction Waste Management Plan will be prepared prior to the commencement of construction on the site. The Construction Waste Management Plan will address the following: a) appropriate waste identification, handling, storage and disposal in accordance with the Department of Environment Climate Change and Water Guidelines; and b) procedures for how the different waste streams will be stored, collected and disposed of by licensed waste contractors.
	An Operational Waste Management Plan will be prepared to address the ongoing handling, storage and disposal of waste. The Operational Waste Management Plan will provide: a) identification of the types of waste likely to be generated during construction; b) appropriate storage of waste on site; c) measures to minimise the amount of waste produced; d) measures to increase the potential for waste to be re-used and recycled; e) appropriate methods to assess if waste can be re-used, recycled or disposed to landfill; and f) maintaining records of waste re-use, recycling and/or disposal.
	Licensed waste contractors will be made responsible for collection and appropriate disposal of waste.
Visual	Following construction, landscaping treatment will be undertaken within the developed area of the site. Appropriate locations for landscaping treatment will be determined based on environmental, operational and safety considerations.
	Buildings will be constructed of low reflective materials and colours will be of earth tones.
Hazardous Material	Any hazardous materials will be stored and disposed of in accordance with WorkCover Authority requirements.
	The amount of diesel fuel to be stored at the TSF exceeds the NSW WorkCover 100kL threshold for C1 combustible goods. As such notification of Dangerous Goods on Premises will be lodged with WorkCover NSW prior to construction being initiated.

6.0 Conclusion

Preferred Project

An Environmental Assessment Report (EAR) in support of a Project Application (MP07_0171) for the Aurizon Train Support Facility, at Hexham, was publicly exhibited for a period of one month from 21 November 2012 to 21 December 2012. The proponent Aurizon Operations Ltd (formerly known as QR Limited, trading as QR National) and its consultants have reviewed and considered the Department's comments and submissions received regarding the EAR. The Preferred Project makes a number of amendments to the exhibited Project Application in order to address the potential environmental impacts identified in submissions and during design development.

Key changes to the exhibited Project Application include amendments to the:

- vertical alignment of tracks lowered;
- project footprint;
- building layout and configurations;
- access roads; and
- construction details.

Environmental Impacts

The Preferred Project Report and accompanying documentation supplements the Environmental Assessment Report and provides further assessment of the potential environmental impacts of the proposed Hexham Train Support Facility. In particular, the PPR includes further detailed assessment of the following key issues:

- flooding;
- stormwater and water quality;
- groundwater;
- ecology;
- contamination;
- acid sulphate soils;
- aboriginal heritage;
- noise and vibration; and
- air quality.

In light of the further environmental assessment provided within the PPR, it is considered that the environmental impacts of the Preferred Project for the Hexham Train Support Facility can be appropriately managed. This further assessment has informed the revised project mitigation measures which should be incorporated in the Project Approval through the Final Statement of Commitments at **Section 5.0**. Key

The proposal has significant economic and environmental and the potential impacts can be effectively mitigated and/or managed through the Final Statement of Commitments.