Hexham TSF Stormwater Management Plan

1 February 2023

AURIZON.

Plan Approval Table

Position	Name	Signature	Date
Regional Maintenance Manager	Dave Price		04/08/2023

Revision History

Rev	Date	Author	Comments
1	29/09/14	Heath Anderson	S1 Draft for Agency review
2	29/10/14	Heath Anderson	S1 Agency comments addressed
3	06/11/14	Heath Anderson	S1 Updated for DPE issue
3 (i)	20/02/15	Heath Anderson	S1 DPE Approved
4	18/03/15	Heath Anderson	S2 Draft for Agency review
5	31/03/15	Heath Anderson	S2 Final for DPE issue
6	18/02/16	Heath Anderson	DIL and WWTP amendments
7	11/12/17	Harry Egan	Addressing Independent Audit Comments
8	07/05/19	Harry Egan	Revision following IEA
9	28/04/20	Harry Egan	Inclusion of turning angle details
10	01/10/21	Harry Egan	Annual Update
11	31/05/22	Harry Egan	Mod 2 Update

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Glossary

Term	Definitions
ADWF	Average Dry Weather Flow
ANZECC	Australian and New Zealand Environment and Conservation Council
the Approval	State Significant Infrastructure MP07_0171
Aurizon	Aurizon Operations Pty Ltd
CMF	Combined Maintenance Facility
CWR	Coal Washery Reject
DAF	Dissolved aeration floatation
EPL	Environmental Protection Licence
EP&A Act	*Environmental Planning and Assessment Act 1979*
NCC	Newcastle City Council
OEMP	14-PLA-0004-HEX Aurizon Hexham TSF OEMP
PAH	Poly Aromatic Hydrocarbon
PASS	Potential acid sulphate soils
PF	Provisioning Facility
PWWF	Peak Wet Weather Flow
SCADA	Supervisory Control and Data Acquisition
Septic System Approval	OS2015/0503
SGMP	Surface and Groundwater Monitoring Plan
SWMP	Stormwater Management Plan
the Site	Hexham Train Support Facility
SoC	Statement of Commitments
SSI	State Significant Infrastructure
TPH	Total Petroleum Hydrocarbon
TSF	Train Support Facility
UST	Underground storage tank
WWTP	Waste Water Treatment Plant

1.0 Introduction

1.1 Site Description

The Aurizon Operations Pty Ltd (Aurizon) Hexham Train Support Facility (the Site) has a total area of 255ha and is located at Hexham approximately 16km north-west of the Newcastle Central Business District.

The Site shares borders with the Main Northern Railway and Pacific Highway to the east and the New England Highway to the north. To the south and west rural properties and the Hexham Swamp Nature Reserve are adjacent. The Site is located within a predominantly industrial setting, with only a small number of residential dwellings within the local vicinity.

The Site's history as a coal handling facility has resulted in the southern portion of the site containing an abandoned rail loop corridor and coal washery reject (CWR). CWR is retained within vegetated stockpiles however it is also present extensively in sub surface deposits. Remediation completed during the construction of the TSF infrastructure has resulted in excavated CWR and Potential Acid Sulphate Soil (PASS) being stockpiled in the southern portion of the site

Brancourts Manufacturing and Processing Pty Ltd are currently licensed to use a portion of the site for a waste water treatment plant and effluent irrigation area under Environmental Protection Licence (EPL) 816. Effluent is irrigated over the above mentioned CWR stockpiles.

1.2 Operational Activities

The Site provides routine and ad hoc provisioning and maintenance services to outbound locomotives and wagons. The treatment of generated septic and operational waste water is undertaken onsite through the utilisation of a septic treatment plant and dissolved aeration floatation (DAF) plant.

Infrastructure associated with the Site and the above mentioned operational activities are restricted to approximately a 38 hectare portion of the Site and consists of:

- Seven train tracks (10.5 kilometres) parallel to the existing mainline, turning angle and a shunt track;
- a provisioning building, service vehicle garage, warehouse and combined locomotive and wagon maintenance shed;
- operational depot and long term wagon storage;
- surface water management infrastructure including retention basins;
- bulk fuel storage area; and
- A wastewater treatment plant with on-site effluent irrigation and DAF.

1.3 Legislative Context

The project was assessed and approved as State Significant Infrastructure (SSI) under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Site approval history is as follows:

- The Site was approved by a delegate of the Minister for Planning and Infrastructure under MP07_0171, dated 10 October 2013.

- The Hexham TSF Turning Angle (the Turning Angle) Modification MP07_0171 MOD 1 (SSI-6090) was approved on the 09 October 2019.

- The Operational Depot and Long-Term Wagon Storage Modification MP07_0171 MOD 2 (SSI-6090) was approved on the September 2022

This Stormwater Management Plan (SWMP) has been developed and implemented as required by the Condition C9 of the Approval. A matrix of the conditions of approval and Statement of Commitments (SoC) is included as Appendix A. This matrix identifies where these conditions/commitments have been addressed in the SWMP.

The SWMP has been developed with reference to the Guidelines for the Preparation of Environmental Management Plans (Department of Planning, 2004) and should be read in conjunction with the Aurizon Hexham TSF OEMP.

1.4 Purpose and Objectives

The SWMP details the environmental management activities to be implemented at the Site required to ensure compliance with relevant regulatory obligations and approvals is achieved and to manage the implemented stormwater management system.

2.0 Site Hydrological Context

2.1 Site Water Quality Context

Historical contamination concerns are summarised as follows:

- Total Petroleum Hydrocarbon (TPH) C10-C36;
- Poly Aromatic Hydrocarbon (PAH);
- Heavy metals;
- CWR; and
- PASS.

The extensive use of CWR as fill in the southern portion of the Site associated with the former coal handling preparation plant and rail sidings was identified. Characterisation results returned a mix of positive and negative detections at various sampling locations and depths, including natural soils and in the CWR fill material.

TPH impacts were greatest in the fill used for the construction of Woodlands Close, former underground storage tank (UST) and refuelling areas.

Groundwater was found to be acidic to slightly alkaline and predominately brackish, with the exception of samples from the south to north western boundary which were found to be saline, and north to central eastern boundary which were found to be fresh. Widespread contamination of surface water comprising faecal coliforms, E.coli, nutrients and metals was identified both on and immediately off-site.

Surface and groundwater contamination was deemed to be associated with cattle disturbing historically deposited contaminated sediment and mobilisation of CWR stockpile in situ contaminants from effluent irrigation. Irrigation is undertaken by Brancourts Manufacturing and Processing Pty under EPL 816.

A summary of monitoring results from surface and groundwater determined that the majority of chemical analysis results were generally consistent within Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values.

2.2 Site Hydrology

The hydrodynamics within the existing Site have been significantly altered by historical coal stockpiling, infilling of wetlands, construction of tailings ponds and installation of surface drainage. The groundwater environment is highly complex due to a shallow natural groundwater level and Brancourts' effluent irrigation which contributes to perched water tables located within coal emplacement areas.

The overall Site is predominantly flat with drainage systems designed to fall at absolute minimum gradients (sometimes flat) due to Site constraints. When rainfall does occur, surface water is generally retained on-site in the lower lying areas with runoff only generated during heavy rain fall events.

When runoff does occur it is noted that due to the relatively flat terrain, restricted pipe culverts and mounding, there can be significant overflows between catchments and ponding over large areas that limits accuracy of hydrologic and hydraulic modelling.

The Site currently drains to three locations:

- TSF infrastructure area drains via swale drains to Water Quality Control Basins (Basins) 1 – 3;
- the Hunter River via culverts to the north and south of the site below the existing Great Northern railway line; and

- To the west to Hexham Swamp via pipe culverts above Hunter Water Corporation's water main.

Swales constructed for the Site drain the rail formation and other operational areas to one of the three Site retention basins. The basins have been designed to prevent the mixing of surface and groundwater and comprise sediment ponds, floating wetland treatment systems and gross pollutant traps.

The Site stormwater system has been designed to address the following:

- Potential changes to the hydrologic response of catchments contributing to sensitive areas during normal wetting and drying cycle events (i.e. events <1 year ARI return period).
- Management of peak flows from the developed site in larger storm events (up to 10% AEP) to ensure they are as close to pre-developed conditions as possible.

Site catchment, impacts and respective sources are detailed in Table 1 and the Site hydrology illustrated in Figure 1 and Figure 2 below.

Table 1 - Catchment and Potential Impacts

Sub-catchment	Area (Ha)	Monitoring Locations	Impacted Surface Water Discharge Locations	Comment
101	1.54	Basin 3, SW05 (via sub-catchment 6) (MW302R, MW101R (SE)	Category B (south east corner of TSF)	• Southern area of TSF area draining to south; • Rail infrastructure; • TSF stormwater drainage infrastructure;
102	9.55	Basin 2, SW03 (via sub-catchment 3), MW106R, MW301R	*Category C (infiltrate) & Category A (Overland to culvert under Hunter Water Easement that flows to Middle Creek)	• Central area of TSF, draining to north; • Rail infrastructure; • CMF; • Provisioning Facility; • Bulk Fuel Storage; • TSF stormwater drainage infrastructure;
103	8.02	Basin 1, MW109, SW1	Category A (Middle Creek downstream of TSF)	• Northern tip of TSF, draining to north; • Operational depot; • Rail infrastructure.
1	31.1	SW01	*Category A (Middle creek downstream of TSF)	• Swamp Oak Forest; • Grazing / agriculture; • TSF and Hexham Relief Roads (HRR) access road.
2	25.8	SW02	Category A (Middle Creek upstream of TSF)	• Swamp Oak Forest; • Grazing / agriculture (upstream).
3	32.09	SW03, MW101R	Category A (Culvert under Hunter Water Easement that flows to Middle Creek)	• Third party irrigation plant; • Effluent irrigation (**third party); • Grazing / agriculture.

Sub-catchment	Area (Ha)	Monitoring Locations	Impacted Surface Water Discharge Locations	Comment
4	28.24	*To west* SW4, MW108R, MW307R, SW6 (via catchment 5)	*Category B (western border and south west corner of Aurizon lands)	• Eastern portion of CWR stockpile; • Long term wagon storage area. • Construction phase ASS treatment pad (southern portion); • Effluent irrigation (third party);
5	22.5	SW4, MW108R, MW307R	Category B (western border of Aurizon lands)	• Western portion of CWR stockpile; • Construction phase ASS treatment pad (southern portion) • Effluent irrigation (third party); • Grazing / agriculture.
6	25.2	SW6, SW7, SW05, MW308R, MW02, MW01R	Category B (southern border of Aurizon lands)	• Southern area of site incorporating old rail loop; • CWR emplacements; • Grazing; • Effluent irrigation pad (Aurizon);
7	280	SW02, SW03, SW11	Category A (Hunter River via Middle Creek)	• Large, flat agricultural catchment to west of site; • Grazing / agriculture; • Effluent irrigation (third party) (south-eastern portion).

2.3 Tidal Exchange

The northern end of the Site traverses an existing highly disturbed and modified estuarine channel (which forms part of Middle Creek), and which provides tidal flows between the Northern Hexham Swamp and the Hunter River. The Middle Creek bridge crossing over this channel has been designed to ensure there is no alteration to the existing channel's hydraulic capacity, to minimise impact on the hydrodynamics of the upstream wetlands.

Apart from the channel crossings, the Site does not include any modifications within the tidal zone or modifications to any channels conveying tidal flows.

The area to the south of the proposed development also exhibits estuarine characteristics. The extent of this depends on the degree of saltwater intrusion which is generally dependant on the conveyance of drains in the adjacent site. No change to infrastructure associated with the Site have been made which would impact on tidal flushing of Coastal Salt Marsh areas.

FIGURE 4

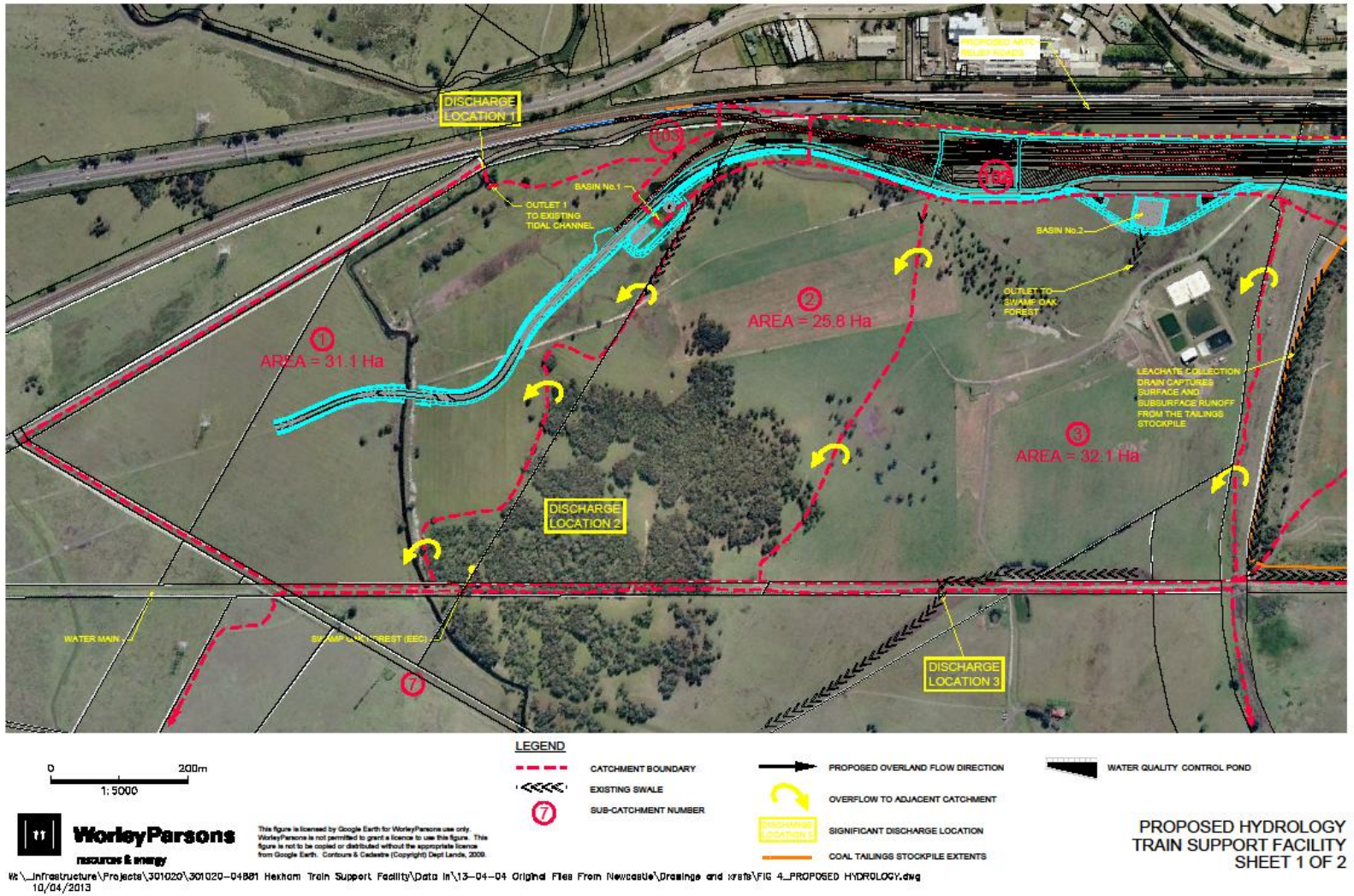

Figure 1 - Site Hydrology (a)

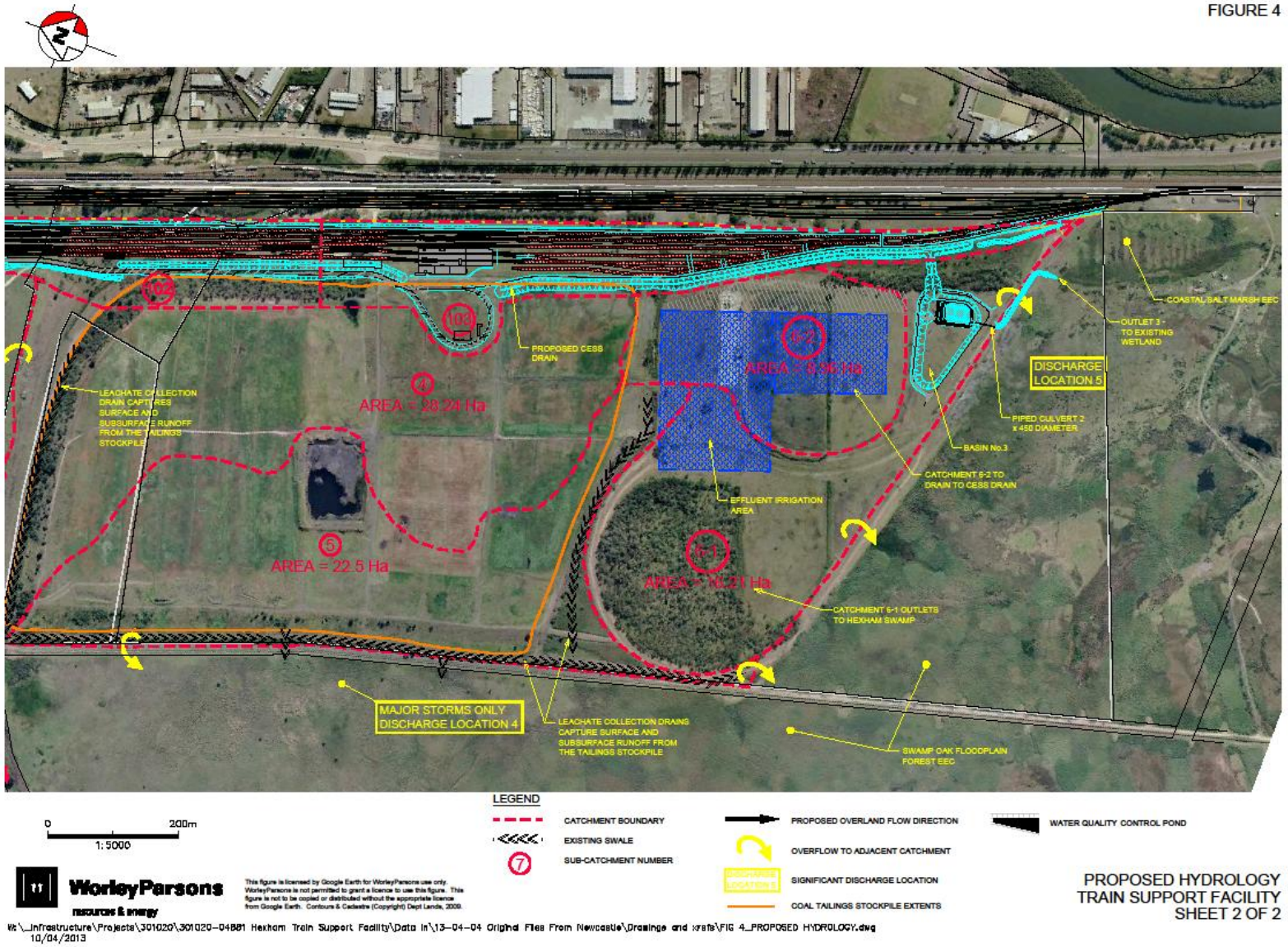

Figure 2 - Site Hydrology (b)

3.0 Stormwater Management

3.1 Stormwater Management Strategy

The stormwater management strategy consists of five key elements detailed in Table 2 below:

Table 2 - Stormwater Management Strategy

Number	Element	Requirement
1	Prevention	• Best practice provisioning of fuel, sand, lubricant, coolant and water to locomotives. • Implementation of operational procedures which define how to operate the site in an environmentally responsible manner. Procedures are to include disposal of hazardous and potentially hazardous material and contingencies in the case of a potentially damaging environmental event (such as hydrocarbon spillage). • Management to be in accordance with all relevant Australian Standards and Guidelines including *AS1940-Storage and Handling of Flammable and Combustible Liquids* and the OEH's Environmental Protection Manual technical Bulletin Bunding and Spill Management. • Implementation of sediment and erosion control measures consistent with the Managing urban stormwater: soils and construction V1.
2	Isolation	Operational activities identified as potentially generating significant contamination are isolated from the greater stormwater system where practicable. These areas include the Provisioning Facility (PF), Combined Maintenance Facility (CMF) and Package Waste Water Treatment Plant. All water generated in the PF and CMF is to be disposed of as trade waste or treated on-site and re-used.
3	Treatment	Runoff is to be treated or controlled by a series of stormwater management devices inclusive of retention basins 1-3, vegetated drains, gross pollutant traps and engineered systems prior to discharge into the environment.
4	Contingencies	There is a potential for accidental spill/leak to occur at any point in the rail yard. Appropriate measures are to be implemented to isolate an area for clean-up purposes.
5	Monitoring	The SWMP has been devised by Aurizon to establish existing baseline parameters and observe the surface and groundwater quality during operational activities.

3.2 SEPP14 Wetlands and EEC Communities

Controls detailed in Table 3 have been incorporated to minimise adverse impacts on the existing sensitive surrounding environments. The controls are based on principles of wetland hydrology outlined in the Lower Central Coast Regional Environmental Management Strategy (LHCCREMS, 2003).

Table 3 - SEPP14 Wetland and ECC Communities Implemented Controls

Number	Activity	Requirement/Comment
1	Minimising changes in flow regimes to the Swamp Oak Forest for smaller low flow (high frequency) storm events.	It is considered that changes in larger storm events (i.e. greater than 1 or 2 year frequency) will not adversely impact these areas, provided any potential erosion issues are addressed. Impacts on vegetation are discussed in Ecobiological Australia (November 2012) Aurizon –Train Support Facility, Hexham Ecological Investigations.
2	Minimising increases in fresh water discharges to and preventing impediments to continued tidal flushing of the Coastal Saltmarsh south of the site.	Prevent potential alterations to the flora composition of this community.
3	Construction of Site access road.	Minimise impoundment of water.
4	Minimise continuous wetting from frequent discharges from the TSF associated with low recurrence interval storm events.	This may result from changes in wetting/drying patterns which influences both physical characteristics (e.g. gas diffusion) and chemical (e.g. redox) characteristics of the soil substratum.

3.3 Water Treatment Systems

Three separate wastewater systems operate on-site. These systems are categorised as either 'non-sanitary' or 'sanitary' as per Table 4:

Table 4 - Trade Waste Systems

Type	Catchment	Trade Waste System
Non-sanitary	Bulk Fuel and Provisioning Shed	2 x 10 kL trade waste tanks
	Combined Maintenance Facility and Locomotive Wash Bay	DAF plant
Sanitary	Administration Building (toilets, showers, lunch rooms etc.)	Waste Water Treatment Plant (WWTP)

3.3.1 Bulk Fuel and Provisioning Shed

All covered and bunded areas within the provisioning facility and bulk fuel unloading areas drain to two 10kL (20kL capacity total) trade-waste tanks located within a bunded area on a concrete hard stand. Drainage to the tanks is via dedicated trade waste collection pits located adjacent to the bulk fuel facility.

The tanks are equipped with external gauges to allow for regular monitoring and are inspected on a weekly basis. The tank levels should be monitored at an increased frequency during extended rainfall events as there is potential for minor incursion of rainwater from the covered bulk-fuel supply envelope bund.

3.3.2 Combined Maintenance Facility and Locomotive Wash Bay

The CMF floor and wash bay areas are bunded and covered. Waste water from the CMF drop pit and wash down facility reports to a central trade waste collection pit located within the wash down bay. The trade waste collection pit is subsequently pumped to a 10kL dirty water collection tank adjacent to the wash bay prior to treatment within the waste water recycling system.

The waste water recycling system is comprised of gross pollutant traps, to remove larger particulate fragments, and a DAF plant. Suitably recycled water is discharged to a 10kL capacity recycled water tank with the remainder discharged to a 10kL capacity sludge tank for off-site disposal by a regulated waste contractor.

Recycled water stored in the 10kL tank is used for rolling stock wash down purposes within the designated wash bay. Water from the wash bay area is to be continually recycled with the dirty water tank overflow and directed to the wash bay area for cyclical processing.

Recycled water is supplemented by rainwater collected from the CMF structure's roof via a first flush diverter and 2 x 10kL capacity rainwater storage tanks.

As a contingency, the treated water storage tank overflows to the on-site stormwater treatment system. It is anticipated that discharge from this system would occur infrequently as the system is designed in accordance with intended wash bay utilisation rates.

3.3.3 WWTP Septic System

The WWTP is operated in compliance with the approval conditions of the Newcastle City Council (NCC) Application No. OS2015/0503 under Section 68 of the *Local Government Act 1993*. The WWTP has been designed and installed in accordance with the:

- *Environment and Health Protection Guidelines;* the *NSW Health On-site Single Domestic Wastewater Management*; and
- AS/NZS 1547:2012, On-site Domestic Wastewater Management.

Wastewater from the administration building (toilets, showers, lunch rooms etc.) will be treated using a package WWTP (aerated wastewater treatment system). Treated effluent is disposed of via a dedicated effluent irrigation area in the southern portion of the Site.

As per Table 18.1 Waste Water Generation of the Basis of Design Report the WWTP has been designed to accommodate 102 FTE personnel onsite. Table 18.2 Treatment Plant Design flows required the WWTP to have the following flow capability:

- Average Dry Weather Flow (ADWF): - 13.20 kL/D
- Peak Instantaneous Flow (PIF): -30.00 kL/d

The WWTP processes is detailed in Table 5 and Figure 3 below.

Table 5 – WWTP Septic System

Stage	Component	Process
Primary Treatment	• Fine screening, • Sand and grit removal	Removal of fine solids – screen size <= 3mm and sand/grit.

Stage	Component	Process
Biological treatment	• MBBR-BNR system;	• Stage 1 – anoxic stage for pre-denitrification. • Stage 2 – aerobic stage for Biochemical Oxygen Demand (BOD) removal; and • Stage 3 – aerobic stage for final BOD removal and nitrification. Internal circulation from the 3rd stage to the 1st stage ensures sufficient de-nitrification. A perforated screen is installed at the outlet of each stage in order to maintain the carriers inside the reactor, while the wastewater flows downstream.
Flocculation	• Flocculation tank	Addition of flocculants to achieve required effluent quality for the secondary clarifier.
Secondary Clarifier	• Secondary clarifier,	Chemical dosing to enhance solids separation and ensure effluent Total Phosphorous remains <5mg/l.
Tertiary Treatment	• Media filtration; • UV disinfection – disinfection of the filtered water; • Water quality monitoring.	Utilised to inactivate potential pathogens present in the water and provides an additional disinfection barrier.
Irrigation	Irrigation area and associated infrastructure	Irrigation.

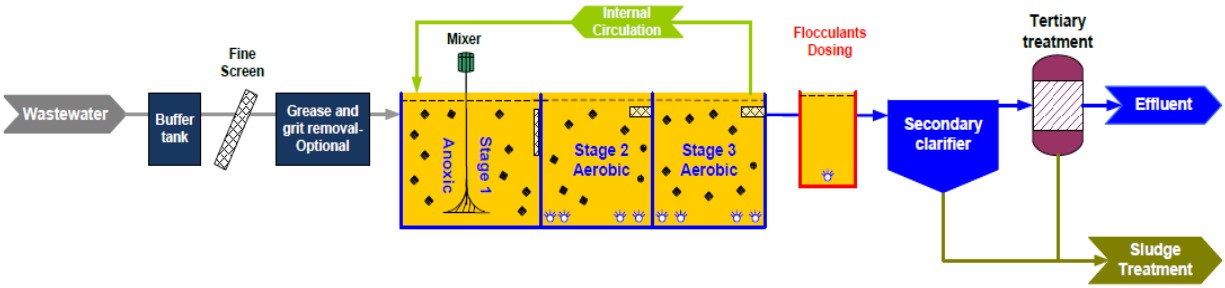

Figure 3 WWTP schematic (Aquise 2015)

3.3.4 WWTP Septic Irrigation Area

The effluent irrigation area has been designed in accordance with the findings of the Effluent Disposal Assessment: Proposed Train Support Facility, Woodlands Close, Hexham (Douglas Partners, 2012) (Effluent Disposal Assessment) undertaken in accordance with AS/NZS 1547:2012, On-site Domestic Wastewater Management.

The Effluent Disposal Assessment (Douglas Partners, 2012) considers the effluent quality criteria detailed in Table 10 and hydraulic capacity of the land to accept effluent and nutrients. The calculated average dry weather irrigation (ADWI) and peak wet weather irrigation (PWWI) rates reporting to the irrigation area have been detailed in Table 6 below.

Table 6 - Estimated Irrigation Flow Rate

Stage	Rate ADWI (Litres/Day)	Rate PWWI (Litres/Day)
Ultimate ADWF	12,960	129,600

The required disposal area for the ADWI rate of 12,960L/day is 39,300m^2. In order to account for potential future expansion, the buffer storage pond has been constructed and a secondary irrigation area of 20,000m^2 allowed for.

The following site improvement recommendations outlined in the Effluent Disposal Assessment (Douglas Partners, 2012) have been incorporated into the design of the irrigation area to mitigate impacts from irrigation activities.

- Addition of lime to acidic soils to maintain plant growth;
- addition of gypsum to improve the soil structure and reduce dispersion/erosion;
- earthworks to prevent surface water entering or runoff exiting the irrigation area;
- placement of fill 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;
- placement of clay loam to form irrigation surface area to improve soil properties and minimise potential for groundwater pollution from infiltration; and
- Installation of catch drains / bunds upslope and downslope of the disposal area to prevent rainfall run-on and run-off.

3.3.5 WWTP Septic Buffer Storage Pond

The treated effluent buffer storage pond has been installed to allow for storage of treated effluent during wet weather periods where effluent is required to be irrigated at a lower rate, or when effluent cannot be irrigated.

The effluent storage pond has a capacity of approximately 900m^3 and is sized to allow for the equivalent of 60 days of effluent discharged at the ADWF for the TSF functioning at full operational capacity.

The volume of the treated water in the buffer storage pond is to be monitored regularly. In the event of an abnormal circumstance (i.e. prolonged wet weather) resulting in the buffer storage pond reaching or nearing full capacity, the treated effluent is to be pumped out and disposed of off-site by a suitably licensed contractor at a suitably licensed facility.

3.3.6 Basin and Floating Wetlands

The permitter swale drains direct surface water runoff from the rail formation and other operational areas to the Site Retention Basins 1 -3. The Basins have been designed to prevent the mixing of surface and groundwater and comprise sediment ponds, floating wetland treatment systems and gross pollutant traps.

Floating wetlands located within Basins 1 – 3 act to improve the quality of retained stormwater prior to passive discharge offsite. The floating wetland dimensions are detailed in Table 7 below.

As the Site does not hold an EPL discharges offsite must comply with *Section 120 of the Protection of the Environment and Operations Act 1997*.

Table 7- Basin and Floating Wetland Specification

Basin	Pond Permanent Water Volume (m^3)	Surface Area	Depth (m)	Floating Wetland Area (m^2)
1	520	2,190	0.6	150
2	390	6,800	0.6	1,400
3	240	6,560	0.6	1,000

4.0 Erosion and Sediment Control

4.1 Context

Condition F2(g) of the Approval requires the development of measures to control soil erosion onsite and to monitor discharge of sediment to surrounding water ways and lands.

As operation of the Site does not require or necessitate undertaking of earthworks erosion and sediment control (ESC) impacts associated with Site operational activities present a minimal level of disturbance to the land.

4.2 Erosion and Sediment Control Management Measures

The following management measures as detailed in Table 8 will be implemented to ensure erosion and sediment control objectives are met.

Table 8 - Erosion and Sediment Control Management Measures

Aspect	Requirement
Erosion and Sediment Control	• Disturbance of ground will be approved by the 14-FRM-006-WHS Permit to Work which will detail required erosion and sediment controls. • All erosion and sediment control structures will comply with the Blue Book. • All water way and drainage inspection undertaken as per the Stormwater Maintenance Checklist. • Monitoring of surface water runoff is undertaken as per the Surface and Groundwater Management Plan. • Runoff from disturbed areas must either be retained in designated on Site storage areas or report to the existing stormwater management system. • All disturbance shall be rehabilitated upon the completion of works consistent with the Fauna and Flora Management Plan.

Monitoring of surface and groundwater quality will be undertaken as detailed in the Surface and Groundwater Monitoring Program (SGMP).

5.0 Monitoring

5.1 Monitoring Program

Real time monitoring of the operational status of the WWTP and DAF plant is undertaken through the Site Supervisory Control and Data Acquisition (SCADA) system.

Monitoring of impacts on surface and groundwater receptors at the Site from wastewater treatment activities, including irrigation, is detailed in the SGMP.

Monitoring of the waste water treatment systems will be undertaken as per the relevant system Operation and Maintenance Manuals. This monitoring has been summarised in Table 9 below.

Table 9 - Waste Water Treatment System Monitoring

Infrastructure	Frequency	Sample Offtake Point
DAF Plant	Monthly	Offtake point
WWTP	Monthly	Post treatment offtake point

5.2 Performance Criteria

Water quality criteria for the WWTP and irrigation area have been taken from Environment and Health Protection Guidelines – Onsite Sewerage Management for Single Households (EPA, Jan 1998) and Use of Effluent by Irrigation (DEC, 2004) as detailed in Table 10 below.

Performance criteria for pollutants not listed in Table 10 will be consistent with ANZECC (2000).

Table 10 - WWTP Performance Criteria

Parameter	Unit	Effluent Quality Standard (post treatment)	Selected WWTP parameters (post treatment)
Total Nitrogen	mg/L	<=25	<=15
Total Phosphorous	mg/L	<=5	<=5
Total Suspended Solids	mg/L	<=20	<=20
Faecal Coliforms	CFU	<100/100mL	<100/100mL
pH	pH	7 - 8.5	6-8
Biological Oxygen Demand	mg/L	<=20	<=20
Total Dissolved Solids	mg/L	<600	NA*
Ammonia*	mg/L	<=2	<=2
Turbidity*	NTU	<=2	<=2

*NCC requirements

Water quality standard required to be achieved prior to discharge from Site Basins 1 – 3 is detailed in the SGMP.

6.0 Compliance and Reporting

6.1 External Reporting Requirements

As required by Condition 7 of OS2015/0503 (Septic System Approval) a quarterly report summarising the completed maintenance activities and monitoring results will be submitted to NCC. Reported monitoring results will identify compliance against prescribed performance criteria.

6.2 Inspections and Maintenance

Routine inspections of the stormwater and waste water treatment systems are to be carried out to assess the need for maintenance and are primarily concerned with checking the functionality of the storm water drainage and treatment facilities. The inspection and maintenance regimes are detailed in Table 11.

Inspections will be completed by the Facilities Coordinator with the exception of the CMF wash bay which will be inspected by the Regional Maintenance Leader or delegate.

Table 11 - Inspections

Infrastructure	Component	Inspection Frequency	Possible Maintenance
Stormwater pits and pipes	• Stormwater inlets • GPT litter nets	Quarterly Rainfall event >75mm/5 days	Removal of litter and debris as required Replacement of oil socks as required.
Stormwater pits and pipes	• CCTV inspection of pipes	Five yearly	TBC from inspection
Permitter Drains and Culverts (including Purgatory Creek)	• Perimeter drains • Pipe outlets	Quarterly	Removal of sediment as required Annual weed management via slashing and or spraying
Permitter Drains and Culverts (including Purgatory Creek)	• Pipe outlets • Head walls, culverts and weir integrity	Annual	Maintenance of headwalls, outlets and weirs
Basins 1 - 3	• Floating wetland condition	Monthly	Increase of water level
Basins 1 - 3	• Outlet and discharges point • Basin water level	Monthly Rainfall event >75mm/5 days	Removal of litter and debris as required
Basins 1 - 3	• Outlet and discharges point structural integrity	Quarterly	Structural repair or outlet and identified erosion as required.

Infrastructure	Component	Inspection Frequency	Possible Maintenance
	• Sediment level • Floating wetlands		Desilting of sediment ponds when settlement >500 mm. Tether and plant replacement.
Basins 1 - 3	• Bund integrity	Annual	Identification of bund failure and repair as required. Consult geotechnical engineer.
CMF Wash Bay	• Wash bay pumps, sumps and drainage systems.	Weekly	Visual inspection targeting blockages.
Trade Waste System (Provisioning Shed and CMF)	• Sumps, pumps and trade waste tanks	Weekly	Maintenance as required.
WWTP	• Sludge tank. • Septic buffer storage	Rainfall event Weekly	Sludge removal from tank as required. Pump out of buffer storage if required.
WWTP	• Maintenance of WWTP and sample collection	Monthly	As per plant Operation and Maintenance Manual.
WWTP	• Irrigation infrastructure (pipe work, isolation valves and drip lines).	Quarterly	Maintenance as required.

6.3 Corrective Actions

As per Section 4.0 of the OEMP:

- Identified non-conformances with the SWMP, legislative or other requirement will be managed in accordance with Aurizon *16-GUI-003-COM Incident Reporting Guidelines*; and
- corrective and preventative actions arising from non-conformances will be managed in accordance with HWD-016416 *Corrective Preventative Actions Non-Conformance Procedure*.

Non-conformances will be identified by the completion of routine inspections of the Site undertaken as per Section 5.2. Exceedances of prescribed monitoring criteria will be identified during monthly review of monitoring data, scheduled reporting as per Section 5 – Reporting and annual auditing detailed in Section 4.0 of the OEMP.

If a material exceedance of the prescribed performance criteria detailed in Table 10 is detected, effluent is to be re-treated and tested prior to irrigation, or retained within the treated effluent buffer pond for off-site disposal by a suitably licensed contractor at a suitably licensed facility.

In the event that chronic exceedances of the listed performance criteria are recorded an investigation into the cause, potential impacts and feasible mitigation options will be triggered. The investigation will be undertaken by Aurizon and in consultation with suitably qualified consultant.

6.4 Plan Revision

The Environment Advisor will review this SWMP and its implementation annually in accordance with Section 7 of the OEMP. The purpose of the review is to ensure that the SWMP and operating system is meeting the facility's statutory requirements.

The Adviser Environment has the authority to approve/ reject minor amendments to the SWMP. Minor amendments are changes that do not have a detrimental effect on the environment or increase the risk profile.

APPENDICIES

APPENDIX A – Minister Conditions of Approval MP07_0171 and Statement of Commitments

Relevant Minister Conditions of Approval

MCoA	Description	OEMP Section
C9	Prior to the commencement of construction, the proponent shall, in consultation with the NoW and OEH, prepare a Stormwater Management Plan and submit the plan for the approval for the Director-General at least one month prior to commencement of construction of the SSI. The Plan shall include but not necessarily be limited to: A. Final details of operational stormwater management measures to be implemented for the SSI based on detailed design, including identification of offsite discharge locations; B. If required, identification of the water quality standards to which wastewater from the wastewater treatment plant would be treated prior to its irrigation. The plan shall demonstrate that the water quality criteria to which the waste water would be treated to is suitable for irrigation purposes based on the land capability of the irrigation site (including nutrient loads, pH and salinity), considering existing baseline conditions and cumulative inputs from other irrigation sources to the site; C. Identification of the water quality standards to which stormwater from the three stormwater detention basins would be treated to prior to offsite discharge with consideration of the receiving environment and relevant water quality standards such as, *Managing Urban Stormwater: Environmental Targets* (DECC & CMA, October 2007); and D. Monitoring, review and maintenance procedures to assess and maintain the operational stormwater integrity and performance of the SSI consistent with the requirements of condition C19. Nothing in this condition precludes the proponent from updating the Stormwater Management Plan presented in Appendix E (Stormwater Management Plan) or the document referred to in condition C19 to meet the requirements of this condition.	Section 2 – Site Hydrological Context Section 3 – Waste Water Treatment Standards Section 5 – Monitoring Section 6.2 - Inspections and Maintenance Surface and Groundwater Monitoring Program
C26	The Proponent shall maximise the reuse and/or recycling of waste materials generated on site as far as practicable, to minimise the need for treatment or disposal of those materials off site.	Section 3.3
C28	All waste materials removed from the site shall be appropriately tracked and shall only be directed to a waste management facility or premises lawfully permitted to accept the materials.	Section 3.3 Waste Management Plan
F2	Prior to the commencement of operation, or as otherwise agreed by the Director- General, the Proponent shall prepare and implement an **Operational Environmental Management Plan** for the SSI. The Plan shall detail the environmental management framework, practices and procedures to be followed during operation of the SSI. The Plan shall be consistent	Noted

MCoA	Description	OEMP Section
	with the document *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004). The Plan shall be prepared in consultation with the relevant government authorities and include, but not necessarily be limited to:	
	(a) a description of all relevant activities to be undertaken during operation of the SSI;	Section 1.2 – Operational Activities
	(b) statutory and other obligations that the Proponent is required to fulfil during operation including all approvals, consultations and agreements required from authorities, and key legislation and policies;	Noted
	(c) details of how the SSI's environmental performance will be monitored and what actions will be taken to address identified adverse environmental impacts;	Section 5.0 – Monitoring Section 6.0 - Compliance and Reporting
	(g) measures to monitor and control soil erosion and the discharge of sediment and other pollutants to surrounding lands and waterways;	Section 2.0 Section 4.0 Surface and Groundwater Monitoring Program
	(k) management and maintenance measures for the floating wetlands, and for the entire stormwater system, including pits and pipes, cess drains, sediment basins, gross pollutant traps and detention basins; (l) management measures for maintaining the Purgatory Creek culvert;	Section 6.2 – Inspection and Maintenance
	(n) measures for maintaining the stormwater management system including the drainage swales; and	Section 6.2 – Inspection and Maintenance

Statement of Commitments

SoC	Commitment	OEMP Section
Item 2	All licences, permits and approvals required by law to construct and operate the TSF will be obtained and maintained as required.	Noted
Item 3	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:	OEMP
	A. Stormwater Management Plan;	This SMP
Item 13	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.	Section 3.0 – Stormwater Management
Item 14	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 (WQCP) as a final barrier to remove suspended solids, remaining floating debris and hydrocarbons.	
Item 16	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 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.	Section 3.0 – Stormwater Management
Item 25	A wastewater system for effluent disposal will be established.	Section 3.3 – Waste Water Treatment System

SoC	Commitment	OEMP Section
Item 26	A recycle system for wash down water will be established.	Section 3.3 – Waste Water Treatment System
Item 27	An irrigation system 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 re-contour 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 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 run-off. H. Dewatering licences will be obtained in respect of the sewer installations where required; I. Rainwater tanks will be installed to top up the recycled water system.	Section 3.3 – Waste Water Treatment System