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Hexham Train Support Facility

Services Investigation Report

301020-03465-CI-REP-0001-H

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QR NATIONAL
HEXHAM TRAIN SUPPORT FACILITY
SERVICES INVESTIGATION REPORT

PROJECT 301020-03465-CI-REP-0001-H HEXHAM TRAIN SERVICING FACILITY							
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1. INTRODUCTION

1.1 Background

QR National proposes to develop a 38 hectare (ha) parcel of land adjacent to the Great Northern Railway at Hexham for a Train Support Facility (TSF). In parallel with the application to be made for the TSF, the Australian Rail Track Corporation (ARTC) has confirmed that it will be lodging an application for a relief roads project (5 rail tracks) on an 18ha site located between the TSF site and the Great Northern Railway.

WorleyParsons (WP) has been engaged by QR National to prepare a services investigation report for the proposed TSF development at Hexham.

This services investigation report forms part of the Environmental Assessment being undertaken as part of the Project Application (development application) for the TSF. Potential cumulative impacts of the ARTC Relief Roads project on servicing of the TSF have also been discussed in this report.

1.2 Report Objectives

The following objectives have been adopted for this services investigation report:

- Assess the existing infrastructure.
- Identify opportunities for services connections to the site.
- Identify service demand, capacity and augmentation of existing infrastructure as a result of the project.
- Identify staged infrastructure.

1.3 Site Description

The TSF site is located at the southern end of Woodlands Close, Hexham. The site is bounded to the east by the Great Northern Railway, which runs parallel to the New England Highway and the south arm of the Hunter River estuary. The Chichester Trunk Gravity Main (CTGM) is located to the west and south of the development site.

Refer to **Figure 1, Appendix A** for the locality plan.

The site incorporates the following properties:

- Lot 1 DP 155530 (QR National)

- Lot 1 DP1062240 (ARTC)
- Lot 2 DP 735456 (QR National)
- Lot 10 DP 735235 (QR National)
- Lot 12 DP 1075150 (QR National)
- Lot 101 DP1084709 (K. Wallin)
- Lot 102 DP 1084709 (QR National)
- Lot 104 DP 1084709 (QR National)
- Pt Lot 104 DP 1084709 (QR National)
- Lot 113 DP 755232 (QR National)
- Lot 311 DP 583724 (QR National)
- Lot 1 DP128309 (Hunter Water)

1.4 Proposed Development

The TSF is required by QR National to aid its coal logistics operations and would incorporate locomotive and wagon maintenance facilities as well as a freight rail yard and associated maintenance infrastructure. The TSF would occupy approximately 38 ha of land.

The adjacent ARTC Relief Roads project will consist of five railway lines on an 18 ha parcel of land between the TSF site and the Great Northern Railway.

Refer to **Figure 2, Appendix A** for site plan.

1.5 Project Timing

A Project Application for the TSF is currently being prepared. It is expected that the construction works for the Train Support Facility would commence in late 2012 and is expected to be complete by mid 2014.

1.6 Relevant Legislation and Guidelines

Relevant legislation and guidelines include the following:

Newcastle City Council (S68 Approval)

Application for approval under Newcastle City Council's Section 68 activity is required when using an onsite waste management system. Plans should detail the proposed waste management network including collection and treatment systems.

Hunter Water Design Standards

In 2010, Hunter Water adopted integrated editions of the Water Services Association of Australia (WSAA) Sewerage (WSA02) and Water Supply (WSA03) design codes. For other aspects of water supply and sewerage design, Hunter Water's design manual (Sections 4, 5 and 6) defines parameters and practices to be adopted in designing components of Hunter Water's water and sewer systems.

Australian Guidelines for Water Recycling

The Environment Protection and Heritage Council, the Natural Resource Management Ministerial Council and the National Health and Medical Research Council have developed National guidelines for the safe use of recycled water.

Environmental Guidelines - Use of Effluent by Irrigation, October 2004

This Guideline is educational and advisory in nature and provides information on best management practices where effluent is managed by irrigation. This information can be used in the design and operation of effluent irrigation systems and can also be relevant and useful for meeting environmental requirements under the Protection of the Environment Operations Act 1997 (POEO Act) and in negotiations for premises-specific environment protection licences. It should be noted that the National guidelines (refer above) generally take precedence over these guidelines.

National Water Quality Management Strategy - Guidelines for Sewerage Systems - Use of Reclaimed Water, November 2000

The Guidelines for Sewerage Systems - Reclaimed Water is one of a suite of documents comprising the National Water Quality Management Strategy. These Guidelines provide advice on reclaimed water quality, level of treatment, safeguards and controls and monitoring.

Interim NSW Guidelines for Management of Private Recycled Water Schemes, May 2008

These interim guidelines, published by the NSW Department of Water and Energy (now part of the Office of Environment and Heritage) provide advice for obtaining approval to install and operate a private recycled water scheme within the existing NSW legislative framework.

1.7 Available Data

The following information was used as part of this investigation:

- Hunter Water Sewer and Water Information Management System (SWIMS) plans.
- Hunter Water Indicative Requirements for the Proposed Development.
- Dial Before You Dig plans (Energy Australia, Telstra, Optus, Nextgen, HWC).

- Telstra Servicing Advice.
- Preliminary Alinta Servicing Advice (Now Jemena).
- Design and operational information from other QR National train servicing facilities.
- Preliminary Geotechnical information.
- Preliminary Environmental investigations.

2. EXISTING CONDITIONS

This section describes the historic and current land uses and the existing infrastructure in the area of the development.

2.1 Historic and Current Land Use

The TSF site formerly contained a coal tailings stockpile, washery facility and a section of the Richmond Vale Railway (RVR), which operated between 1856 and the late 1980s. In the 1950s, the southern portion of the site was reclaimed and utilised as a Coal and Allied coal preparation, stockpiling and dispatch terminal. These operations ceased in 1987, when the washery and majority of the rail facilities were removed, but the concrete foundations, coal tailings and "chitter" remain on the site.

As a result of this, there are significant stockpiles of coal washery reject on the site. There is also potential for a wide range of soil contamination to be present on the site and this has been assessed by Douglas Partners in their report dated 2012 as part of TSF submission.

Currently, the site is utilised for cattle grazing and irrigation of treated wastewater effluent from the wastewater treatment plant located on-site and operated by Australian Co-operative Foods Ltd. Under a license agreement, treated effluent from the plant is spray irrigated over selected areas of the site. Areas subject to irrigation are harvested regularly for hay.

2.2 Existing Services

2.2.1 Water

The recently upgraded DN900 CTGM is located parallel to the western and southern boundaries of the development site. The previous (above ground) CTGM was located to the west of the development site. A DN200 water main supplied from the previous CTGM runs along the southern boundary of the former RVR corridor to Australian Co-operative Foods Ltd and also industrial land on the eastern side of the New England Highway. Refer Hunter Water's Chichester Water System plan in **Appendix B**.

2.2.2 Wastewater

Currently there is no Hunter Water Corporation sewer infrastructure within the area of the proposed development. Australian Co-operative Foods Ltd, located to the east of the development, has a wastewater treatment plant on site. Under a license agreement, treated effluent from this plant is spray irrigated over selected areas of the site.

2.2.3 Telecommunications Network

Telstra, Optus and Nextgen telecommunications networks are located within the eastern pavement on Maitland Road. Refer Dial Before You Dig plans in **Appendix B**. According to the Telstra preliminary servicing advice a network upgrade would be required.

2.2.4 Gas Service

A DN500 gas supply trunk main crosses the site from west to east. Refer Jemena's Dial Before You Dig plans in **Appendix B**.

The TSF development is over this main and QR National has commenced discussions with Jemena regarding the possible relocation of this main.

According to the Jemena preliminary servicing advice there is natural gas available and could be extended to supply the development.

2.2.5 Electricity

Street lighting and auxiliary underground cables are located along Maitland Road. Overhead powerlines are located along Maitland Road and across the development site. Ausgrid has previously advised that there is electricity available to the development site.

3. WATER

3.1 Water Authority

The water authority responsible for the proposed development area is Hunter Water Corporation and we are currently waiting on updated advice applicable to the TSF. This will be forwarded upon receipt.

3.2 Water Demand

As detailed information on water demand is not available for the proposed TSF, the ultimate water demand for the TSF has been calculated using a range of methods outlined in the Hunter Water WSAA design codes and has been found to range between approximately 6 ET and 14 ET. Due to the preliminary nature of this investigation, a conservative water demand of 13.6 equivalent tenements (ET) has been adopted, based on the following assumptions:

- Ultimate site capacity of 30 persons.
- Two shifts per day (total 60 persons using the site each day).
- Each person at the site would have a water demand equivalent to half of the demand of a person occupying a residential house in the Newcastle local government area.
- Occupancy rate for residential houses of 2.2 equivalent persons (ep) per ET.

It is recommended that water demands be calculated from first principles during the detailed design phase of the project.

The water supply would be provided for the showers and toilets in the administration block, two maintenance facilities and other facilities located within the TSF. The water demand quantification for the TSF is included in **Table 3.1**.

Table 3.1 Train Support Facility Water Demand

Stage	ET	Average Day Demand			Peak Day Demand * kL/day	Extreme Day Demand * kL/day	Peak Hour Demand * kL/day
		Administration kL/day	Wash Down Top Up kL/day	Total * kL/day			
Ultimate	13.6	9.5	0.5	11.5	13.8	15.9	17.0

* includes 15% unaccounted for water

3.3 Water Connection

The former above ground CTGM to the west of the site has recently been replaced with a new DN900 below ground CTGM located to the west and south of the development site. A DN200 water main was supplied from the former CTGM and ran along the southern boundary of the former RVR corridor to Australian Co-operative Foods Ltd and to industrial / residential properties along Maitland Road.

The above ground CTGM has since been removed from the site and it has been assumed that the existing DN200 water main has been connected to the new below ground CTGM.

Preliminary investigations into the capacity of the existing DN200 water main indicated that the TSF could be supplied from this main without requirement for an upgrade. However, as a result of the filling works across the site, the existing water main could be significantly deep (more than 1.5 metres), which would create a constraint for maintenance. Therefore, some sections of the water main may need to be re-laid to reduce their depth. This alteration would be subject to detailed design and assessment by HWC.

3.4 Internal Reticulation

As mentioned in **Section 3.3**, the TSF water demand would be supplied from the existing DN200 water main. A loop DN150 reticulation water main servicing the Train Support Facility would be located outside road and rail routes for the administration building, wash down area and other facilities.

Hydrants would be provided in the reticulation main for fire fighting. Fire fighting requirements are likely to include hydrants at each of the major facilities, including fuel depot, provisioning depot (two locations) and administration buildings.

3.5 Relief Roads Project

The Relief Roads project currently proposed by ARTC will not have any impact on water servicing for the TSF.

4. WASTEWATER

4.1 Wastewater Authority

The wastewater systems for the TSF would be owned and managed by QR National according to the approval and requirements of NCC and the Office of Environment and Heritage (OEH).

4.2 Wastewater Loadings

The initial wastewater loading quantification for the development is included in **Table 4.1**.

Table 4.1 Train Support Facility Wastewater Loadings

Stage	ET	ADWF L/s	SA L/s	PWWF L/s
Ultimate	13.6	0.15	0.8	1.5

In addition to the above, there is likely to be a discharge from the wash down ponds estimated as 5% of the daily usage, i.e. 250 L per day at ultimate development. Assuming a slow release over 24 hours, flow from the wash down ponds would be 0.003 L/s.

4.3 Wastewater Reticulation Design

As mentioned in **Section 2.2.2,** there is currently no sewerage infrastructure within the area of the proposed development.

The TSF would be serviced by DN150 reticulation sewer, which would be constructed to service the administration building, wash down area and other facilities.

The wastewater from the TSF would be treated on site. A package wastewater treatment plant would be provided for treatment of domestic effluent and a separate treatment process is proposed for reclamation of wash-down water.

The wastewater management system is further detailed in **Section 5** and shown on drawing nos.**301017-03465-CI-DSK-0001** and **0002** included in **Appendix A**.

4.4 Relief Roads Project

The Relief Roads project currently proposed by ARTC will not have any impact on wastewater loadings or servicing for the TSF.

5. WASTEWATER MANAGEMENT

The proposed wastewater management philosophy is demonstrated on drawing nos. **301017-03465-CI-DSK-001 and 002** included in **Appendix A**. There are two separate treatment streams - one for sewage, and the other for the wash down water recycling.

5.1 Sewage Treatment

5.1.1 Loadings

The initial wastewater loading quantification for the development is included in **Section 4.2**.

5.1.2 Layout

Sewage from the TSF would gravitate to a collecting wastewater pump station for transportation to the package wastewater treatment plant. Alternatively, pressure or vacuum sewerage systems may be used to collect sewage and deliver it to the package wastewater treatment plant. The effluent would be treated, including biological treatment, and possibly chemical dosing for phosphorus control. The treated effluent would then be transported via an effluent irrigation pump station to a diversion valving unit. From here the treated effluent would be directed to be spray irrigated over the selected irrigation fields. In the event that there is no spare capacity for irrigation, the treated effluent would be stored in the buffer storage until suitable conditions occur.

5.1.3 Collecting Wastewater Pump Station and Effluent Irrigation Pump Station

A package sewage pump station would be constructed for collection and transport of the sewage effluent from the TSF. The collecting wastewater pump station would be located in the vicinity of the administration building and would transport wastewater to the package treatment plant. The effluent irrigation pump station would be located in the vicinity of the irrigation fields. Refer drawing no. **301020-03465-CI-DSK-001** in **Appendix A**.

The package pump station would include two submersible pumps, a suitable wet well, dual control panel and sewer rising main.

The irrigation pump station would comprise two pumps mounted on a concrete slab with an adjacent control cabinet.

Based on the initial wastewater loading quantification detailed in **Section 4.2**, the preliminary package pump station specification would be as follows:

Pump duty: 1.5 L/s

Requires: 1 duty and 1 standby pump operating alternately

Rising main diameter: 50 mm

5.1.4 Package Wastewater Treatment Plant

Package wastewater treatment plants provide the same treatment process to that of a conventional sewage treatment works such as those owned and operated by Hunter Water, but on a smaller scale. They are often manufactured externally to the site and assembled on site. They are more likely to be economical for smaller scale plants such as that required for the TSF.

A sample proprietary package treatment plant is detailed in **Table 5.1**.

Table 5.1 Sewage Package Treatment Plant

Supplier	Treatment System Description
Septech Industries Australia	Turbojet treatment technology – The Turbojet system is a package treatment plant that treats liquid wastewater and chlorinates effluent, if required.

The above list is by no means exhaustive and many more suppliers may be able to meet the needs of the TSF.

5.1.5 Buffer Storage

Buffer storage would be provided to balance out the peak flows from the package treatment plant, allowing a relatively uniform irrigation rate for effluent. In addition, the buffer storage would store treated effluent during wet weather until the irrigation areas are dry enough to allow the effluent to be spray irrigated over the irrigation fields.

The buffer storage of 790m^3 is sized with sufficient storage for 60 days of treated effluent discharged at average dry weather flow of 0.15 L/s for the ultimate development stage of the TSF.

A secondary back-up irrigation area has also been provided to allow irrigation during periods when the primary irrigation area becomes too saturated to allow irrigation to occur (refer **Section 5.1.6**).

During operation, the volume of storage would be monitored. In exceptional circumstances, such as prolonged wet weather, an operational procedure would be put in force for disposal of excess treated effluent. According to this procedure, the excess treated effluent would be pumped out and transported by a tanker truck to a suitable point of disposal to Hunter Water's sewerage system under

a trade waste agreement. It is anticipated that this would not occur more than once or twice during the first five years of operation.

5.1.6 Irrigation

The treated effluent would be spray irrigated over the irrigation fields located in the southern corner of the development site.

An effluent disposal assessment undertaken by Douglas Partners (**Reference 2**) indicated that the irrigation area for the ultimate average dry weather flow of 0.15 L/s would be 40,000m^2 based on a conservative irrigation rate.

Based on the above analysis, the primary irrigation area was sized at 40,000 m^2. In addition, to manage the irrigation during wet weather periods, a secondary irrigation area of 20,000 m^2 would be provided.

It will be necessary to provide a diversion drain west of the irrigation areas so that storm water does not discharge onto the irrigation areas.

In addition, the following recommendations have been made by Douglas Partners regarding the preparation of the site effluent irrigation area:

- Removal, or avoidance of existing concrete hardstand and footings in the proposed irrigation area. Alternatively, 0.5m of suitable clay loam fill material could be placed over the concrete hardstand (subject to levels matching etc).
- Addition of lime to acidic soils to maintain plant growth.
- Addition of gypsum to improve soil structure and reduce potential for erosion / dispersion.
- As discussed above, earthworks to re-direct and fill existing drainage paths away from the effluent irrigation area.
- Importation of fill materials or earthworks to locally raise site levels above the 1 in 20 year flood level, and at least 1 metre above the permanent groundwater level.
- Importation and placement of a suitable clay loam fill to form the surface of the irrigation area to improve soil properties and minimise potential for groundwater pollution (i.e. reduce infiltration through coal reject filling).
- Installation of catch bunds / drains upslope and downslope of the disposal area to prevent rainfall run-on and run-off.

Refer drawing no's **301017-CI-DSK 0001 and 0002** in **Appendix A**.

5.2 Wash Down Water Treatment

5.2.1 Loadings

The initial wash down water loading quantification includes the following assumptions:

- There would be 40 wagons washed per day using 3.8 kL/day of water per day.
- There would be 1 locomotive washed per week using 7.5 kL of water per week.

As a result, the average daily water usage would be 5 kL/day and the peak demand would be 11.3 kL/day.

During the initial 2 to 3 months there would be a requirement for top-up water from the Hunter Water water supply system, but after that water from the mains would only be required for top-up to counter evaporation and to dilute potential salt build up in the recycled water. Rainwater harvesting from building roofs would also contribute to the required top-up.

Initial demand is estimated as a total of 400 kL for the start up period. Then the continuing top up demand is estimated as 10% of daily usage, i.e. 500 L/day at ultimate development.

5.2.2 Layout

There would be separate wash down areas for locomotives and for wagons. The locomotive wash down would use high pressure steam cleaners. The wagon wash down would use high volume hoses. The wash down water carrying sediment, road dust, coal fines and coarse coal would be collected by channels. The wash down areas would be screened to retain spray drift and minimise rainfall contributing to the wash down water flow.

The wash down water from the locomotive shed would gravitate to a proprietary gross pollutant trap. The wash down water from the wagons would gravitate to a coarse waste coal trap.

From the waste traps the locomotive wash down water and the wagon wash down water would be transported to a flocculant and pH adjustment tank and then to an oil / grease separator.

The oil / grease separator would yield three separate streams. The oil and grease skimmed off the top would go to an oil holding tank. The settled sludge would go to a sludge holding sump and the clear water would go to a collection pump station.

The oil and sludge would be collected by a trade waste treatment contractor for further treatment off site.

The collection pump station would transport the treated water to the wash-down water storage. The wash down return delivery pump station would transport the reclaimed wash down water improved by chlorine dosing to the re-use header water tank for further use in the wash down process.

There is likely to be a small discharge from the recirculation system associated with the wash down facilities. This is estimated to be 250 L/day at ultimate development. Assuming a slow release over 24 hours, these flows from the wash down ponds may range from 0.001 to 0.003 L/s. That is, this discharge is likely to be a very small proportion of the domestic sewage flows. The overflow from the pond is likely to be slightly saline as a result of the wagon wash down process. There is no information on how saline this overflow water would be, but the system would be operated so that the salinity is kept within limits not exceeding a maximum TDS of 1,224 mg/L.

A small quantity of wash down water would overflow to the collection wastewater pump station for further treatment and disposal over the irrigation fields.

5.3 Wash Down Water Treatment Process

The wash down water treatment process would include coal separation sumps, waste traps, flocculant and pH adjustment tank, oil / grease separator and chlorine dosing.

Coal Separation Sumps

QR National has advised that the wash bay areas would be screened and bunded with a concrete bunded floor for containment of wash down water. All wash down water, including sediment such as road dust and coal build-up would be collected in floor channels and directed to sumps for waste capture.

Waste Capture

Due to the different size of the pollutant components washed down in the locomotive and wagon wash down areas, the wash down water from these two areas would gravitate to separate gross pollutant traps.

The wash down water from the collection sump in the locomotive wash down area would gravitate to a proprietary gross pollutant trap (e.g. HUMES). The clear water would then gravitate to the wagon wash down coarse waste coal trap.

The wash down water from the collection channel in the wagon wash down area would gravitate to a coarse waste coal trap.

Flocculant and pH Adjustment Tank

The water from the coarse waste coal trap would be pumped to a mixing tank. In the mixing tank the wash down water would be treated with flocculants to remove solids then undergo pH adjustment before being discharged to an oil / grease separator.

Oil / Grease Separator

The oil and grease separator would remove all free oil from contaminated streams to comply with the discharge requirements. Typically no more than 5mg/L of oil would remain with no visible sheen.

The AJM EnviroSEPTM is one such example of the many proprietary products on the market that are commonly used in wastewater treatment operations. AJM's system includes a two stage plate pack assembly. The first stage is designed to remove gross slugs of oil followed by the secondary polishing stage that removes any remaining droplets. The plate packs are fabricated in flat stainless steel sheet configured to maximise coalescing of oil droplets. Sludge hoppers with drains are provided on the bottom of the unit.

Alternative Solution

As an alternative to the separate components listed above special suppliers, such as Sepa, are able to provide a package arrangement that would include all components between the coarse waste coal trap and the wash down water discharge. This includes flocculant and pH adjustment tanks, dosing units, oil and grease separator, oil holding tanks, sludge holding tanks, chemical tanks and all controls, and pumps would be included in a skid-mounted package ready to be connected.

5.3.1 Wash Down Water Pump Stations

Two wash down water pump stations would be constructed for transport of the wash down water. The collecting pump station would transport wash down water to the wash down water storage. The wash down return delivery pump station would deliver wash down water to the re-use header water tank. Refer drawing no.301017-03465-CI-DSK-001 1 in **Appendix A**.

A package pump station including the submersible pumps, suitable wet well, dual control panel and rising main would be provided for the wash down water collection pump station.

The wash down return delivery pump station would be two pumps dry mounted on a concrete slab adjacent to the wash down water storage. A control panel would be located in the vicinity.

Based on the initial wastewater loading quantification detailed in **Section 5.2.1**, the preliminary package pump station specification would be as follows:

Pump duty: 1 L/s

Requires: 1 duty and 1 stand by pump operating alternately

Rising main diameter: 40 mm

5.3.2 Wash-Down Water Storage

The wash down water storage would store reclaimed wash down water prior to it being re-used in the wash down area.

The wash down water storage of 150m^3 was sized to provide sufficient storage for 30 days of wash down water discharged at an average daily usage of 5 kL/day.

The wash down water storage would be in ground and have a sprayed concrete liner and 'pop-up' valves in the base as a protection for rising ground water when the storage is empty or low.

5.3.3 Re-Use Header Water Tank

The re-use header water tank would receive chlorinated water from the wash down return delivery pump station for distribution to the wash down areas.

The re-use header tank also provides the connection point for top-up water from the Hunter Water Corporation potable water supply. Refer to the layout description in **Section 5.2.2**.

To utilise roof water from the buildings in the vicinity water would be captured in tanks and gravitate to the re-use header tank.

6. TELECOMMUNICATIONS

6.1 Telecommunications Authority

The telecommunications authority responsible for the proposed development is Telstra.

6.2 Telecommunications Connection

Telstra maintains an existing telecommunication network throughout the land marked for rezoning and development.

According to Telstra's preliminary servicing advice, a small network upgrade would be required for the Train Support Facility. This network upgrade would probably involve a bore under the existing railway line. The size and scale of the upgrade would depend on the services required,

The technology and services provided would be determined closer to the time of development commencement, depending on Telstra deployment policy and any negotiations based on a commercial agreement.

7. GAS

7.1 Gas Authority

The authority responsible for gas within the proposed development area is Jemena (formerly Alinta).

7.2 Gas Connection

According to Jemena's preliminary servicing advice, natural gas is available in the vicinity of the development and could be extended to supply the Train Support Facility.

A DN500 gas supply trunk main crosses the site from west to east. Refer Jemena's Dial Before You Dig plans in **Appendix B**.

Further discussions will be required to determine impacts of proposed construction over the existing main once more detailed plans of the facility are available.

In consideration of their shareholders' interests and under NSW regulations, Jemena is required to ensure that any extension of the natural gas distribution system is commercially viable and therefore must assess each request for supply on an individual basis.

8. ELECTRICITY

Power Solutions P/l are Ausgrid accredited electrical designers who have previously carried out investigation regarding electrical infrastructure and supply required for the proposed Train Support Facility.

As limited information is available at this stage regarding electrical details of the equipment to be installed in the TSF, a preliminary estimate of electrical demand was made by Power Solutions based on the loading of a similar facility. The major areas & items of equipment requiring electrical supply at the TSF are:

- Office & Amenities
- Wheel Lathe
- Train Wash Area
- Wagon Shed
- Loco Shed
- Provisioning Shed
- Yard Lighting

Due to the intermittent nature of the usage of much of the equipment at the TSF, the diversity factor is expected to be quite low. Based on the above, we estimate the expected maximum electrical load to be in the vicinity of 500kVA. This level of load will require the installation of a dedicated kiosk substation.

Ausgrid has previously indicated that at least two connection points to their 11kV network would be required to provide a ring feed. This allows maintenance to be undertaken on sections of the 11kV network without requiring a supply interruption. It is advised that the existing 11kV high voltage overhead lines in the vicinity of the development have adequate capacity to supply the TSF.

It is expected that the initial connection for the TSF would be to the 11kV underground line to the North of the development off Woodlands Close, presently supplying an Industrial Wastewater Treatment Plant.

The second connection point, to provide the ring feed, is likely to require under boring of the Great Northern Rail line and Maitland Road at the central area or southern end of the development, to allow a connection to the existing overhead 11kV line on the Eastern side of the highway.

The need to relocate existing electrical infrastructure to make way for connection of the TSF to the power supply grid may be necessary but at this stage has not been examined. This should be looked at during the detailed design stage.

9. CONCLUSIONS

This investigation report identified an opportunity for the proposed Hexham TSF to be connected to the existing water, telecommunications network and gas services.

The new DN900 CTGM is located to the west and along the southern boundary of the development site. The previous (above ground) CTGM is located along the western boundary of the development site and it is unknown whether this pipe has been removed by Hunter Water.

A DN200 water main was supplied from the former CTGM and ran along the southern boundary of the former RVR corridor to Australian Co-operative Foods Ltd and to industrial / residential properties along Maitland Road. It has been assumed that the existing DN200 water main has been connected to the new below ground CTGM and that the TSF could be supplied from this DN200 main.

Currently there is no sewer infrastructure within the area of the proposed development. Sewage effluent from the TSF would be treated on site using a package wastewater treatment plant. Under a license agreement, treated effluent from this plant would be spray irrigated over the selected areas of the site.

A separate recycling system is proposed for the wash down water. Wash down water from the locomotive and wagons wash down areas would be treated on site and returned to the wash down process. Minor quantities of water from the wash down system would be released to the sewage system.

The Relief Roads project currently proposed by ARTC will not have any impact on water or wastewater servicing or effluent management for the TSF.

Telstra maintains an existing telecommunication network near the development site. A small network upgrade would be required for the Train Support Facility. This network upgrade would probably involve a bore under the existing railway line. There is natural gas available in the vicinity of the development and could be extended to supply the proposal.

There is natural gas available in the vicinity of the development and could be extended to supply the proposal if required.

Street lighting and auxiliary underground cables are located along Maitland Road. Overhead powerlines are located along Maitland Road and across the development site. Ausgrid has advised that there is electricity available to supply the development.

Further detailed discussions would be required with all service authorities during the design stages when detailed information will be available.

10. REFERENCES

1. Preliminary Geotechnical Investigation Report, Douglas Partners, 2006
2. Report On Effluent Disposal Assessment, Proposed Hexham Redevelopment Maitland Road and Woodlands Close, Hexham, Prepared for QR National – Project 39798.07, Douglas Partners, May 2012.
3. Hexham Train Facility & Industrial Subdivision Electrical Infrastructure, Power Solutions, June 2008.

Appendix A – Preliminary Figures and Drawings

Figure 1 - Locality Plan

Figure 2 - Site Plan

Figure 3 - Preliminary Water Supply Design

301017-03465-CI-DSK-001 -	**Water Recycling and Wastewater Treatment System, General Arrangement**
301017-03465-CI-DSK-002- -	**Water Recycling and Wastewater Treatment System, System Schematic Process/ Flow Diagram**

PRIMARY EFFLUENT IRRIGATION AREA 40,000m²

SECONDARY BACK-UP EFFLUENT IRRIGATION AREA 20,000m²

EXISTING STORMWATER CHANNELS TO BE DIVERTED AWAY FROM THE EFFLUENT IRRIGATION AREAS TO AN EROSION & SEDIMENT CONTROL POND

EROSION & SEDIMENT CONTROL POND

DIVERSION VALVING

WASTEWATER TREATED EFFLUENT BUFFER STORAGE

EFFLUENT IRRIGATION PUMP STATION

PACKAGE WASTEWATER TREATMENT PLANT

REFER TO INSET

LEGEND

RM — WASTEWATER RISING MAIN

DIVERSON CHANNEL

NOTE

1. OVERFLOW OF WASH-DOWN SYSTEM TO WASTEWATER COLLECTING PUMP STATION IS SUBJECT TO ACCEPTABLE SALINITY LEVELS IN WASH-DOWN TAKE OFF
2. GRAVITY SEWER RETICULATION NOT SHOWN

0 20 40 60 80 100m
1:1000 (A1) 1:2000 (A3)

0 50 100 150 200 250m
1:2500 (A1) 1:5000 (A3)

CH174300 CH174350 CH174400 CH174450 CH174500 CH174550 CH174600 CH174650 CH174700 CH174750 CH174800 CH174850 CH174900 CH174950 CH175000 CH175050 CH175100 CH175150 CH175200 CH175250 CH175300 CH175350 CH175400 CH175450 CH175500 CH175550 CH175600 CH175650 CH175700 CH175750 CH175800 CH175850 CH175900 CH175950 CH176000 CH176050 CH176100 CH176150 CH176200

PLAN
SCALE 1:2500

OIL / GREASE SEPARATOR HOLDING TANK & SUMP & TRANSFER PUMP

COLLECTING WASTEWATER PUMP STATION

VEHICLE WASH-DOWN FLOCCULATION / SEDIMENTATION POND & RE-USE WATER STORAGE

OVERFLOW STRUCTURE TO WASTEWATER SYSTEM

OFFICE, AMENITIES & GARAGE

CAR PARK

LOCO SHOP

LOCO WASH

HARDSTAND

WAGON SHOP

TURNTABLE

OIL / GREASE SEPARATOR HOLDING TANK & SUMP & TRANSFER PUMP

WASH-DOWN CHEMICAL DOSING, OIL / GREASE SEPARATOR HOLDING TANK & SUMP & TRANSFER PUMP

LOCOMOTIVE WASH-DOWN AREA INCLUDING SUMPS & GROSS POLLUTANT TRAP

INSET
SCALE 1:1000

PRELIMINARY NOT FOR CONSTRUCTION

REV	DATE	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
A	25-05-12	ISSUED FOR CLIENT REVIEW	NAH	CD	MLC	GS				

A1 SHEET SCALE AS SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No. 301017-03465

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

WorleyParsons resources & energy

HEXHAM TRAIN SUPPORT FACILITY
WATER RECYCLING AND WASTEWATER TREATMENT SYSTEM
GENERAL ARRANGEMENT

DRG No 301017-03465-CI-DSK-001 REV A

WORLEYPARSONS_A1_REV2

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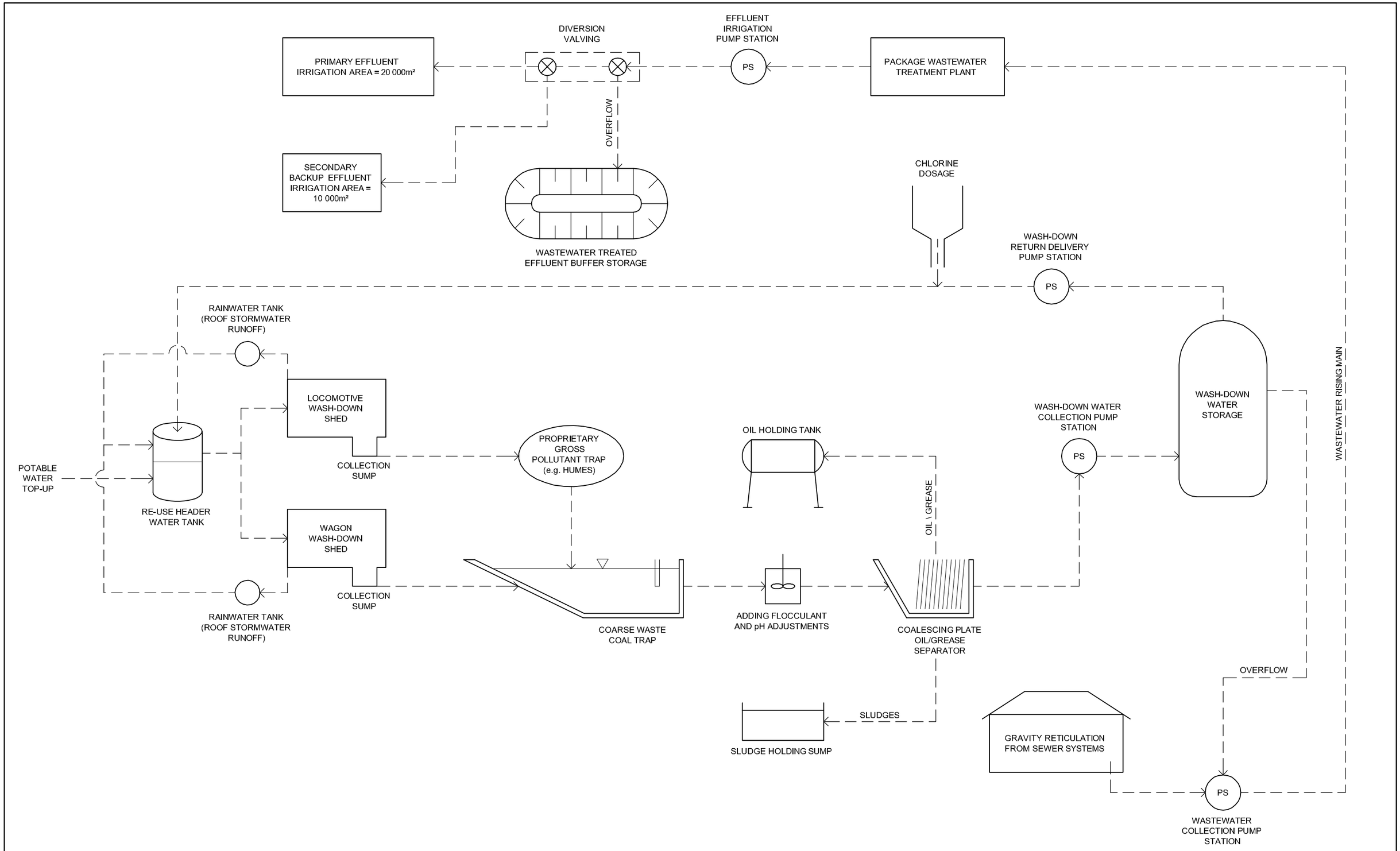

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A	25-05-12	ISSUED FOR CLIENT REVIEW	NAH	CD	MLC	GS				

A1 SHEET | SCALE AS SHOWN

OneWay™ to zero harm

WORLEYPARSONS PROJECT No.
301017-03465

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

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WATER RECYCLING AND WASTEWATER TREATMENT SYSTEM
SYSTEM SCHEMATIC PROCESS/FLOW DIAGRAM

DRG No 301017-03465-CI-DSK-002 | REV A

WORLEYPARSONS_A1_REV2

LOCATION:
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PLOT DATE & TIME:
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FIGURE 1

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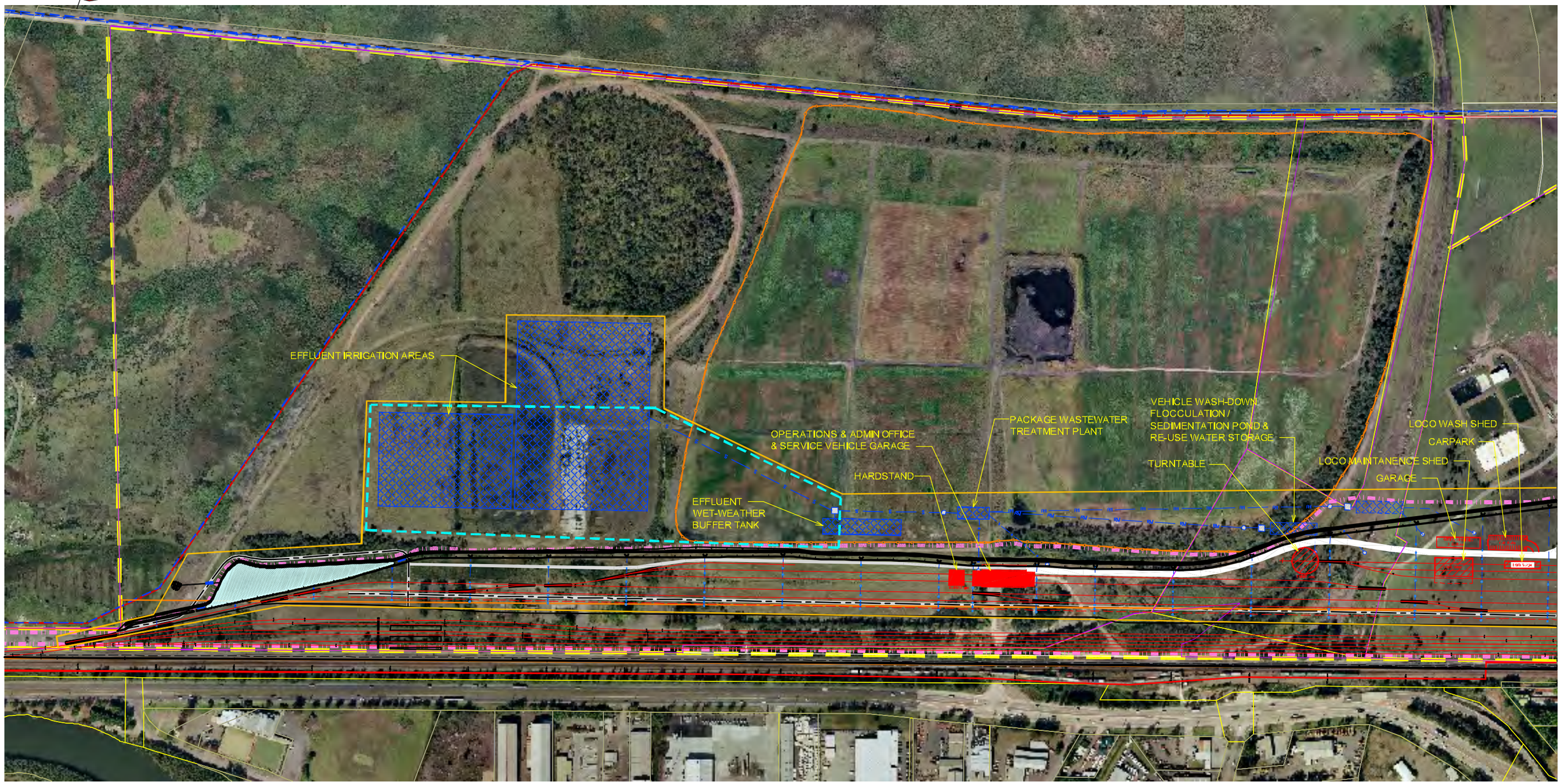
0:\301020\03465 – QR TSF (GS)\12.0 Drawings\12.01 Civil Infrastructure\CAD\STORMWATER FIGURES\FIG 1–1_LOCALITY.dwg 25/05/2012

SITE LOCALITY PLAN

FIGURE 2



LEGEND

- TRAIN SUPPORT FACILITY BOUNDARY
- PROPERTY BOUNDARY
- WATER RECYCLING & WASTEWATER TREATMENT SYSTEM
- HWC PROPOSED WATER MAIN
- EXISTING WATER MAIN
- PROPOSED ARTC RELIEF ROADS (TRACKS)
- TSF ROADS (TRACKS)
- STORMWATER DRAINAGE NETWORK
- COAL TAILINGS STOCKPILE EXTENTS
- PROPOSED CESS DRAIN
- PROPOSED WASTEWATER DRAINAGE LINE
- PROPOSED RISING MAIN

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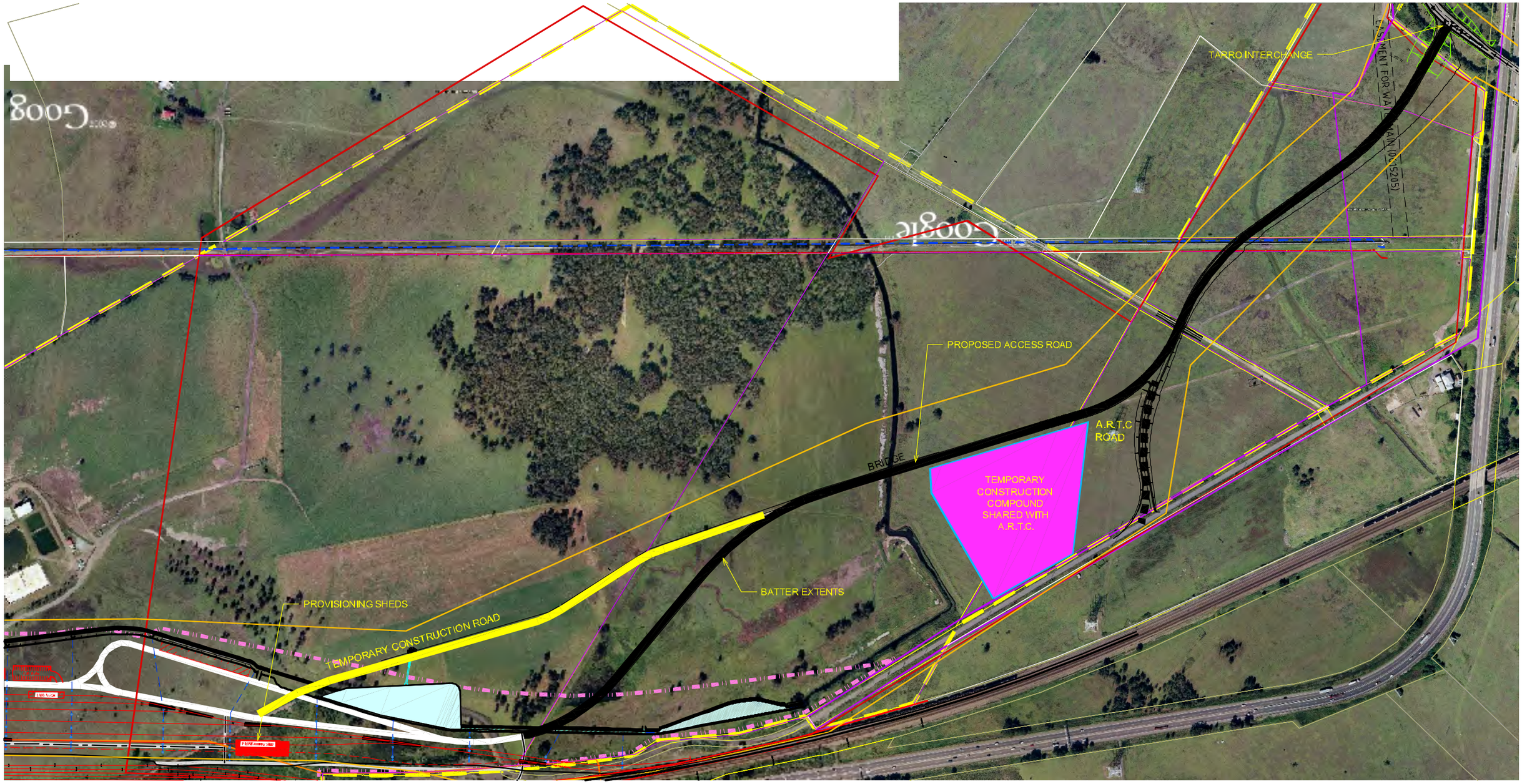
0 200m
1:5000

PROPOSED ARRANGEMENT TRAIN SUPPORT FACILITY SHEET 1 OF 2

O:\301020\03465 – QR TSF (GS)\12.0 Drawings\12.01 Civil Infrastructure\CAD\STORMWATER FIGURES\FIG 2-1_2-2_PROPOSED ARRANGEMENT.dwg 23/08/2012

FIGURE 2



LEGEND

- TRAIN SUPPORT FACILITY BOUNDARY
- PROPOSED CESS DRAIN
- PROPERTY BOUNDARY
- WATER RECYCLING & WASTEWATER TREATMENT SYSTEM
- TRUCK SHAKEDOWN AND WASHDOWN BAY (IF REQUIRED)

0 200m

1:5000

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PROPOSED ARRANGEMENT
TRAIN SUPPORT FACILITY
SHEET 2 OF 2

O:\301020\03465 – QR TSF (GS)\12.0 Drawings\12.01 Civil Infrastructure\CAD\STORMWATER FIGURES\FIG 2-1_2-2_PROPOSED ARRANGEMENT.dwg 23/08/2012

FIGURE 3

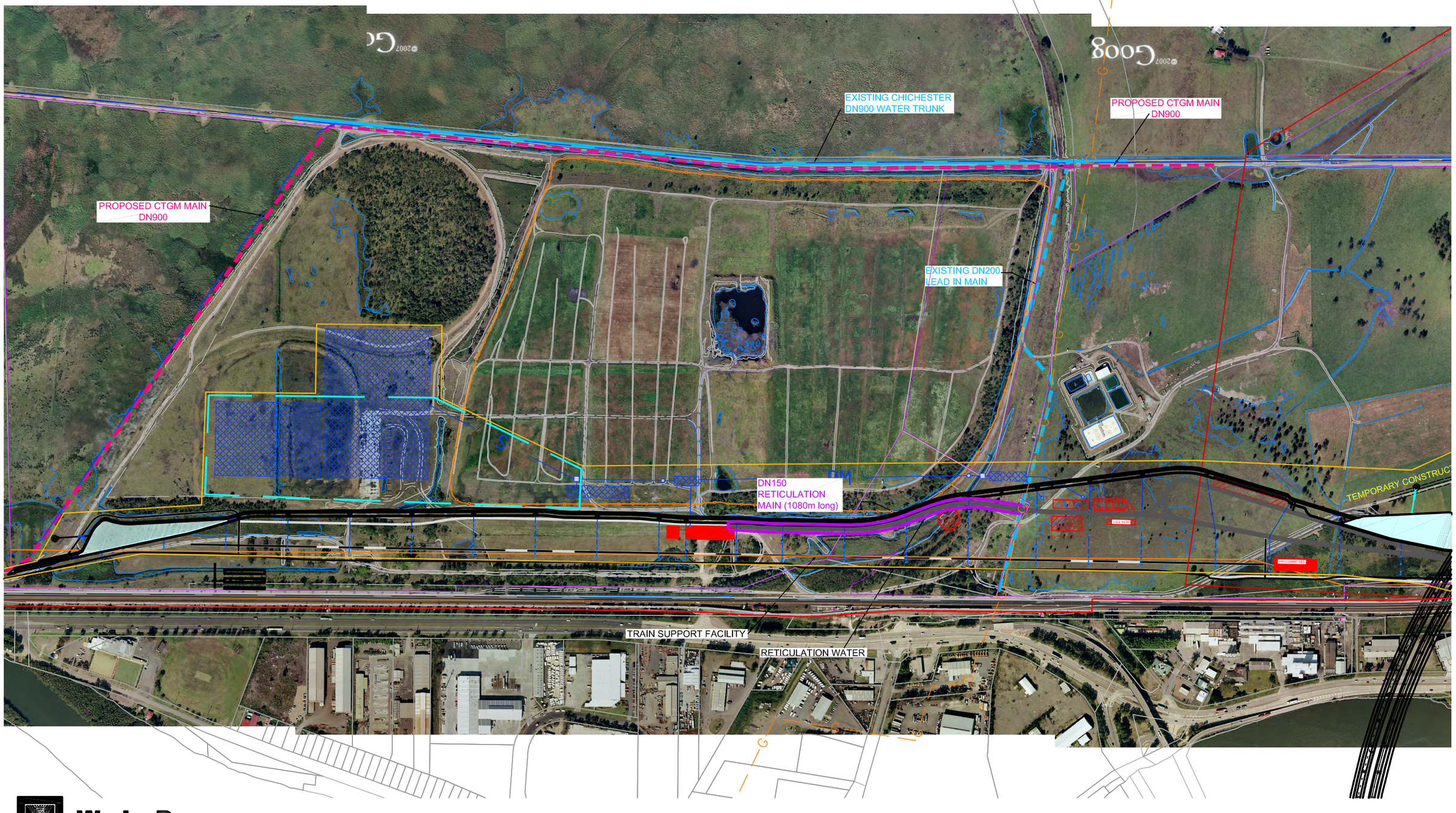
N

0 200 m

1: 6000

LEGEND

- EXISTING CTGM WATER TRUNK MAIN
- EXISTING LEAD IN WATER MAIN DN200
- PROPOSED RETICULATION WATER MAINS
- PROPOSED CTGM WATER TRUNK MAIN
- COAL TAILINGS STOCKPILE EXTENTS



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HEXHAM TRAIN SUPPORT FACILITY
PRELIMINARY WATER SUPPLY LAYOUT

O:\301020\03465 – QR TSF (GS)\12.0 Drawings\12.01 Civil Infrastructure\CAD\SERVICES FIGURES\FIG 3 – WATERMAIN SERVICING.dwg 07/09/2012