22 July 2022

2210316

Alexander Scott
A/ Director Freight Team – Transport Assessments
Department of Planning & Environment
4 Parramatta Square, 12 Darcy Street
Parramatta NSW 2150

Dear Alexander,

Hexham Long Term Train Stabling Facility Modification 2 (SSI-6090-Mod-2) – Response to Submission

The purpose of this submission is to respond to the Department of Planning and Environment's (DPE) request for Response to Submissions (letter dated 9 June 2022) for the modification to the approved State Significant Infrastructure Project for the Hexham Long Term Train Support Facility (LTTSF Project) (SSI-6090 – Mod 2, formerly MP07_0171). This modification is for the development of a depot, warehouse and wagon storage (the Modification Proposal) under Section 5.25 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

This response has been prepared by Ethos Urban, on behalf of Aurizon. Response tables have been prepared within this document based upon the following approach:

- DPE (received on 6 July 2022) – comments transcribed in full and responded to within Table 1
- Newcastle City Council (dated 8 June 2022) – comments transcribed in full and responded to within Table 2.
- Transport for NSW (dated 6 June 2022) - comments transcribed in full and responded to within Table 3.
- Community (x 2) – comments summarised and responded to within Table 4.

In addition to the above, submissions were also provided by DPE Water (dated 9 June 2022) and Environment Protection Authority (EPA) (dated 27 May 2022) who raised no comments or concerns with the Modification Proposal. Further, DPE (Biodiversity and Conservation) provided a submission (dated 10 June 2022) supporting the submission of a Biodiversity Assessment Development Report (BDAR) Waiver, rather than BDAR, for the Modification Proposal (BDAR Waiver included within Appendix M of the Modification Report). These submissions have been acknowledged with no further response considered necessary.

Technical specialists including GHD (Soil and Water), SLR (Traffic and Transport) and Aurizon (Site and rail operations) have provided input in the responses identified within this RtS. Ethos Urban has drafted, reviewed and curated all responses.

Where suitable, additional supporting information has been prepared, including the following:

- Hexham TSF Surface and Groundwater Monitoring Plan (Draft) prepared by Aurizon (***Attachment A***)
- Hexham TSF Stormwater Monitoring Plan (Draft) prepared by Aurizon (***Attachment B***)
- MUSIC Modelling Information prepared by GHD (***Attachment C***)
- Updated traffic flow diagrams prepared by SLR (***Attachment D***)
- Updated SIDRA modelling outputs prepared by SLR (***Attachment E***)

- Updated Mitigation Measures prepared by Ethos Urban (***Attachment F***).

We thank DPE of the opportunity to submit this response and welcome further discussion. Do not hesitate to contact either Harry Egan (Aurizon – Senior Advisor Environment - 0438 136 697 / harry.egan@aurizon.com.au) or the Tim Ward (details below) should you have any questions.

Regards,

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CC: Harry Egan (Aurizon), Juliet Wittenoom Louw (Ethos Urban)

Department of Planning and Environment

A submission comprising an excel spreadsheet (received on 6 July 2022) was received from the Department of Planning and Environment (DPE). Comments (transcribed in full) with responses have been provided in Table 2.

Table 1 DPE comments and response

Aspect	Comment	Response	Reference
Noise and Vibration	Please confirm construction duration. P22 of the mod report does not include proposed construction duration	Section 3.2 of the Noise Impact Assessment (Appendix I of the Modification Report) identifies the construction staging for the Modification Proposal. The construction period duration for the Modification Proposal would be 40 weeks consisting of 2 weeks site establishment (earthworks and other activities), 30 weeks construction (pouring concrete and structure works / building envelope and car park) and 8 weeks contingency.	Section 3.2 of Appendix I of the Modification Report
	Please confirm proposed start and finish out of hours works	Section 3.1.2 of the Modification Report provides an overview of the proposed construction hours for the Modification Proposal. As discussed, there is the potential for works to be undertaken outside of standard construction hours, which would be undertaken in consultation with relevant authorities. In particular, like other works undertaken for the Hexham Long Term Train Support Facility (Hexham LTTSF Project) (SSI-6090, formerly MP07_0171), an Outside Standard Construction Hours protocol would be prepared in discussion with the DPE, prior to undertaking works which are potentially audible at nearby sensitive receptors. The specific periods of these out of hours works would be clarified as part of this protocol and have yet to be determined.	Section 3.1.2 of the Modification Report
	Please confirm proposed out of hours activity	Refer to comments above. The out of hours activities would include those which are consistent with Section 3.1.2 of the Modification Report. The specific activities would be clarified as part of the Outside Standard Construction Hours protocol.	Section 3.1.2 of the Modification Report

Newcastle City Council

A formal submission comprising a letter (dated 8 June 2022) was received from the Newcastle City Council. Comments (transcribed in full) with responses have been provided in Table 2.

Table 2 Newcastle City Council comments and response

Aspect	Comment	Response	Reference
1. Modification proposal	According to Section 3.1 of the MAR, the Modification Proposal includes the following: • a warehouse for the storage of rail maintenance equipment • a depot for office staff and train crew • ancillary staff and visitor car park • rail wagon storage area It would appear the descriptions of the buildings as a depot and warehouse is based on rail industry parlance and is not consistent with the definitions of a *depot* and *warehouse or distribution centre*, respectively, under the Newcastle: Local Environmental Plan 2012. It is recommended the proponent is required to provide further explanation of the nexus between the above descriptions and the characterisation of the modification proposal as a depot and freight transport facility.	The Modification Proposal is considered an ancillary development to the approved Hexham LTTSF Project (SSI-6090, formerly MP07_0171). The LTTSF Project (and therefore the ancillary Modification Proposal), as discussed within Section 4.1 of the Modification Report, is located on land zoned IN3 and meets the definition of a 'depot' and 'freight transport facility', which are both permissible with consent under the *Newcastle Local Environmental Plan 2012*.	Section 4.1 of the Modification Report
2. Stormwater management	2.1 Stormwater Management Plan While it is acknowledged that the provisions of the Newcastle Development Control Plan (NDCP) 2012 do not apply State Significant Infrastructure projects they are often used by both applicants and the DPE to consider various aspect of such proposals. Given the scale of the proposed modification project it is recommended that the proponent be required to submit a Stormwater Management Plan demonstrating compliance with water quality and quantity requirements set out in the NDCP.	Under the Hexham LTTSF Project impacts to the environment from Hexham LTTSF Site operations are monitored in line with the Surface and Ground Water Monitoring Plan (Rev 10)[1]. Section 2.3 of the Surface and Ground Water Monitoring Plan indicates that performance criteria (which has been utilised for monitoring purposes for the Hexham LTTSF Project from commissioning to date) has been developed from utilising information on water quality originating from the site since 1999 and based upon the *Australian and New Zealand Guidelines for Fresh Water Quality 95% species protection levels* (ANZECC, 2000). This monitoring approach is considered reflective of maintaining a high-water quality for the surrounding environment. Section 2.3 of the Soil and Water Assessment (Appendix J of the Modification Report) identifies that the Newcastle City Council Development Control Plan	Section 2.3 of the Surface and Ground Water Monitoring Plan (Rev 10) Sections 2.3 and 4.4.3 of the Appendix J of the Modification Report

[1] Document located here: https://www.aurizon.com.au/sustainability/environmental-management/hexham-turning-angle

		2012 (NCC DCP 2012), like the Hexham LTTSF Project, was considered in the assessment of the Modification Report. Section 4.4.3 of the Soil and Water Assessment identifies that the existing stormwater management system, post development of the Modification Proposal, would continue to achieve the total phosphorus, total nitrogen and gross pollutant criteria identified under the NCC DCP 2012 (Section 7.06.02). It is noted that the target for total suspended soils has been incorrectly transcribed in Section 4.4.3 of the Soil and Water Assessment, with the target identified as 80% rather than 85% as prescribed by the NCC DCP 2012. The Modification Proposal would achieve an 81.2% reduction, which is slightly less than the pollution reduction criteria. Notwithstanding this, Table 4.12 of the report shows that the modelling results indicate that the Modification Proposal is expected result in negligible change in concentrations of nutrients at the outlet of Basin 02 and remain well below approved performance criteria detailed in the Hexham TSF Surface and Ground Water Monitoring Plan. Overall, the Modification Proposal is not considered to adversely impact surface water quality and no further mitigation measures are considered necessary. As requested by Newcastle City Council Aurizon has updated the operational management plans (in draft format) which consider the Modification Proposal, namely: • Hexham TSF Surface and Groundwater Monitoring Plan (Rev 11 – DRAFT) • Hexham TSF Stormwater Management Plan (Rev 11 – DRAFT) These plans have been included within ***Attachment A*** and ***Attachment B*** of this RtS, respectively.	Attachment A and Attachment B of this RtS
	2.2 Coastal Wetlands Catchment Requirements The development site is located in the 'Coastal Management SEPP Wetlands Catchment' as defined in Appendix 2 of the 'Stormwater and Water Efficiency for Development' Technical Manual (Updated 2019) (SWEDTM) of NDCP 2012. It is recommended the proponent be required to comply with the controls of the NDCP to meet the hydrological objectives of the wetland. It is noted that the requirements of the former State Environmental Planning Policy (SEPP) (Coastal	The existing Hexham LTTSF Site stormwater controls have been implemented in accordance with the Hexham LTTSF Project, as per the approved Hexham TSF Surface and Ground Water Monitoring Plan (refer to Section 3 Stormwater Management and Section 4 Erosion and Sediment Control). The approach to monitoring criteria for this plan has been discussed above. GHD has provided a response to the NCC DCP requirements, as requested by Council, which includes the following: 1.	Section 2.3 of the Surface and Ground Water Monitoring Plan (Rev 10) Sections 2.3 and 4.4.3 of the Appendix

	Management) 2018 are now included in SEPP (Resilience and Hazards) 2021. For large scale developments (>5000m^2), the SWEDTM recommends the following deemed-to-comply scenario to satisfy the NDCP coastal wetland catchment requirements: 1. *Provision of a rainwater tank configured such that:* a) *The total capacity is sized in accordance with Table 3 of Section 7.06 of the NDCP. For the proposed warehouse roof area of 643m^2 and depot roof area of 1175m^2, a total storage capacity (including airspace) of 72,720 L is required.* b) *All roof areas greater than 10m^2 drain to a rainwater tank.* c) *Rainwater tanks are connected to roof areas only.* d) *100% of the proposed roof area drains to a rainwater tank.* e) *The top 50% of the rainwater tank is proposed as air space. This top half of the rainwater tank shall drain to a small 5mm weep hole to the end-of-line infiltration basin or retention tank.* f) *The tank shall be connected to non-potable reuse including irrigation, outdoor taps, all toilets, laundry taps, and hot water service.* 2. *An end-of-line bioretention system is to be provided to treat runoff from the development in addition to the rainwater tank required above. Alternatively, an on- site retention tank can be used in cases where bioretention is constrained in a development.*	(a) The proposed depot and warehouse structures include 50kilolitre (kL) rainwater tanks each, resulting in a combined storage volume of 100kL (i.e. 100,000L). (b) Due to excess rainwater storage capacity provided by the warehouse and depot rainwater tanks no rainwater storage is included for the vehicle wash bay roof (61.5m^2) and motorcycle parking bay roof (36.7m^2). Stormwater runoff from the vehicle wash bay and motorcycle parking bay roofs is directed to the site stormwater system, which can accommodate this run-off. (c) Rainwater tanks are proposed to only be connected to the roof areas. (d) Refer to comments above. (e) The requirement for air space and weepholes will be addressed as part of the 100% design, however is anticipated to be able to be accommodated. (f) The depot and warehouse tanks are connected to non-potable uses consisting of irrigation, outside taps and all toilets. All hand wash basins, hot water supplies and sinks are connected to potable sources for hygiene purposes as NSW Health guideline recommended potable water as the most reliable source of drinking water. 2. The Hexham LTTSF Site discharges into the existing bio-retention system/floating wetlands, specifically via Basin 02. Overall, the Modification Proposal is not considered to adversely impact surface water quality and no further mitigation measures are considered necessary (refer to comments in the row above).	J of the Modification Report
	<u>2.3 Pre and Post-Development Site Discharge</u> The NDCP and SWEDTM requires that peak post-development stormwater discharge for a given site is not greater than pre-development (natural) conditions	Section 4.4 of the Soil and Water Assessment (Appendix J of the Modification Report) provides an analysis of the Modification Proposal in particular in relation to the 1% AEP. Details of the modelling have been provided within Section 4.4.2 of the report. Table 4.10 provides an overview of all peak flows (baseline and proposed for the Modification Proposal) up to and include the 1% AEP. The	Section 4.4 of the Appendix J of the Modification Report

	for all major storm events up to the 1% AEP. For large-scale development, hydraulic modelling (i.e. DRAINS or equivalent software) is required to demonstrate compliance with NDCP water quantity requirements. The submitted Modification Statement indicates modelling was undertaken to confirm the existing stormwater system has sufficient capacity to accommodate discharge from the proposed development. It is recommended the proponent be required to provide details of this modelling to confirm compliance with NDCP requirements. The outcomes of any hydraulic modelling are to be summarised in a stormwater management report. The reported information shall include a table comparing pre and post- development peak site discharge for major storm events up to the 1% AEP.	report indicates that the peak flow for the 1% AEP design flood remains within the hydraulic capacity of the existing Basin 02, and therefore the existing stormwater management system is expected to provide a similar level of treatment under the proposes and existing conditions. Overall, the impacts f the Modification Proposal on stormwater quantity are comparable to the impacts of the current condition and are considered minor.	
	2.4 Water Quality Modelling Modelling shall be undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) or similar software to demonstrate compliance with development stormwater quality targets set out in Section 7.06 of the NDCP. It is recommended that the Proponent be required to submit a copy of the MUSIC link report along with a summary of the model (including a node diagram).	Section 4.3.2.1 of the Appendix J of the Modification Report indicates that MUSIC modelling has been undertaken to determine the potential water quality impacts for the Modification Proposal. A copy of the MUSIC link report and summary model (including node diagram) has been included within ***Attachment C*** of this RtS.	Section 4.3.2.1 of the Appendix J of the Modification Report Attachment C of this RtS
3. Traffic generations	3.1 Illegal Turns Traffic survey data obtained in 2021 as part of the Traffic Impact Assessment (TIA) prepared by SLR Consulting identified illegal right-turn movements being made at the following intersections: a) Anderson Drive / Private Access Road (to development) b) Anderson Drive / New England Highway Offramp (Off Eastbound)	For clarity an overview of the 12-hour traffic movements (06:00-18:00)for existing and proposed (under the Modification Proposal) vehicles has been provided below. **Vehicle Type** / **Existing** / **Proposed** / **Total (Existing + Proposal)** Heavy vehicle / 19 / 0 / 19 Light vehicle / 149 / 118 / 267	Section 6.11 of the Modification Report Section 6.5 of Appendix K of the Modification Report

	These illegal right turn movements were included in the SIDRA modelling under the assumption that these movements would increase proportionally with any increase of traffic to the private access road. The 'With Development' 2032 modelled scenario estimates that illegal right turns made during peak hours will increase: a) From 3 movements per hour (mph) to 22 mph at the Anderson Drive / Private Access Road intersection; and b) From 0 mph to 4 mph at the Anderson Drive / New England Highway Offramp (off Eastbound) intersection. The propensity to make these illegal turns is likely driven by existing movement restrictions originally intended to prevent truck traffic accessing the site from Beresfield and Tarro – likely to avoid impacts to the amenity of residential areas. Below is a relevant excerpt from the TIA prepared by Better Transport Futures and submitted in support of SSI-6090: *'The preliminary design for the access on the Tarro interchange has been prepared by ARTC and this access allow for right movements in for heavy and light vehicles as well as light vehicles to turn left into the site off the Tarro interchange. The design does not allow for heavy vehicles to turn left into the site off the Tarro interchange and all exit movements will be a left hand turn only.* *This design will ensure that no heavy vehicles will have to access the site via Beresfield and Tarro. No right turn out will be permitted from this access to ensure road safety is maintained and to reduce the traffic impacts within Beresfield and Tarro.'* A consequence of these restrictions is that vehicle access to and egress from the site can be difficult for certain destination/origins.	Section 6.5 of the Traffic Impact Assessment (Appendix K of the Modification Report) indicates potential illegal right-turn movements which were utilised for the impact assessment of the Modification Proposal. SLR has provided updated traffic flow diagrams (***Attachment D*** of this RtS) which considered the removal (and re-assignment) of the existing and forecast illegal right turn movements at the Tarro interchange. These diagrams also provide a breakdown between light and heavy vehicles. For the existing illegal right turn movements, traffic was re-assigned to the road network as follows: • Those movement which currently turn right from the eastbound off ramp at the Tarro interchange will instead turn left from New England Highway on to Quarter Sessions Road, then right on to Anderson Drive before turning left into the site access road. • Those movement which currently turning right from the site access road will instead turn left and perform a u-turn at the u-turn facility on the New England Highway (located opposite Carr Place), before turning left on to Quarter Sessions Road. The following trip distribution assumptions were adopted for the proposed development trips, based on postcode data for the existing Aurizon workforce: • North (9.66%): Staff that reside to the north of the development will approach along Anderson Drive and turn left into the site access road. When departing from the site, staff will turn left from the site access road and perform a u-turn at the u-turn facility on the New England Highway (located opposite Carr Place), before turning left on to Quarter Sessions Road. • West (33.52%): Staff that reside to the west of the development will approach from New England Highway, turn left on to Quarter Sessions Road before turning right on to Anderson Drive and left into the site access road. While departing from the site, staff will turn left from the site access road before merging with New England Highway in the westbound direction. • East/ South (56.82%): Staff that reside to the east and south of the development will approach from New England Highway before taking the westbound off- ramp at the Tarro interchange, and right into the site access road. When departing, staff will turn left from the site access road and perform a u-turn at the u-turn facility on the New England Highway (located opposite Carr Place).	Attachment D, Attachment E and Attachment F of this RtS

Traffic from Newcastle can access the site from the westbound New England Highway offramp at the Tarro Interchange. Return trips to Newcastle, however, must detour approximately 2km westbound on New England Highway to make a U-turn at a designated bay just northwest of John Renshaw Drive.

Vehicles from the southwest or northwest cannot access the site directly from New England Highway via the Tarro Interchange eastbound offramp and must detour off Quarter Sessions Road to Anderson Drive. Return trips egressing to the northwest and southwest are uncomplicated.

The detoured access to the site (from southwest/northwest origins) results in only a minor delay and is not a significant driver of illegal movements as compared to the detoured egress to Newcastle. The detoured egress from the development to Newcastle represents a significant trip delay and will likely continue to influence the propensity for a driver to make illegal movements to avoid the detour.

The estimated 2032 post-development frequency of 22 peak movements per hour for the illegal right turn out of the private access road is not acceptable. It is recommended that the proponent be requested to address the issue of illegal right turns generated by the development. The following information should be requested:

a) A revised operational traffic access plan to be included in staff induction to mitigate instances of illegal turns when accessing or egressing the development via any vehicle. It is noted that the previous site access plan (Figure 3-2, Better Transport Futures 2012) is obsolete due to the conversion of the John Renshaw Drive/Weakleys Drive roundabout to a signalised intersection.

The updated traffic movements have been input into the SIDRA traffic model. Summary output from the revised modelling (***Attachment E*** of this RtS). Updated SIDRA model files are also supplied for review (submitted under separate cover). As identified from the updated SIDRA outputs, the Modification Proposal would, with the redirection of these illegal turns, not result in an increased level of service at the identified intersections. The traffic impacts of the Modification Proposal are therefore considered minor.

It should be noted that the concept design for the site access road intersection with Anderson Drive as appended to the Traffic Impact Assessment for the Train Support Facility (Better Transport Futures, dated 10 September 2012) considered in its design the potential for limiting the left turn from Anderson Drive so that only light vehicles could undertake such a manoeuvre into the access road. The excerpt referenced in Council's comments relates to this concept design, however the high entry angle left-turn treatment which has ultimately been constructed removes this potential limitation (i.e. the design has been improved to limit this illegal turn).

A Traffic Access Plan (similar to Figure 3-2 referred to above) will be prepared and provided within a site wide communication to all existing staff, and further included in induction material for new starters, to mitigate instances of illegal turns when accessing or egressing the development via any vehicle. The existing Hexham TSF Environmental Management Plan (Traffic Management Strategy) will be updated (as required) to be consistent with this Traffic Access Plan. The mitigation measures for the Modification Proposal (Section 6.11 of the Modification Report) have been updated to include this commitment (***Attachment F*** of this RtS).

Further, Aurizon has undertaken extensive consultation to date with TfNSW regarding the M1 Pacific Motorway extension to Raymond Terrace Project (M1RT Project)[2]. The current alignment of the M1RT Project bisects northern portions of the Hexham LTTSF Project landholdings adjacent to the New England Highway. The proposed alignment is likely to result in compulsory acquisition (currently under negotiation) of affected land parcels and realignment of the existing Hexham LTTSF Project access road.

It is noted that the M1RT Project proponent is TfNSW and the acquisition of Aurizon land parcels and realignment of the existing Hexham LTTSF Project access road is not within the scope of the Modification Proposal. Regardless,

[2] https://caportal.com.au/tfnsw/m1rt

	b) A breakdown of vehicle types and associated traffic volumes accessing the Hexham LTTSF site (new and existing) during its operation. It further recommended that the proponent be requested to initiate separate discussions with CN and Transport for NSW (TfNSW) to address existing access issues to the site. The subsequent removal of the roundabout at the John Renshaw Drive and Weakleys Drive intersection has impacted on the existing access plan at the Hexham LTTSF site and legal/safe access to the site (which may require changes to existing turn restrictions) will need to be determined in consultation with TfNSW and CN.	Aurizon will initiate separate discussions with City of Newcastle Council and TfNSW to address existing access issues to the Hexham LTTSF Site.	

4. Wastewater management	The site is unsewered and the existing facility operates an on-site wastewater treatment system with land application of effluent to a dedicated disposal area. This system required approval to operate from CN under Section 68 of the *Local Government Act 1993*. Section 3.1.3 – 'Operation' of the MAR indicates the Modification Proposal will *'accommodate approximately 180 employees*', although all personnel will not be on site at any one time. This will result in a potential significant increase in the volume of wastewater requiring treatment and disposal at the site. Consideration of wastewater management in the modification report is limited to: '*No change proposed. It is understood the existing waste treatment plant can accommodate the additional amenities to be located on site*'.
	
	It is recommended the proponent be required to provide further information to address the management of wastewater for the proposed modification. A technical assessment should be provided to confirm the capacity of the system to safely treat and dispose the predicted increased wastewater loads. The assessment should refer to applicable standards and guidelines and provide a clear conclusion whether there are any modifications required to the existing wastewater treatment system (and consequently the approval required from CN) and, if so, the nature of any works necessary.
		Site Personnel Numbers
		
		The existing number of personnel onsite is approximately 27 people per day inclusive of employees, contractors and visitors. This has been determined by reviewing available sign-on records for the period January 2022 – June 2022 and conservatively considered that all personnel that signed on remained onsite for a full shift regardless of their actual attendance.
		
		The increase in personnel attending site as part of the modification is assumed to be approximately 41 full time staff and 65 train crew on a pass-through basis per day. All train crew have been assumed to conservatively spend no more than two hours on site per day.
		
		Once the depot is operational it is conservatively assumed that there will be approximately:
		
		• 68 full time personnel onsite per day when allowing for:
		  ○ 27 existing staff, visitors and contractors.
		  ○ 41 additional full-time staff associated with the Modification Proposal.
		• 65 train crew on a pass-through basis.
		
		WWTP and Irrigation Area Specifications
		
		The Waste Water Treatment Plant (WWTP) was designed in accordance with the NSW Long Term Train Support Facility: Basis of Design Report (GHD, 10 April 2013) (Basis of Design Report) under the Hexham LTTSF Project. As per Table 18.1	

of the Basis of Design Report the WWTP has been designed to accommodate 102 full-time equivalent (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

In 2012 Douglas Partners were engaged by Aurizon to undertake an effluent disposal assessment in accordance with AS/NZS 1547:2012, On-site Domestic Wastewater Management. The irrigation area Initial Build Up and Maximum operational phase irrigation rates are detailed for both the Average Dry Weather Irrigation (ADWI) and Peak Wet Weather Irrigation (PWWI) in Table 1 below.

Table 1 – Modelled Treated Effluent Irrigation Rate

Stage	ADWI (L/day)	PWWI (L/day)
Modelled Initial Build Up	4 320	43 200
Modelled Maximum	12 960	129 600

Meteorological Context 2021 - 2022

To provide context to modelled irrigation and flow figures Aurizon reviewed the previous 15 months of rainfall volumes from Jan 2021 – Mar 2022 as shown in Table 2. This period was chosen to align with selected available irrigation and WWTP flow data.

Rainfall data is sourced from the Williamtown weather station. Review of the rainfall data from the Williamtown weather station indicated that the total rainfall during 2021 was 1556 mm, which is significantly above the long-term average of 1127.6 mm. Following the 2021 period monthly averages were exceeded significantly for the cumulative Jan – March 2022 period.

Table 2 – Rainfall (Williamtown)

Month	Average (mm)	Recorded (mm)	Average vs Recorded Difference (mm)
Jan - 21	99.3	186.8	+87.5
Feb -21	118.9	157.8	+38.9
March - 21	128.3	459.2	+330.9
April - 21	109.5	70.0	-39.5
May - 21	108.5	90.8	-17.7
June - 21	124.3	104.6	-19.7
Jul – 21	72.2	44.2	-28.0
Aug - 21	72.4	48.8	-23.6
Sept- 21	60.5	85.2	+24.7
Oct - 21	75.9	74.4	-1.5
Nov- 21	83.4	213.8	+130.4
Dec – 21	77.8	20.4	-57.4
Jan -22	99.3	89.6	-9.7
Feb – 22	118.9	161.4	+42.5
Mar - 22	128.3	354	+225.7

Modification Proposal Estimated Flow vs Design Flow Criteria

A comparison of estimated Modification Proposal flow rates against the WWTP ADWF and PIF design criteria is detailed in Table 3. A comparison of Modification Proposal irrigation rates against ADWI and PWWI design criteria is detailed in Table 4 below.

The Modification Proposal's wastewater flow volumes and irrigation rate requirements have been conservatively estimated by calculating estimated flow generated by the additional personnel and train crew and adding it to known monthly volumes.

A conservative flow generation volume of 131/L/day/person has been adopted from the Basis of Design Report. To ensure train crew contribution is accounted for each crew member is assumed to generate 8% (2 hours in a 24 hour period) of the daily volume of a full time employee.

It should be noted that demand on the site WWTP system is likely being overestimated as traincrew are already passing through the Hexham LTTSF Site so a portion of their wastewater generation is likely being double counted.

Table 3 – Throughput Flow Criteria Comparison

Month	Current Daily Flow (L)	Estimated Proposal Daily Flow (L)	Proposal vs Daily ADWF Criteria (%)	Proposal vs Daily PIF Criteria%
Apr - 21	7 000	13 081	99%	44%
May - 21	5 000	11 081	84%	37%
June - 21	5 000	11 081	84%	37%
Jul – 21	5 323	11 403	86%	38%
Aug - 21	4 839	10 919	83%	36%
Sept- 21	933	7 014	53%	23%
Oct - 21	4 677	10 758	82%	36%
Nov- 21	5 900	11 981	91%	40%
Dec – 21	6 290	12 371	94%	41%
Jan -22	5 645	11 726	89%	39%
Feb – 22	6 786	12 866	97%	43%
Mar - 22	7 419	13 500	102%	45%

ADWF: 13.2 kL/D
PIF: 30 kL/d

Table 4 – Irrigation Rates Criteria Comparison

Month	Current Daily Irrigatition (L)	Estimated Proposal Daily Irrigation (L)^	Proposal vs Daily ADWI (%)	Proposal vs Monthly PWWI (%)
Apr - 21	7 000	13 081	101%	10%
May - 21	5 000	11 081	85%	9%
June - 21	5 000	11 081	85%	9%
Jul – 21	5 323	11 403	88%	9%
Aug - 21	4 839	10 919	84%	8%
Sept- 21	933	7 014	54%	5%
Oct - 21	4 677	10 758	83%	8%
Nov- 21	5 900	11 981	92%	9%
Dec – 21	6 290	12 371	95%	10%
Jan -22	5 645	11 726	90%	9%
Feb – 22	6 786	12 866	99%	10%
Mar - 22	7 419	13 500	104%	10%

Conclusion

As per Table 3 and 4 the existing WWTP and associated irrigation pad has sufficent capacity to accommodate the conservatively estimated flow volumes associated with the increase in site personnel as part of the Modification Proposal.

This compliance is demonstrated by calculated Modification Proposal flows and irrigation volumes being compliant with relevant ADWF and ADWI performance criteria despit extreme rainfall experienced during the modelled period.

As such Aurizon proposes that no modification to the existing system is warranted and its ongoing operation continue to be monitored and reported on as per the requirements of Sewage Treatment Plant Approval 737 (STP 737) and Hexham TSF Stormwater Management Plan (Rev 10). Refer also to updated Plan at **Attachment B** of this RtS.

5. Bushfire	While it is acknowledged that section 100B of the *Rural Fires Act 1997* does not apply to State Significant Infrastructure, it is recommended that the proponent be required to respond to the following matter relating to the bush fire risk to the site.	GHD has advised that the design of the Modification Proposal is to be fully compliant with fire-resisting construction requirements and satisfies the objectives of: • Relevant Australian Standards	

	The Newcastle Bush Fire Prone Land Map (2018) identifies the subject land as bush fire prone land. Subclause (b) of condition B1 of the Infrastructure Approval (Oct 2013) for the existing facility requires the Applicant to proponent to carry out the development generally in accordance with Environmental Assessment (EA) (ADW Johnson Pty Ltd Nov 2012). Appendix F of the EA is Bushfire Protection Assessment (BPA) (Ecological Australia 11 September 2012). It is recommended that the proponent be required to consider whether the BPA requires amendment having regard to the additional uses proposed under the Modification Proposal.	• Newcastle Council Development Control Plan Section 4.02 Bush Fire Protection. • Planning for Bushfire Protection 2019 Technical Manual (NSW Rural Fire Service, 2019). Further, Aurizon's site emergency response procedures are detailed in the 16-PLA-0001-HEX Site Emergency Response Plan (Version 1.5) (the SERP). The SERP has been prepared in consultation with the Aurizon Safety Department and routinely maintained by the Site leadership team. The Site Evacuation Coordination Procedure and Bushfire are addressed in Section 14 and 24 respectively of the SERP.	
6. Section 7.12 Development Contributions	The existing Project Approval (PA) does not contain a condition which requires the Applicant to pay a development contribution to CN under the provisions of the former Section 94A of the *Environmental Planning and Assessment Act 1979* (EP&A). Notwithstanding this, Aurizon generously agreed, via a Voluntary Planning Agreement in accordance with condition C39 of the PA, to pay a monetary contribution to CN for proposed upgrading works at Tuxford Park Oval, Shortland. The provisions of CN's Section 7.12 Development Contributions Plan, which became operational on 1 January 2022, apply to the subject site. Under the plan, a contribution rate of 1% of the cost of the development applies to all non-residential developments having a cost of more than $200,000. Having regard to scale and nature of the proposed uses comprising the Modification Proposal it is recommended that in accordance with section 5.22(3) of the E&PA Act the proponent be required to address the requirements of the above Section 7.12 Plan and submit a cost summary report for the Modification Proposal.	Section 1 of the City of Newcastle Section 7.12 Development Contributions Plan (NCC Section 7.12 Contributions Plan) indicates that if a modification application has been made (under s4.55 or s4.46 of the EP&A Act) then the previous plan, at the time the original development consent was granted is relevant. The Secretary's Environmental Assessment Requirements (SEARs) for the Modification Proposal were issued on 17 August 2021. Albeit the Modification Proposal is not under s4.55 or 4.56 of the EP&A Act (under Part 5, Section 5.2 of the EP&A Act) the previous plan (Draft City of Newcastle Section 94A Development Contributions Plan 2009) is likely to apply (based upon Section 1 of the current plan). It is noted that both plans have a similar calculation rate for contributions. Previously, as part of the Hexham LTTSF Project, Aurizon entered into, and honoured, a Voluntary Planning Agreement (VPA) with NCC in accordance with condition C39 of MP07_0171. The value of the VPA was for $260,000 and for the purpose of an upgrade to Tuxford Park Oval located at King St, Shortland NSW 2307. Aurizon acknowledges the provisions of the NCC Section 7.12 Contributions Plan/ Draft City of Newcastle Section 94A Development Contributions Plan 2009, however, does not believe it is application is suitable based upon the benefits of the Modification Proposal, namely: • Reducing existing demands on NCC infrastructure due to the relocation of the depot from Mayfield to Hexham (on-site sewage and stormwater both of which are managed and treated by Aurizon on-site, rather than NCC Council).	N/A

		• Reducing train crew car driving between Mayfield and Hexham by approximately 17,000 hours (173,000km) per year, which reduces impacts (congestion, mainteance etc) of NCC's (and TfNSW's) road network • Positive economic impact on the surrounds with the additional workforce (both temporary and perminant) further supporting local business • Based on the scale, not resulting in additional requirements for community infrastructure (with breakout areas provided on-site) • Not impacting the amenity of surrounding residential areas. Further, The Modification Proposal, is included under the definition of an 'infrastructure facility' under the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP) which if developed by a NSW Government department, would be otherwise be exempt from contributions[3]. The Modification Proposal does not have a direct increase in revenue/profit to Aurizon however is being undertaken from a staff social benefit perspective, and therefore embodies objectives (amoungst others) which could also be aligned to a government driven project. Overall, the Modification Proposal involves a relatively minor overall addition and is consistent with the current operations of the Hexham LTTSF Project and presents net positive impacts on the surrounding infrastructure. As a result, and based upon the honouring of the previous VPA, Aurizon requests an exemption to further contributions being required for the Modification Proposal, in accordance with Section 8 of the Draft City of Newcastle Section 94A Development Contributions Plan 2009.	

[3] Section 7 of the Draft City of Newcastle Section 94A Development Contributions Plan 2009

Transport for NSW

A formal submission comprising a letter (dated 8 June 2022) was received from Transport for NSW (TfNSW). Comments (transcribed in full) with responses have been provided in Table 3.

Table 3 TfNSW comments and response

Aspect	Comment	Response	Reference
Intersection model	The submitted Traffic Impact Assessment (TIA) has undertaken an analysis of the current State road network. The model however has identified vehicle movements inconsistent with the current road layout. For example, I1 has no right turn movement out from the Access Road, and I2 has no right turn movements out from the New England Highway off-ramp. These should be amended as part of a revised TIA.	SLR has provided updated traffic flow diagrams (***Attachment D*** of this RtS) which consider the removal (and re-assignment) of the existing and forecast illegal right turn movements at the Tarro interchange. These diagrams also provide a breakdown between light and heavy vehicles. The updated traffic movements have been input into the SIDRA traffic model. Summary output from the revised modelling (***Attachment E*** of this RtS). Updated SIDRA model files are also supplied for review (submitted under separate cover). As identified from the updated SIDRA outputs, the Modification Proposal would, with the redirection of these illegal turns, not result in an increased level of service at the identified intersections. The traffic impacts of the Modification Proposal are therefore considered minor.	Attachment D and Attachment E of this RtS
SIDRA	The revised TIA should be accompanied with an electronic copy of the SIDRA file.	Updated SIDRA model files have been supplied for review (submitted under separate cover).	N/A
Additional Intersection	Confirmation is sought that the LILO arrangement at NEH and Woodlands Close will not be utilised as part of this development for movement from the east / south.	Condition E45 of the Hexham LTTSF Approval prohibited the use of the New England Highway/ Woodlands Close intersection for construction traffic. This condition does not extend to operational traffic. Notwithstanding this, Aurizon have continuously engaged with their operational staff to ensure they use the Tarro Interchange/ Access Road for access to the Hexham LTTSF Site (i.e. not use Woodlands Close). To further ensure this is managed as part of the Modification Proposal, a Traffic Access Plan will be prepared and provided within a site wide communication to all existing staff, and further included in induction material for new starters, to mitigate instances of illegal turns when accessing or egressing the development via any vehicle. The existing Hexham TSF Environmental Management Plan will be updated (as required) to be consistent with this Traffic Access Plan. The mitigation measures for the Modification Proposal (Section 6.11 of the Modification Report) have been updated to include this commitment (***Attachment F*** of this RtS).	Attachment F of this RtS

Egress Movements	A large proportion (56.82%) of external trips have been identified to / from the east / south. Further detail is sought as to where these vehicles will intend to perform a U-turn manoeuvre.	As identified within Section 6.5 of the Traffic Impact Assessment (Appendix K of the Modification Report) 56.82% of staff will approach from/ depart to the east/ south. Staff that reside to the east and south of the development will approach from New England Highway before taking the westbound off-ramp at the Tarro interchange, and right into the site access road. When departing, staff will turn left from the site access road and perform a u-turn at the u-turn facility on the New England Highway (located opposite Carr Place).	Section 6.5 of Appendix K of the Modification Report
Ingress Movements	A notable proportion (33.52%) of external trips have been identified to / from the west. Further detail is sought as to how these vehicles will approach the site.	As identified within Section 6.5 of the Traffic Impact Assessment (Appendix K of the Modification Report) 33.52% of staff will approach from/ depart to the west. Staff that reside to the west of the development will approach from New England Highway, turn left on to Quarter Sessions Road before turning right on to Anderson Drive and left into the site access road.	Section 6.5 of Appendix K of the Modification Report
Sight Distances	An analysis of the available sight distances needs to be undertaken upon intersections within the State road network.	Sections 2.4 and 8 of the Traffic Impact Assessment (Appendix K of the Modification Report) consider existing and proposed road safety. It's not clear which part(s) of the state-controlled road network to which TfNSW's comments relate. The Modification Proposal does not propose any upgrades to the public road network. Traffic travelling to and from the Modification Proposal will use the existing public road network and enter/ exit from the site via Anderson Drive at the Tarro interchange. In relation to the existing site access road at Anderson Drive (to be used for the Modification Proposal), this intersection was considered within the Traffic Impact Assessment[4]. The previous Traffic Impact Assessment notes that this intersection was to be 'designed and constructed in accordance with Austroads Guidelines. Using these guidelines the intersection shall provide adequate sight distance for all vehicles, provide a sheltered right turn lane and allow for the swept path movement of vehicles'. The intersection has since been constructed and operates accordingly. As a result of the comments raised above, no further sight distance assessment is considered to be required.	Sections 2.4 and 8 of Appendix K of the Modification Report Traffic Impact Assessment Appendix O of the Hexham LTTSF Approval

[4] Reference: Better Transport Futures, dated 10 September 2012

<table>
<tr>
<td>Design Heavy Vehicle</td>
<td>Swept turning paths for the 20m AV design vehicle is to be overlaid upon intersections within the State road network.</td>
<td>The Modification Proposal does not propose any upgrades to the public road network. Traffic travelling to and from the Modification Proposal will use the existing public road network and enter/ exit from the site via Anderson Drive at the Tarro interchange.

Further, the Modification Proposal does not comprise any changes to the type of vehicles that currently access the existing site. The largest vehicle that currently accesses the site is a 20m long articulated vehicle. In particular, Section 7.4 (Table 16) of the Traffic Impact Assessment provides an overview of the vehicles that will be used during the construction phase of the Modification Proposal, where the 20m articulated vehicle is considered to have the most onerous swept path.

Appendix C of the Traffic Impact Assessment (Appendix K of the Modification Report) provides swept path assessments for the Modification Proposal (i.e. additions to the existing Hexham LTSSF Project car park). It is concluded that the Modification Proposal (during construction and operation) and existing access routes can accommodate the proposed vehicles (which are the same as existing).</td>
<td>Section 7.6 and Appendix C of Appendix K of the Modification Report</td>
</tr>
<tr>
<td>Existing Operations</td>
<td>Additional commentary is sought to gain an appreciation of the current light and heavy vehicle movements associated with the facility. It is understood that the development seeks to consolidate operations at this site.</td>
<td>For clarity an overview of the operational traffic movements for existing and proposed (under the Modification Proposal) vehicles has been provided below.

<table>
<tr><th>Vehicle Type</th><th>Existing</th><th>Proposed</th><th>Total (Existing + Proposal)</th></tr>
<tr><td>Heavy vehicle</td><td>19</td><td>0</td><td>19</td></tr>
<tr><td>Light vehicle</td><td>149</td><td>118</td><td>267</td></tr>
</table>

Updated traffic flow diagrams are provided within Attachment D of this RtS.</td>
<td>Attachment D of this RtS</td>
</tr>
<tr>
<td>M1 to Raymond Terrace Project</td>
<td>It is requested that the Applicant be required to consult with TfNSW and provide advice as to the anticipated construction timing, details of construction traffic and equipment, so that TfNSW (and Contractors) can appropriately plan construction work should the two projects overlap.</td>
<td>Consultation with TfNSW is currently ongoing regarding impacts to the Hexham LTTSF Project access and potential land acquisition requirements. As part of this process TfNSW, in consultation with Aurizon, has committed to providing Aurizon with an alternate access during construction of the M1RT that will accommodate all required vehicle sizes. Aurizon will continue to consult with TfNSW, in particular confirming the timing for the Modification Proposal, subject to approval.</td>
<td>N/A</td>
</tr>
</table>

Community

Two submissions were received from the community. Comments (summarised) with responses have been provided in Table 4.

Table 4 Community submissions and response

Aspect	Comment	Response	Reference
Impact on wetlands	Concern that the Modification Proposal will further impact on the "protected wetlands".	Under the Hexham LTTSF Project impacts to the environment from Hexham LTTSF Site operations are monitored in line with the Surface and Ground Water Monitoring Plan (Rev 10). Section 2.3 of the Surface and Ground Water Monitoring Plan indicates that performance criteria (which has been utilised for monitoring purposes for the Hexham LTTSF Project from commissioning to date) has been developed from utilising information on water quality originating from the site since 1999 and based upon the *Australian and New Zealand Guidelines for Fresh Water Quality 95% species protection levels* (ANZECC, 2000). This monitoring approach is considered reflective of maintaining a high-water quality for the surrounding environment. Section 4.4.3 (Table 4.12) of the Soil and Water Assessment shows that the modelling results indicate the Modification Proposal would continue to meet the approved performance criteria detailed in the Hexham TSF Surface and Ground Water Monitoring Plan. Overall, the Modification Proposal is not considered to adversely impact surface water quality and no further mitigation measures are considered necessary.	Section 2.3 of the Surface and Ground Water Monitoring Plan (Rev 10) Section 4.4.3 of the Appendix J of the Modification Report
Monitoring of previous biodiversity offsets	Concern that Aurizon may not have previously met their offset requirements, in relation the wetlands, identified as part of previous approvals.	Confirmation of compliance with Condition C4 (Biodiversity Offsets) of the Hexham LTTSF Approval (MP07_0171), along with supporting information, was issued to the DPE on the 01/09/2016. This information can be provided again on request from DPE.	N/A
Surface water run-off onto surrounding properties	Purported that previous drainage work undertaken by Aurizon has resulted in an increased retention of water on neighbouring development. Concern is that this will be further exacerbated by the Modification Proposal.	Aurizon has proactively undertaken extensive and ongoing consultation with the landholder regarding projects at the Hexham LTTSF Site as evidenced by the submitted consultation documentation (submitted under separate cover). On the 20 December 2016 the landholder issued Aurizon with formal correspondence stating that Aurizon has consulted with them to develop	Appendix F of the Modification Report

		reasonable and feasible measures to manage and mitigate flood impacts to their property. As part of this consultation the landholder confirmed that they are satisfied with this consultation and have reached agreement on management and mitigation measures of potential flood impacts. No further comments have been received to date, outside of this submission, in relation to additional flooding or water retention concerns from this landowner. Further, a Flood Assessment (Appendix F of the Modification Report) was prepared to consider the potential impacts of the Modification Proposal. The assessment concluded that the flood impacts from the Modification Proposal would be negligible (confined to the Hexham LTTSF Site – Aurizon's land) with no off-site flood impacts anticipated. Overall, based upon the previous consultation (confirming the landowners satisfaction with the implementation of flood controls) and that the Modification Proposal would not result in offsite impacts no further mitigation measures are considered necessary.	
Flooding of neighbouring areas	Concern that flooding of neighbouring property (and surrounds) would be exacerbated by the Modification Proposal. Details on the final ground levels should be provided for the Modification Proposal.	As discussed above, the Modification Proposal would not result in any adverse flooding impacts on neighbouring properties (Flood Assessment (Appendix F of the Modification Report)). An estimate of the cut and fill balance and therefore levels proposed for the Modification Proposal is provided within Appendix D of the Modification Report. Final levels would be determined as part of detailed design for the Modification Proposal.	Appendix D and Appendix F of the Modification Report
Construction impacts	Impacts on access from the private road as a result of additional construction vehicles. Also potential for impact of noise from construction vehicles (and construction activities in general) on the neighbouring property.	Section 7.4 of the Traffic Impact Assessment (Appendix K of the Modification Proposal) provides an impact assessment of potential construction traffic impacts. The assessment concludes that the existing road network (external roads) could accommodate the additional traffic anticipated during construction. Further, the Modification Proposal does not comprise any changes to the type of vehicles that currently access the existing site. Aurizon would ensure that access is maintained to all properties utilising the private access road during construction (As is required under conditions E53 and E54 of the Hexham LTTSF Project Approval). Overall, construction traffic is not anticipated to restrict access or the use of the private road. Section 3.2.2 of the Noise Impact Assessment (Appendix I of the Modification Report) provides an assessment of potential construction noise impacts for the Modification Proposal. This assessment concludes that potential	Section 7.4 of Appendix K of the Modification Proposal Section 3.2.2 of Appendix I of the Modification Report

		construction noise impacts at sensitive receivers would be well below the identified criteria.	
Access road movement	Concern that the 'access road' will be moved closer to the existing neighbouring residential property. This could cause flooding, noise, air and visual impacts.	Aurizon has undertaken extensive consultation to date with TfNSW regarding the M1RT Project. The current alignment of the M1RT Project bisects northern portions of the Hexham LTTSF Project landholdings adjacent to the New England Highway. The proposed alignment is likely to result in compulsory acquisition (currently under negotiation) of affected land parcels and realignment of the existing Hexham LTTSF Project access road. It is noted that the M1RT Project proponent is TfNSW and the acquisition of Aurizon land parcels and realignment of the existing Hexham LTTSF Project access road is not within the scope of the Modification Proposal.	N/A
Increases to train noise	Concern from existing noise impacts from train driver horns being increased as a result of the operation of the Modification Proposal. Potential for other operational noise impacts on the surrounding property.	Aurizon has confirmed that the Modification Proposal would not result in the additional movement of trains and as such an intensification of noise impacts would not occur. In relation to horn usage Aurizon locomotives are required to sound their 'town horn' when moving from a stationary position under Aurion's Safety Management System and when approaching a level crossing as per network requirements. As a level crossing is present prior to the network access point and locomotives will move from a stationary position when entering the network Aurizon locomotives are required to sound their town horn as part of existing operations in proximity to the Hexham LTTSF Project.	N/A
Consultation	Concerned that no previous consultation has been undertaken to discuss the Modification Proposal with the surrounding neighbour.	Aurizon has proactively undertaken extensive and ongoing consultation with the landholder regarding projects at the Hexham LTTSF Site as evidenced by the submitted consultation documentation (submitted under separate cover). Section 5.2 of the Modification Report identifies that key adjacent private landowners were consulted to provide an overview of the Modification Proposal, via letter, on 1 November 2021. No comments were received at this time. In addition to the Aurizon 24-hour Community Engagement phone line and email address the landholder has been provided with the email address and mobile phone number of the Aurizon Senior Adviser Environment as part of completed consultation.	N/A

Attachment A - Hexham TSF Surface and Groundwater Monitoring Plan (Draft)

Hexham TSF Surface and Groundwater Monitoring Plan

~~30 March 2021~~30 May 2022

Plan Approval Table

Position	Name	Signature	Date
Regional Maintenance Manager	Dave Mayo		30/~~03~~05/~~2021~~2022

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
4	13/03/15	Heath Anderson	S2 Draft review (Internal)
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 for DPE issue
7	11/10/17	Heath Anderson	Minor revisions
8	07/01/19	Harry Egan	Revision following IEA
9	19/05/20	Harry Egan	Inclusion of turning angle details
10	30/03/21	Harry Egan	Update of Section 3.1
11	30/05/22	Harry Egan	IEA recommendations

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Glossary

Term	Definitions
ANZECC	Australian and New Zealand Environment and Conservation Council
the Approval	State Significant Infrastructure MP07_0171 MOD 1
Aurizon	Aurizon Operations Pty Ltd
CWR	Coal Washery Reject
DAF	Dissolved aeration floatation
DPI&E	Department of Planning, Industry and Environment
EPL	Environmental Protection Licence
EP&A Act	*Environmental Planning and Assessment Act 1979*
OEMP	14-PLA-0004-HEX Aurizon Hexham TSF OEMP
PAH	Poly Aromatic Hydrocarbon
PASS	Potential acid sulphate soils
SGMP	Surface and Groundwater Monitoring Plan
the Site	Hexham Train Support Facility
SoC	Statement of Commitments
SSI	State Significant Infrastructure
TPH	Total Petroleum Hydrocarbon
UST	Underground storage tank

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 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;
- ~~a provisioning building, service vehicle garage and combined maintenance/administrative centre;~~
- 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 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
- Potential acid sulphate soils (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 Environmental Protection Licence (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.

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:

- ~~was~~ 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 MP-07_0171 MOD 1 (SSI-6090) ~~(the Approval)~~ 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 <TBC>.

~~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 MP-07_0171 MOD 1 (SSI-6090) (the Approval) was approved on the 09 October 2019.~~

This Surface and Groundwater Monitoring Plan (SGMP) has been developed and implemented as required by condition C19 of the Approval. A matrix of the conditions of approval and Statement of Commitments (SoC) is included in Appendix A. This matrix identifies where these conditions/commitments have been addressed in the SGMP.

The SGMP 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 ~~14-PLA-0004-Hex~~ Aurizon Hexham TSF Operational Environmental Management Plan (OEMP).

1.4 Purpose and Objectives

The SGMP 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 potential onsite and offsite surface and groundwater impacts.

Condition C19(h) of the approval requires:

> *"details of how interactions with the ARTC Hexham Relief Roads Project and potential cumulative impacts would be monitored and managed;"*

This condition relates to assessing cumulative dewatering impacts associated with the simultaneous construction of both the Site and the Relief Roads Project. As construction of both projects has been finalised cumulative impacts and interactions are no longer occurring and as such no longer warrant monitoring or management as part of the OEMP.

2.0 Environmental Monitoring

2.1 Monitoring Network and Program

Surface and groundwater monitoring locations and monitoring frequencies are detailed in Table 1 below with a site layout showing monitoring locations included as Figure 1.

Table 1 - Monitoring Network and Program

Site	Type	Easting	Northing	Monitoring Frequency	Rainfall Event
MW01R	Groundwater	377080	6365705	Quarterly	No
MW301R	Groundwater	376564	6367446	Quarterly	No
MW302R	Groundwater	376918	6366499	Quarterly	No
MW307R	Groundwater	376287	6366363	Quarterly	No
MW308R	Groundwater	376405	6365896	Quarterly	No
MW109	Groundwater	376273	6368095	Quarterly	No
MW106R	Groundwater	376758	6366928	Quarterly	No
MW02	Groundwater	376711	6365816	Quarterly	No
101R	Groundwater	377110	6365956	Quarterly	No
MW108R	Groundwater	376083	6366960	Quarterly	No
MW101R	Groundwater	376282	6367404	Quarterly	No
SW1	Surface Water	376210	6368225	Quarterly	Yes
SW2	Surface Water	375612	6368068	Quarterly	Yes
SW3	Surface Water	375884	6367384	Quarterly	Yes
SW4	Surface Water	376197	6366571	Quarterly	Yes
SW4A	Surface Water	376222	6366553	Quarterly	Yes
SW05	Surface Water	377144	6365655	Quarterly	Yes
SW6	Surface Water	376411	6365873	Quarterly	Yes
SW07	Surface Water	376680	6365799	Quarterly	Yes
SW8	Surface Water	377474	6365420	Quarterly	Yes
SW9	Surface Water	377496	6365387	Quarterly	Yes
SW10	Surface Water	376776	6367600	Quarterly	Yes

Site	Type	Easting	Northing	Monitoring Frequency	Rainfall Event
SW11	Surface Water	375433	6367878	Quarterly	Yes
Basin 1	Surface Water	376205	6367977	Monthly	Yes
Basin 2	Surface Water	376481	6367284	Monthly	Yes
Basin 3	Surface Water	377038	6365758	Monthly	Yes

2.2 Rainfall Event Sampling

Rainfall sampling will be undertaken following rainfall totalling greater than 75mm over a duration of 5 consecutive days or less. Rainfall is measured from the from the Manly Hydraulics Lab, Hexham Bridge, station number 210448 (http://www.mhl.nsw.gov.au/Site-210448).

Sampled sites will consist of all surface water and site Basins for the analytical schedule detailed in Table 2.

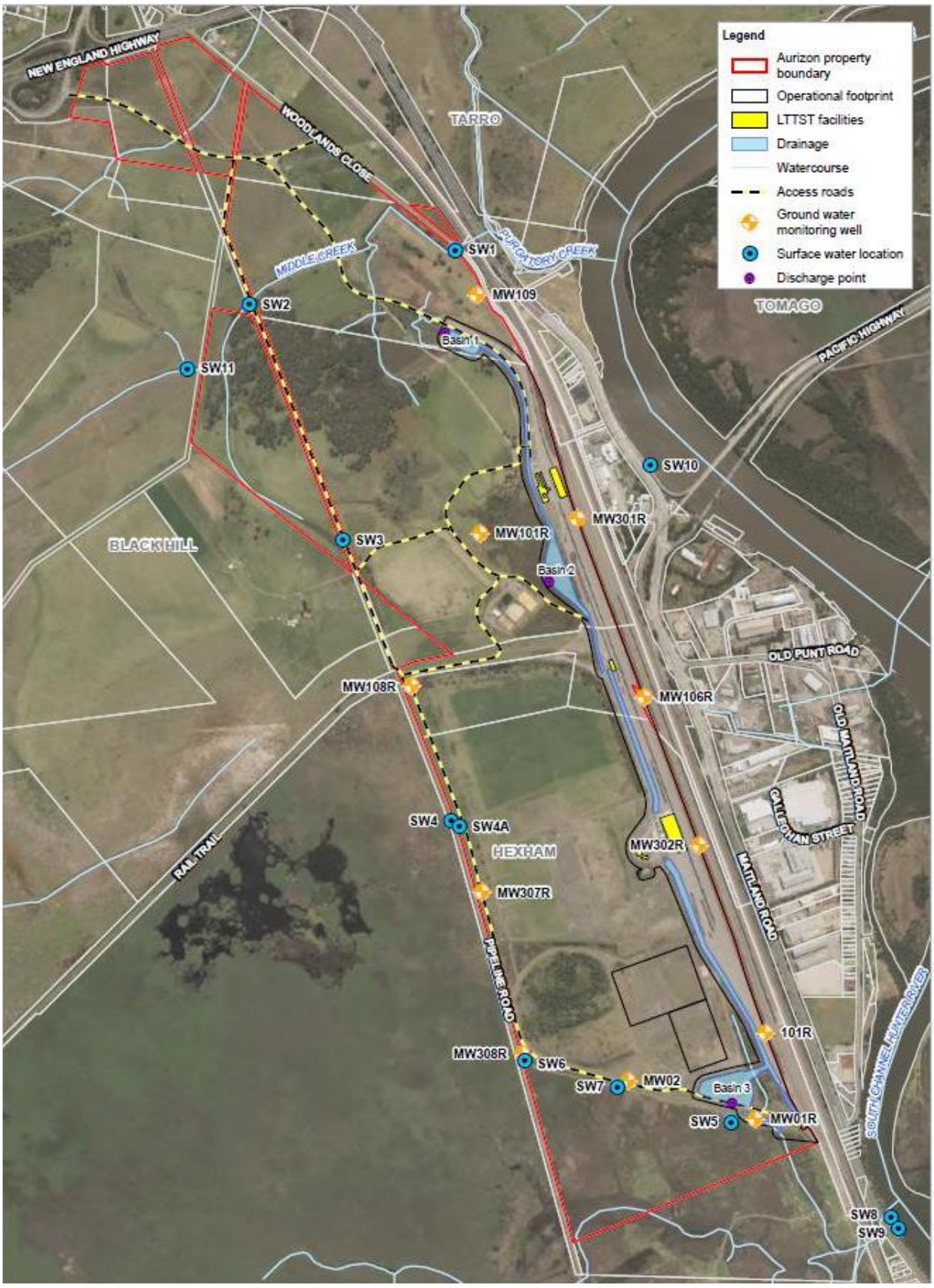

Figure 1 - Surface and Groundwater Monitoring Locations

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2.3 Performance Criteria

Performance criteria were developed for Aurizon by Douglas Partners Pty. Ltd. in February 2014[1] utilising information on water quality originating from the site since 1999. Criteria was based on the *Australian and New Zealand Guidelines for Fresh Water Quality 95% species protection levels (ANZECC, 2000)*. The ANZECC 95% investigation levels apply to typical slightly to moderately disturbed fresh waters systems. The DP report applied statistical analysis to the historic and baseline surface and groundwater data to determine appropriate background chemistry.

Performance criteria are categorised as A, B or C, based on the different categories of receiving environments as listed below:

- Performance Criteria A – Hunter River (SW01, SW02 and SW03);
- Performance Criteria B – Hexham Swamp (SW04, SW05, SW06, SW07); and
- Performance Criteria C – (Groundwater).

The developed/referenced criteria and monitoring analytical schedule is shown in Table 2 and takes into account the sites historical utilisation and will be used to assess the quality of surface and groundwater results.

Table 2 - Performance Criteria and Analytical Schedule

Parameter	Units	Performance Criteria A	Performance Criteria B	Performance Criteria C	ANZECC 2000
Depth	mAHD	N/A	N/A	-	N/A
Conductivity	uS/cm	40000	6000	20500	20500
pH	pH Units	6.5 - 8.5	5.5 - 8.5	6.5 - 8.5	6.5 - 8.5
Aluminium (Al)	mg/L	2.5	2.5	0.055	0.055
Arsenic (As)	mg/L	0.013	0.013	0.013	0.013
Cadmium (Cd)	mg/L	0.0002	0.0002	0.0002	0.0002
Chromium (Cr)	mg/L	0.004	0.002	0.002	0.001
Copper (Cu)	mg/L	0.0045	0.0026	0.0071	0.0014
Iron (Fe)	mg/L	35	1.3	350	0.3
Lead (Pb)	mg/L	0.0044	0.0034	0.0034	0.0034
Mercury (Hg)	mg/L	0.0006	0.0006	0.0006	0.0006

[1]Douglas Partners, 2014, *Report on discharge Criteria Assessment: Proposed Long Term Train Support Facility, Woodlands Close, Hexham.* Report for Aurizon Operations Limited.

Parameter	Units	Performance Criteria A	Performance Criteria B	Performance Criteria C	ANZECC 2000
Nickel (Ni)	mg/L	0.017	0.011	0.18	0.011
Zinc (Zn)	mg/L	0.054	0.019	0.65	0.008
Ammonia	mg/L	0.9	0.9	25	0.9
Turbidity	NTU	60	50	1200	50
Total Susp. Solids	mg/L	50	40	650	N/A
TKN	mg/L	8	4	12	N/A
Total Nitrogen	mg/L	10	4	12	0.5
Total Phosphorus	mg/L	2.75	1.9	14.5	0.05
Faecal Coliforms	cfu/100mL	1500	500	2000	150
BOD	mg/L	40	15	30	15
TRH C6-C36	mg/L	0.15	0.15	0.3	N/A
Naphthalene	mg/L	0.05	0.05	0.05	0.05
Phenanthrene	mg/L	0.0006	0.0006	0.0015	0.0006
Anthracene	mg/L	0.0006	0.0006	0.00095	0.00001
Fluoranthene	mg/L	0.001	0.001	0.0015	0.001
Benzo(a) pyrene	mg/L	0.0006	0.0001	0.0007	0.0001
Total PAHs	mg/L	0.01	0.0015	0.02	N/A
Benzene	mg/L	0.95	0.95	0.95	0.95
Ethyl Benzene	mg/L	0.08	0.08	0.08	0.08
Toluene	mg/L	0.18	0.18	0.18	0.18
Xylenes (total)	mg/L	0.625	0.625	0.625	0.625

Note: Groundwater metals will be dissolved and surface water total respectively.

2.4 Monitoring Methodology

The methodology required to be implemented when completing all surface and groundwater monitoring is detailed in Table 3 below.

Table 3 - Monitoring Methodology

Item	Surface Water	Groundwater
Relevant Technical Guidelines	*ASTM D6771–02, Standard practice for low-flow purging and sampling for wells and devices used for groundwater quality investigations, ASTM International.* *Australian Standard 5667:1998 Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS 5667.1:1998).* *Australian Standard 5667:1998 Water Quality – Sampling, Part 11: Guidance on the Sampling of Groundwater (AS 566.11:1998).*	
Field Sampling	Surface water sampling is conducted using a reach pole with a dedicated sampling bottle attached. The bottle is lowered into the water body to allow a sample to be collected from below the surface. The sample is poured into the sample bottle and lid closed being careful to not overfill causing loss of preservatives. Air bubbles are to be minimised in the sample bottle.	Monitoring wells are gauged using an oil/water interface probe to measure standing water levels (SWL) and assess for the potential presence of LNAPL. Groundwater sampling is conducted using low flow techniques (peristaltic pump). The sample is poured into the sample bottle and lid closed being careful to not overfill causing loss of preservatives. Air bubbles are to be minimised in the sample bottle.
Field Analysis	Field measurements are taken using a calibrated water quality meter with measurements of temperature, pH, electrical conductivity (EC), turbidity, dissolved oxygen (DO) and oxidation-reduction potential (REDOX) recorded.	
Decontamination	Prior to and following the collection of each sample, all non-disposable sampling equipment will undergo decontamination including: • Washing of equipment with phosphate-free detergent (Decon Neutracon); and • Rinsing of equipment with fresh water.	
Sample Handling and Transport	Following collection, water samples are immediately placed on ice and stored in a cool, dark environment (esky) prior to being forwarded to the analytical laboratory within the specified holding times along with a COC form.	

2.5 Quality Assurance

The methodology required to be implemented when completing all surface and groundwater monitoring is detailed in Table 4 below.

Table 4 - Quality Assurance

Item	Description	Requirement
Laboratory Analysis	All surface and groundwater samples are submitted to laboratories accredited by the National Association of Testing Authorities (NATA).	
Field Duplicates	Field duplicates are duplicate samples that are sent as independent samples to the same laboratory for analysis to assess the precision of the analytical results. Field duplicates should generally be collected from a well-mixed sample of soil, water or air. Water duplicates should be taken from the sample container simultaneously.	1 in 20 samples or 1 per day whichever is greater.
Field Splits	Field splits are duplicate samples that are sent to different laboratories for analysis to assess the precision of the results. Field splits should be collected using the same procedures as for field duplicates.	1 in 20 samples or 1 per day whichever is greater.
Equipment Blanks	Equipment blanks monitor possible contamination that may be introduced by inadequate equipment decontamination. After equipment has been decontaminated deionised water should be run through or over that section of the equipment that is used to collect the samples. The deionised water should be collected, sealed and labelled as a sample.	Equipment blanks can be placed on hold at the laboratory and only analysed should the primary data set indicate potential for cross contamination.
Trip Blanks	Trip blanks monitor possible contamination introduced during field and laboratory work. Before commencement of work each day that sampling is undertaken, in a clean location the trip blank sample container is filled with deionised water, sealed and labelled. It is then taken into the field for the duration of the work that day and is sent alongside all the other samples for analysis.	Trip blanks are usually placed on hold at the laboratory and only analysed should the primary data set indicate potential for cross contamination.

3.0 Compliance and Reporting

3.1 Reporting Requirements

Reporting requirements are detailed in Table 5 below.

Table 5 - Reporting Requirements

Type	Requirements	Approval Authority	Frequency
Quarterly Report	• Completed monitoring and QA; • Statistical comparison of monitoring results to site specific criteria and historical results; • identification of exceedances; • photograph of monitoring locations for comparison with previous years; and • Graphing of monitoring results.	Aurizon	Quarterly
Annual Comprehensive Report		DPI&E and Newcastle City Council	Annual (calendar year)

All results are recorded in the field either by hand or electronic tablet on forms developed by the engaged contractor with lab results recorded on certificates of analysis. All data is transferred to Aurizon maintained databases by the engaged contractor and interrogated to determine Site environmental performance as detailed in the quarterly and annual reports.

The quarterly report will be submitted to Aurizon to ensure non-compliances are identified and corrective actions implemented as required. The quarterly report is not required to be submitted to any regulatory authority.

As per condition C19(j) of the approval results of completed monitoring will be reported to the DP&E and EPA through completion and submission of an annual report.

3.2 Corrective Actions

As per Section 4 of the OEMP:

- Identified non-conformances with the SGMP, legislative or other requirement will be managed in accordance with *BSEMS-STD25 Operational Non Conformance & Incident Reporting*; and
- corrective and preventative actions arising from non-conformances will be managed in accordance with *BSEMS-STD05 Effectiveness of Corrective & Preventative Actions*.

Non-conformances will be identified by the completion of routine inspections of the site undertaken as per Section 4 of the OEMP. Exceedances of prescribed monitoring criteria will be identified during review of monitoring data undertaken as part of scheduled reporting as per Section 3 – Reporting of this plan and annual auditing detailed in Section 4.2 of the OEMP.

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 contaminated land consultant if required in accordance with Section 4 of the OEMP.

Due to the Site experiencing high groundwater levels and being relatively flat, capping of the site and construction of permanent drainage swales and detention ponds may have the potential to impact groundwater levels and surface water flow regimes. To ensure impacts to surface and groundwater levels/flow are addressed a Stormwater Management Plan has been adapted from the Hexham Train Support Facility: Stormwater Management Plan (Worley Parsons, 2013).

APPENDICIES

APPENDIX A Minister Conditions of Approval MP07_0171 and Statement of Commitments

Relevant Minister Conditions of Approval

MCoA	Description	Section/Management Plan
C19 (a)-(j)	A Surface Water and Groundwater Monitoring Program shall be prepared and implemented to monitor impacts on surface water and groundwater quality and hydrology. The program shall be developed in consultation with the EPA, NoW and Hunter-Central Rivers CMA and shall include but not necessarily be limited to: (a)-(j)	This Plan
F2	(h) procedures for periodic monitoring of groundwater depth and flow and groundwater quality in the vicinity of the SSI and groundwater seepage, including the location and frequency of monitoring;	Section 3.2 SGMP
	(i) a contingency plan to address changes in groundwater depths and flows and/or groundwater quality and groundwater seepage into the drainage swales;	Section 3.2 SGMP

Statement of Commitments

SoC	Commitment	OEMP Section/Management Plan
Item 3	A. Water Quality Management Plan;	This Plan
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.	This Plan

Attachment B - Hexham TSF Stormwater Monitoring Plan (Draft)

Hexham TSF Stormwater Management Plan

31 May 2022

Plan Approval Table

Position	Name	Signature	Date
Regional Maintenance Manager	Dave Mayo		

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	IEA and Depot 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:

- ~~was~~ 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 MP-07_0171 MOD 1 (SSI-6090) ~~(the Approval)~~ 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 <TBC>.

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 ~~14-PLA-0004-Hex~~ Aurizon Hexham TSF OEMP ~~(Rev 10) (October 2021)~~.

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

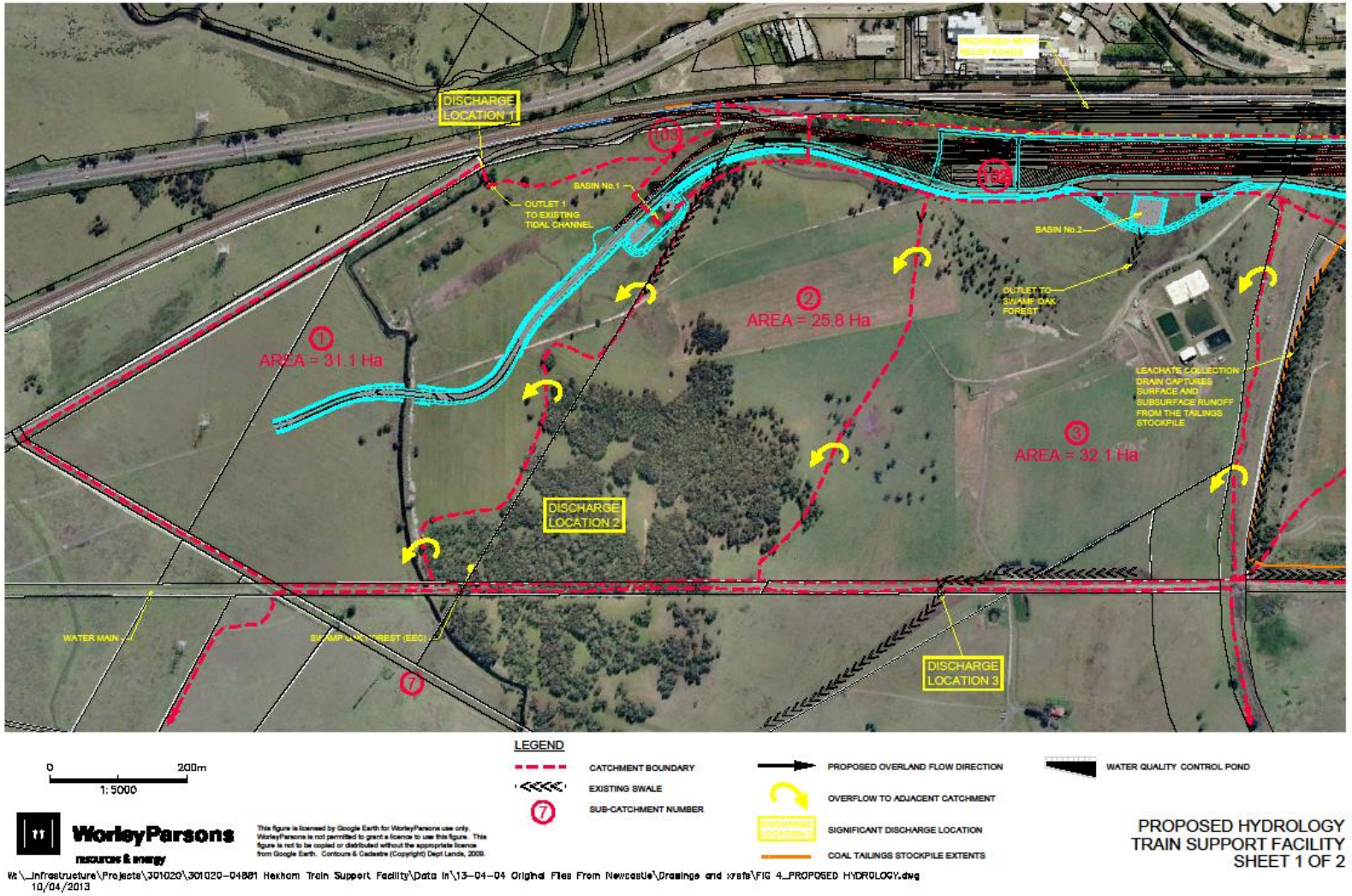


Figure 1 - Site Hydrology (a)

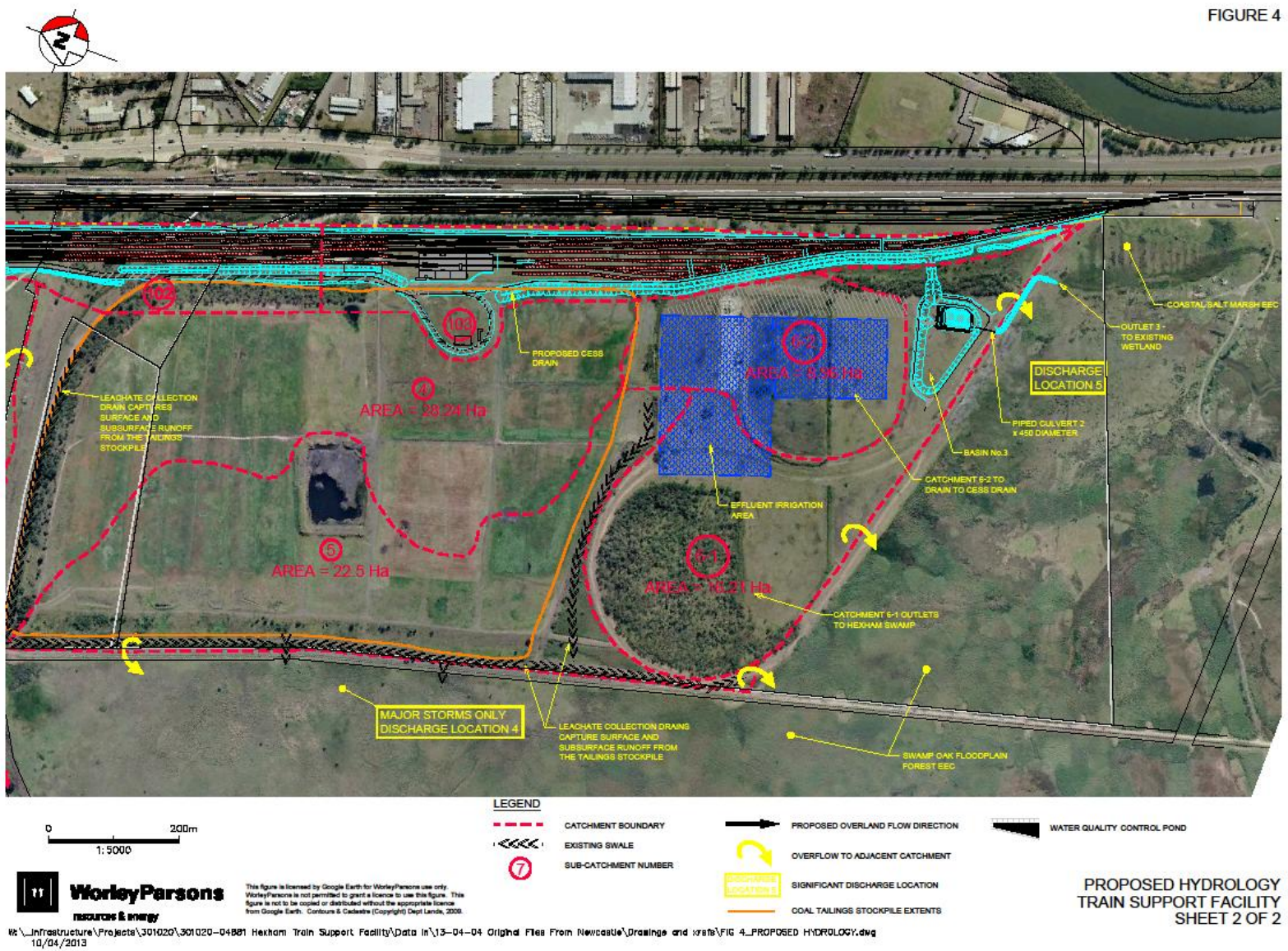


Figure 2 - Site Hydrology (b)

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.

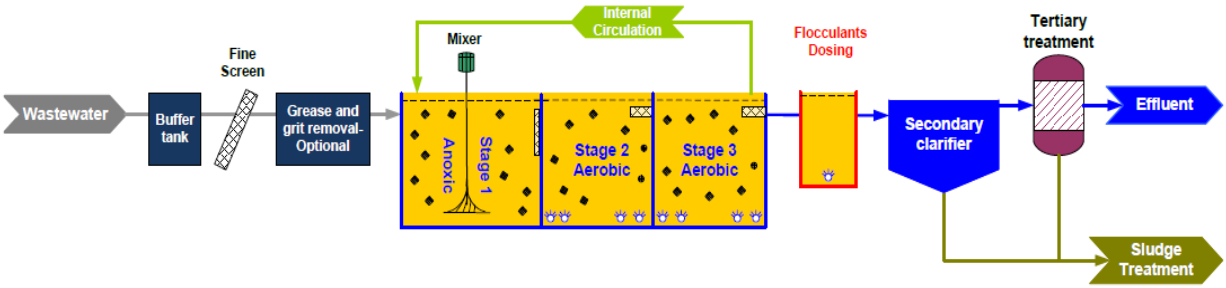


Figure 3 WWTP schematic (Aquise 2015)

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*~~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 Senior 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 ~~4~~ 5 – Monitoring Section ~~5~~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 ~~4~~5.0 – Monitoring Section ~~5~~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 ~~5~~6.2 – Inspection and Maintenance
	(n) measures for maintaining the stormwater management system including the drainage swales; and	Section ~~5~~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

~~APPENDIX B – Inspection Forms~~

Attachment C – MUSIC Modelling information

GHD Tower, Level 3, 24 Honeysuckle Drive
Newcastle, New South Wales 2300
Australia
www.ghd.com

Your ref: Hexham LTTSF- RtS Plan
Our ref: 12564230

04 July 2022

Harry Egan
Aurizon Operations Limited
121 Woodstock Street
Mayfield NSW 2304

By email: Harry.Egan@aurizon.com.au

Hexham LTTSF – Assistance for response to submission

Dear Harry

1. Introduction

1.1 Background

GHD Pty Ltd (GHD) prepared a Soil and Water Assessment report on behalf of Aurizon for the development of a depot, warehouse and wagon storage (the Modification Proposal) to support the ongoing operations of the Hexham Long Term Train Support Facility (Hexham LTTSF Project), Hexham (the Hexham LTTSF Site). The Modification Proposal is being undertaken as a modification (under Part 5, Section 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act)) to the Hexham LTTSF Approval (MP07_0171).

The Department of Planning and Environment received a submission from City of Newcastle (CN) in response to a request to CN to provide advice of the Modification Proposal. Aurizon requested that GHD assist in preparing a response to the submission.

1.2 Purpose

The purpose of this letter is to provide a response to specific questions from Aurizon to assist Aurizon in preparing a response to submissions.

1.3 Limitations

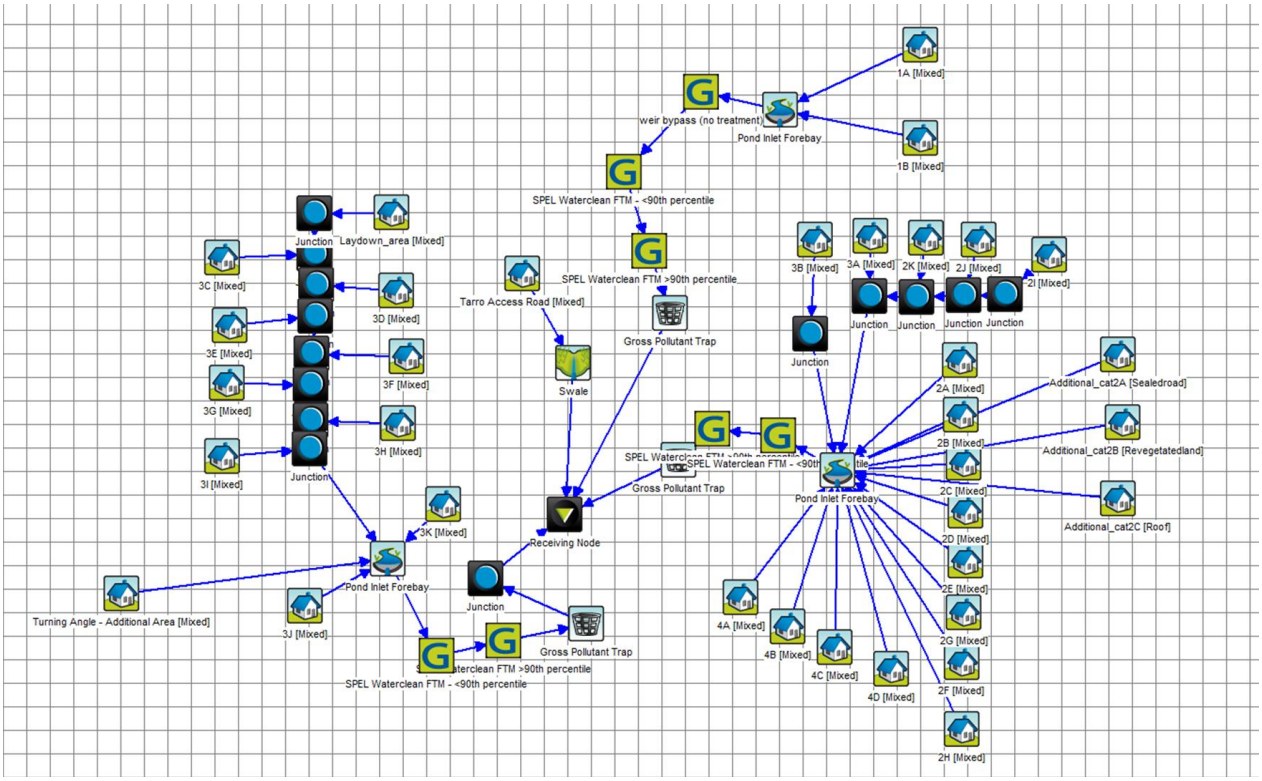
This letter is subject the limitations set out in the Soil and Water Assessment report.

2. Specific responses

MUSIC link report along with a summary of the model and node diagram or similar (for water quality assessment) to be provided.

The model is summarised in Section 4.3.2.1 of the report.

A node diagram is included below. A MUSIC link report is provided in Attachment A.



Regards

Tyler Tinkler
Water Engineer

+61 2 4979 9061
tyler.tinkler@ghd.com

Attachment A – MUSIC link report

Attachment 1

MUSIC link report

THE CITY OF NEWCASTLE

MUSIC-*link* Report

Project Details		Company Details	
Project:	Soil and Water Assessment Operational Depot and Long-Term Wagon Storage, Hexham Train Support Facility	**Company:**	GHD
		Contact:	Tyler Tinkler
Report Export Date:	1/07/2022	**Address:**	Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300
Catchment Name:	2019-01-30_TOTAL SITE_REV_E_Williamtown_proposed_basin2_JMM	**Phone:**	+61 2 4979 9061
Catchment Area:	28.842ha	**Email:**	tyler.tinkler@ghd.com
Impervious Area*:	93.47%		
Rainfall Station:	61078 WILLIAMTOWN		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1995 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	1125mm		
Evapotranspiration:	1735mm		
MUSIC Version:	6.3.0		
MUSIC-link data Version:	6.34		
Study Area:	Newcastle		
Scenario:	Newcastle		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node: Receiving Node	**Reduction**	**Node Type**	**Number**	**Node Type**	**Number**
Flow	7.87%	Pond Node	3	Urban Source Node	34
TSS	82%	Swale Node	1		
TP	74.3%	GPT Node	3		
TN	68.6%	Generic Node	7		
GP	99.4%				

Comments

Soil and Water Assessment report has been prepared for the development of a depot, warehouse and wagon storage (the Modification Proposal) to support the ongoing operations of the Hexham Long Term Train Support Facility (Hexham LTTSF Project), Hexham (the Hexham LTTSF Site). The Modification Proposal is to be undertaken as a modification (under Part 5, Section 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act)) to the Hexham LTTSF Approval (MP07_0171). A MUSIC model was previously prepared for the detailed design of the LTTSF Project Site and updated for MOD1 assessment. This model was further updated to reflect the proposed changes in catchments due to the Modification Proposal.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	Gross Pollutant Trap	Hi-flow bypass rate (cum/sec)	None	None	0.5
GPT	Gross Pollutant Trap	Hi-flow bypass rate (cum/sec)	None	None	0.5
GPT	Gross Pollutant Trap	Hi-flow bypass rate (cum/sec)	None	None	0.5
Pond	Pond Inlet Forebay	% Reuse Demand Met	None	None	0
Pond	Pond Inlet Forebay	% Reuse Demand Met	None	None	0
Pond	Pond Inlet Forebay	% Reuse Demand Met	None	None	0
Receiving	Receiving Node	% Load Reduction	None	None	7.87
Receiving	Receiving Node	GP % Load Reduction	90	None	99.4
Receiving	Receiving Node	TN % Load Reduction	45	None	68.6
Receiving	Receiving Node	TP % Load Reduction	65	None	74.3
Urban	1A	Area Impervious (ha)	None	None	0.867
Urban	1A	Area Pervious (ha)	None	None	0
Urban	1A	Total Area (ha)	None	None	0.867
Urban	1B	Area Impervious (ha)	None	None	0.396
Urban	1B	Area Pervious (ha)	None	None	0
Urban	1B	Total Area (ha)	None	None	0.396
Urban	2A	Area Impervious (ha)	None	None	0.563
Urban	2A	Area Pervious (ha)	None	None	0
Urban	2A	Total Area (ha)	None	None	0.563
Urban	2B	Area Impervious (ha)	None	None	0.753
Urban	2B	Area Pervious (ha)	None	None	0
Urban	2B	Total Area (ha)	None	None	0.753
Urban	2C	Area Impervious (ha)	None	None	1.084
Urban	2C	Area Pervious (ha)	None	None	0
Urban	2C	Total Area (ha)	None	None	1.084
Urban	2D	Area Impervious (ha)	None	None	1.511
Urban	2D	Area Pervious (ha)	None	None	0
Urban	2D	Total Area (ha)	None	None	1.511
Urban	2E	Area Impervious (ha)	None	None	1.168
Urban	2E	Area Pervious (ha)	None	None	0
Urban	2E	Total Area (ha)	None	None	1.168
Urban	2F	Area Impervious (ha)	None	None	1.474
Urban	2F	Area Pervious (ha)	None	None	0
Urban	2F	Total Area (ha)	None	None	1.474
Urban	2G	Area Impervious (ha)	None	None	1.511
Urban	2G	Area Pervious (ha)	None	None	0
Urban	2G	Total Area (ha)	None	None	1.511
Urban	2H	Area Impervious (ha)	None	None	1.255
Urban	2H	Area Pervious (ha)	None	None	0
Urban	2H	Total Area (ha)	None	None	1.255

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	2I	Area Impervious (ha)	None	None	1.095
Urban	2I	Area Pervious (ha)	None	None	0
Urban	2I	Total Area (ha)	None	None	1.095
Urban	2J	Area Impervious (ha)	None	None	0.782
Urban	2J	Area Pervious (ha)	None	None	0
Urban	2J	Total Area (ha)	None	None	0.782
Urban	2K	Area Impervious (ha)	None	None	0.759
Urban	2K	Area Pervious (ha)	None	None	0
Urban	2K	Total Area (ha)	None	None	0.759
Urban	3A	Area Impervious (ha)	None	None	0.794
Urban	3A	Area Pervious (ha)	None	None	0
Urban	3A	Total Area (ha)	None	None	0.794
Urban	3B	Area Impervious (ha)	None	None	1.287
Urban	3B	Area Pervious (ha)	None	None	0
Urban	3B	Total Area (ha)	None	None	1.287
Urban	3C	Area Impervious (ha)	None	None	1.546
Urban	3C	Area Pervious (ha)	None	None	0
Urban	3C	Total Area (ha)	None	None	1.546
Urban	3D	Area Impervious (ha)	None	None	1.073
Urban	3D	Area Pervious (ha)	None	None	0
Urban	3D	Total Area (ha)	None	None	1.073
Urban	3E	Area Impervious (ha)	None	None	0.947
Urban	3E	Area Pervious (ha)	None	None	0
Urban	3E	Total Area (ha)	None	None	0.947
Urban	3F	Area Impervious (ha)	None	None	0.852
Urban	3F	Area Pervious (ha)	None	None	0
Urban	3F	Total Area (ha)	None	None	0.852
Urban	3G	Area Impervious (ha)	None	None	0.697
Urban	3G	Area Pervious (ha)	None	None	0
Urban	3G	Total Area (ha)	None	None	0.697
Urban	3H	Area Impervious (ha)	None	None	0.711
Urban	3H	Area Pervious (ha)	None	None	0
Urban	3H	Total Area (ha)	None	None	0.711
Urban	3I	Area Impervious (ha)	None	None	0.747
Urban	3I	Area Pervious (ha)	None	None	0
Urban	3I	Total Area (ha)	None	None	0.747
Urban	3J	Area Impervious (ha)	None	None	0.449
Urban	3J	Area Pervious (ha)	None	None	0
Urban	3J	Total Area (ha)	None	None	0.449
Urban	3K	Area Impervious (ha)	None	None	0.432

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	3K	Area Pervious (ha)	None	None	0
Urban	3K	Total Area (ha)	None	None	0.432
Urban	4A	Area Impervious (ha)	None	None	0
Urban	4A	Area Pervious (ha)	None	None	0.546
Urban	4A	Total Area (ha)	None	None	0.546
Urban	4B	Area Impervious (ha)	None	None	0
Urban	4B	Area Pervious (ha)	None	None	0.376
Urban	4B	Total Area (ha)	None	None	0.376
Urban	4C	Area Impervious (ha)	None	None	0
Urban	4C	Area Pervious (ha)	None	None	0.466
Urban	4C	Total Area (ha)	None	None	0.466
Urban	4D	Area Impervious (ha)	None	None	0
Urban	4D	Area Pervious (ha)	None	None	0.401
Urban	4D	Total Area (ha)	None	None	0.401
Urban	Additional_cat2A	Area Impervious (ha)	None	None	0.422
Urban	Additional_cat2A	Area Pervious (ha)	None	None	0
Urban	Additional_cat2A	Total Area (ha)	None	None	0.422
Urban	Additional_cat2B	Area Impervious (ha)	None	None	0.264
Urban	Additional_cat2B	Area Pervious (ha)	None	None	0
Urban	Additional_cat2B	Total Area (ha)	None	None	0.264
Urban	Additional_cat2C	Area Impervious (ha)	None	None	0.203
Urban	Additional_cat2C	Area Pervious (ha)	None	None	0
Urban	Additional_cat2C	Total Area (ha)	None	None	0.203
Urban	Laydown_area	Area Impervious (ha)	None	None	0.545
Urban	Laydown_area	Area Pervious (ha)	None	None	0
Urban	Laydown_area	Total Area (ha)	None	None	0.545
Urban	Tarro Access Road	Area Impervious (ha)	None	None	0.373
Urban	Tarro Access Road	Area Pervious (ha)	None	None	0.092
Urban	Tarro Access Road	Total Area (ha)	None	None	0.466
Urban	Turning Angle - Additional Area	Area Impervious (ha)	None	None	2.4
Urban	Turning Angle - Additional Area	Area Pervious (ha)	None	None	0
Urban	Turning Angle - Additional Area	Total Area (ha)	None	None	2.4

Only certain parameters are reported when they pass validation

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Pond	Pond Inlet Forebay	Evaporative Loss as % of PET	75	75	100
Pond	Pond Inlet Forebay	Evaporative Loss as % of PET	75	75	100
Pond	Pond Inlet Forebay	Evaporative Loss as % of PET	75	75	100
Pond	Pond Inlet Forebay	Extended detention depth (m)	0.25	1	0.2
Receiving	Receiving Node	TSS % Load Reduction	85	None	82
Swale	Swale	Bed slope	0.01	0.04	0.0025
Urban	1A	Field Capacity (mm)	40	70	80
Urban	1A	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	1A	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	1B	Field Capacity (mm)	40	70	80
Urban	1B	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	1B	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2A	Field Capacity (mm)	40	70	80
Urban	2A	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2A	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2B	Field Capacity (mm)	40	70	80
Urban	2B	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2B	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2C	Field Capacity (mm)	40	70	80
Urban	2C	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2C	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2D	Field Capacity (mm)	40	70	80
Urban	2D	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2D	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2E	Field Capacity (mm)	40	70	80
Urban	2E	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2E	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2F	Field Capacity (mm)	40	70	80
Urban	2F	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2F	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2G	Field Capacity (mm)	40	70	80
Urban	2G	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2G	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2H	Field Capacity (mm)	40	70	80
Urban	2H	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2H	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2I	Field Capacity (mm)	40	70	80
Urban	2I	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	2I	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	2J	Field Capacity (mm)	40	70	80

Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual

Urban	2K	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3A	Field Capacity (mm)	40	70	80
Urban	3A	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3A	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3B	Field Capacity (mm)	40	70	80
Urban	3B	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3B	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3C	Field Capacity (mm)	40	70	80
Urban	3C	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3C	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3D	Field Capacity (mm)	40	70	80
Urban	3D	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3D	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3E	Field Capacity (mm)	40	70	80
Urban	3E	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3E	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3F	Field Capacity (mm)	40	70	80
Urban	3F	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3F	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3G	Field Capacity (mm)	40	70	80
Urban	3G	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3G	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3H	Field Capacity (mm)	40	70	80
Urban	3H	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3H	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3I	Field Capacity (mm)	40	70	80
Urban	3I	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3I	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3J	Field Capacity (mm)	40	70	80
Urban	3J	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3J	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	3K	Field Capacity (mm)	40	70	80
Urban	3K	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	3K	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	4A	Field Capacity (mm)	40	70	80
Urban	4A	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1

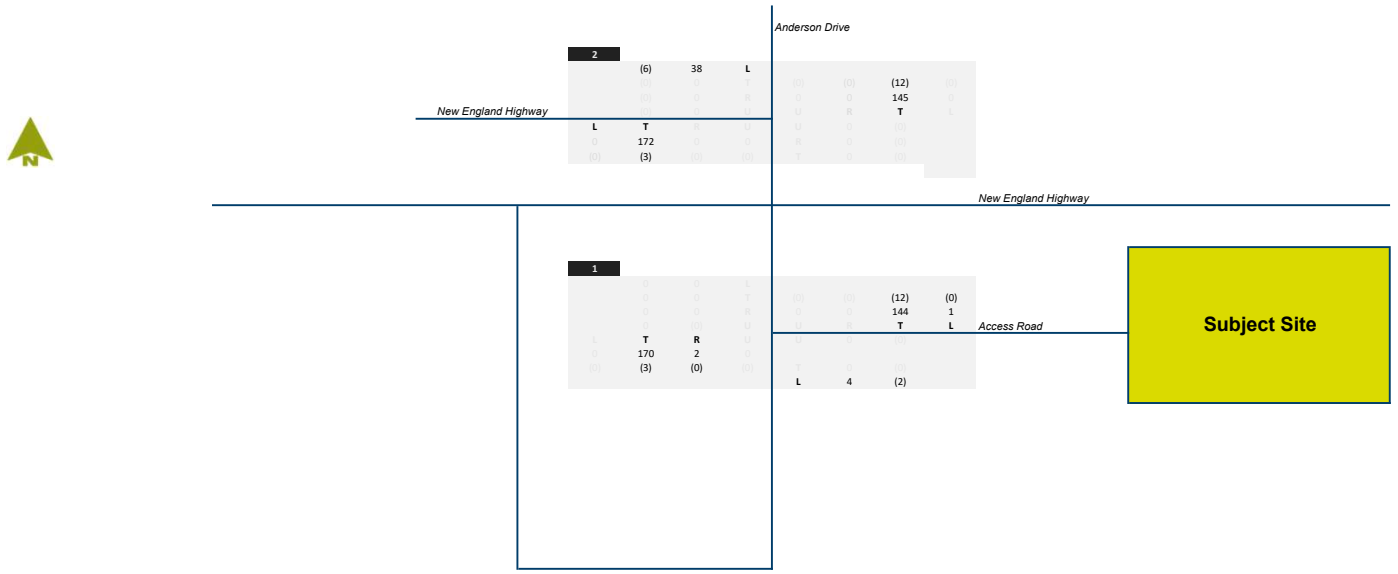
Only certain parameters are reported when they pass validation

Node Type	Node Name	Parameter	Min	Max	Actual
Urban	4A	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	4B	Field Capacity (mm)	40	70	80
Urban	4B	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	4B	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	4C	Field Capacity (mm)	40	70	80
Urban	4C	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	4C	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	4D	Field Capacity (mm)	40	70	80

Urban	Additional_cat2A	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	Additional_cat2A	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Additional_cat2B	Field Capacity (mm)	40	70	80
Urban	Additional_cat2B	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	Additional_cat2B	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Additional_cat2C	Field Capacity (mm)	40	70	80
Urban	Additional_cat2C	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	Additional_cat2C	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Laydown_area	Field Capacity (mm)	40	70	80
Urban	Laydown_area	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	Laydown_area	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Tarro Access Road	Field Capacity (mm)	40	70	80
Urban	Tarro Access Road	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	Tarro Access Road	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25
Urban	Turning Angle - Additional Area	Field Capacity (mm)	40	70	80
Urban	Turning Angle - Additional Area	Pervious Area Infiltration Capacity exponent - b	3.5	4.7	1
Urban	Turning Angle - Additional Area	Pervious Area Soil Initial Storage (% of Capacity)	30	30	25

Only certain parameters are reported when they pass validation

Attachment D – Updated traffic flow diagrams



Legend

L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

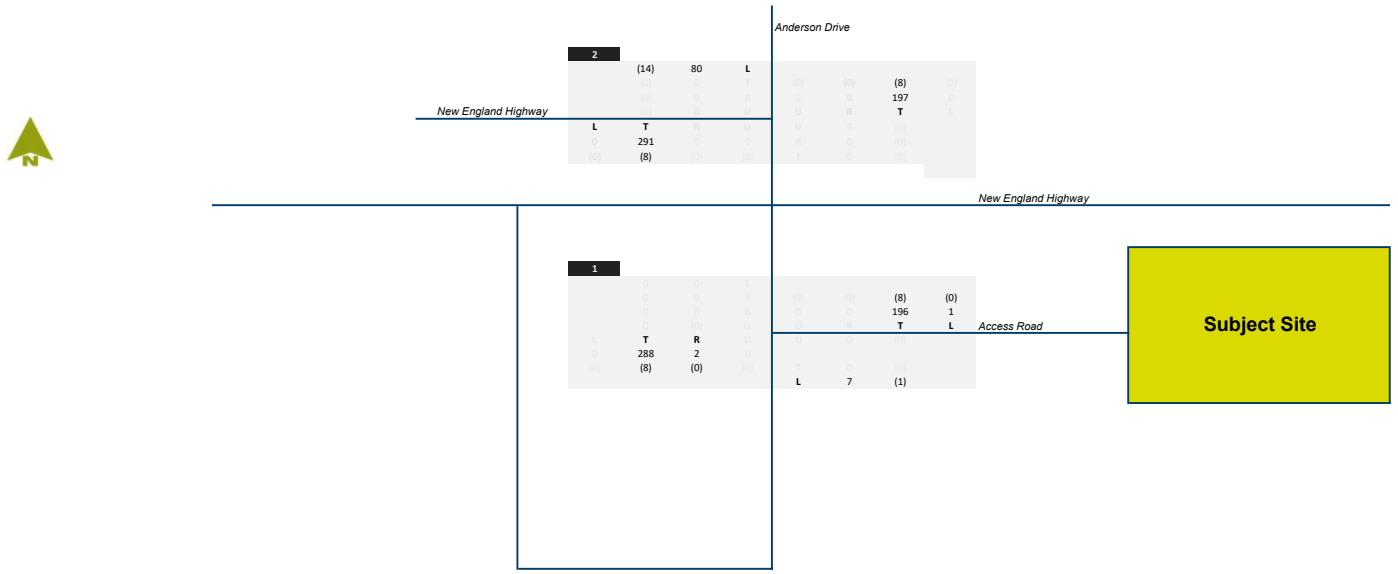
2021 Traffic Survey Results - AM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022

SLR



Legend

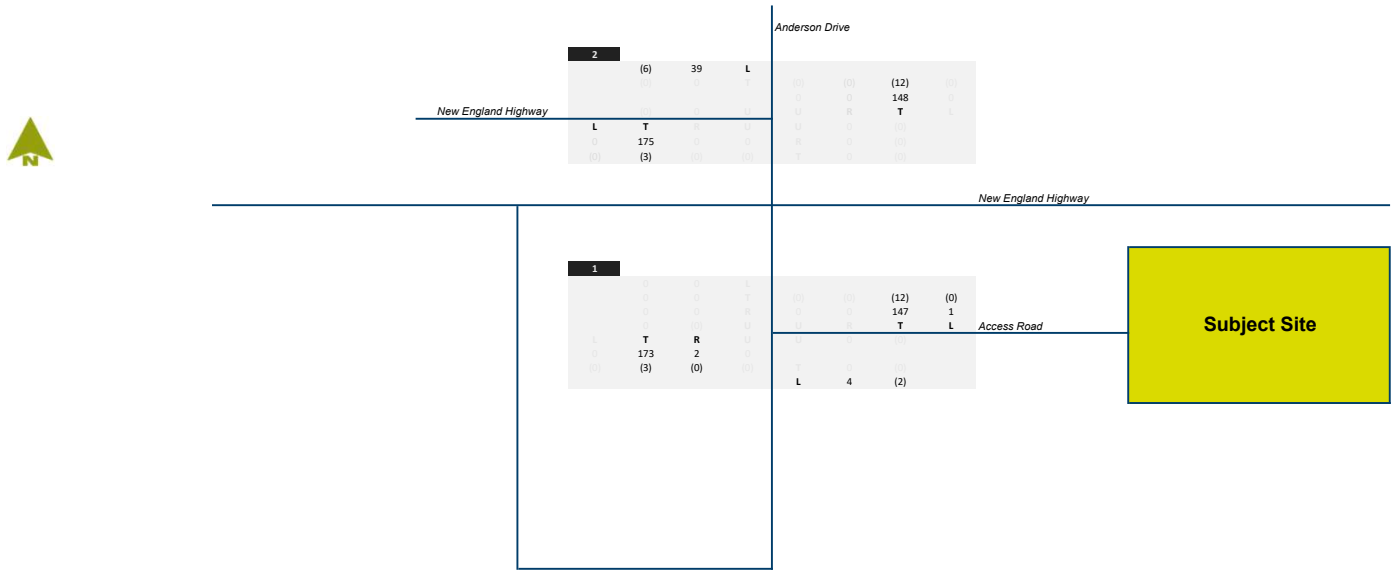
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

2021 Traffic Survey Results - PM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

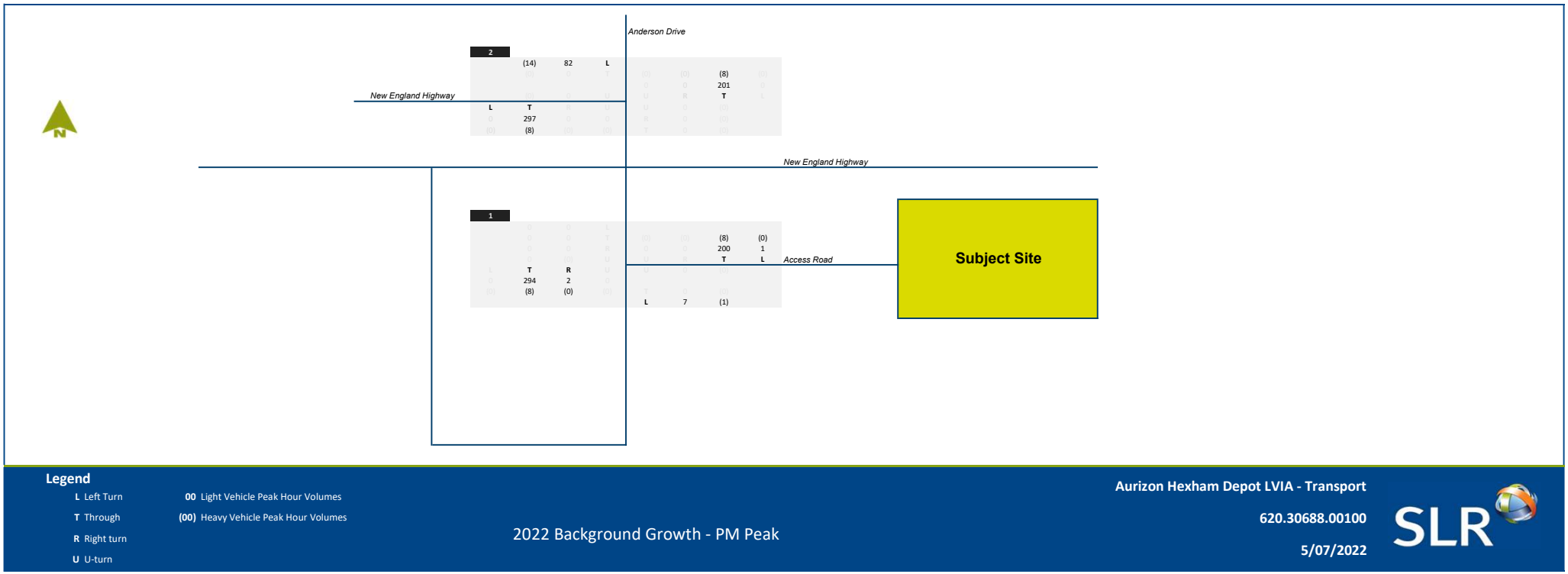
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

2022 Background Growth - AM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

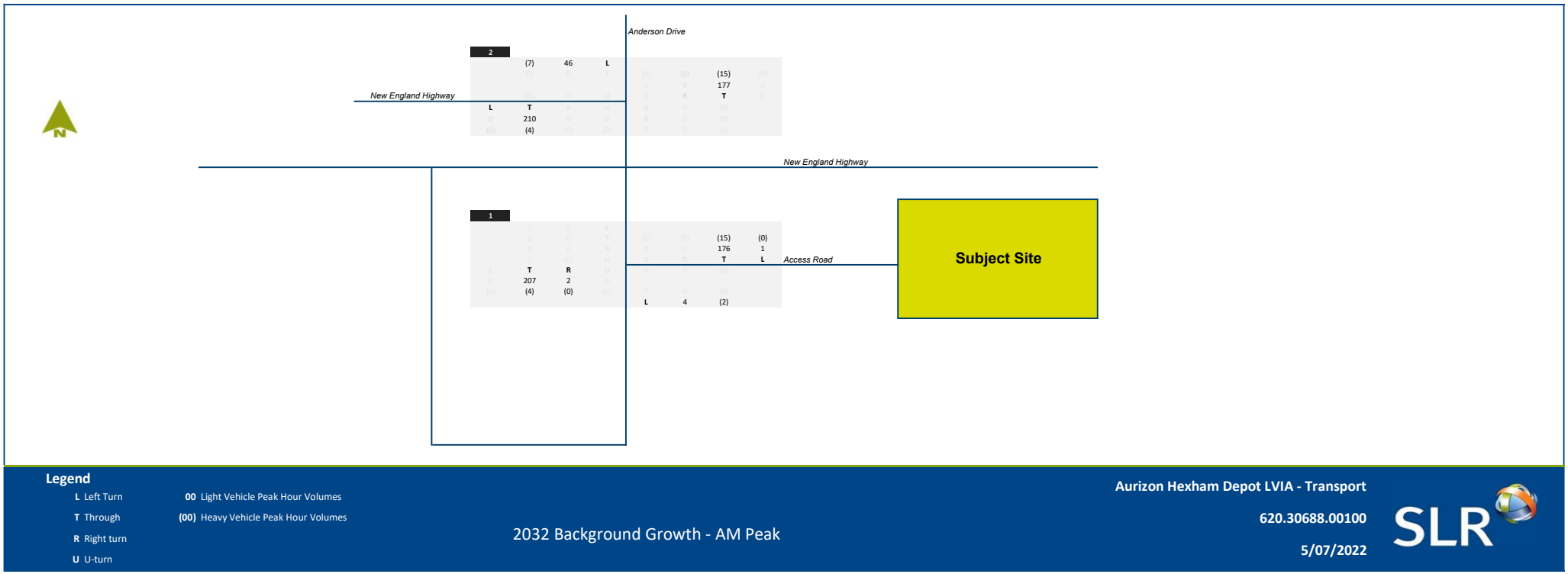
2022 Background Growth - PM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022

SLR



Legend

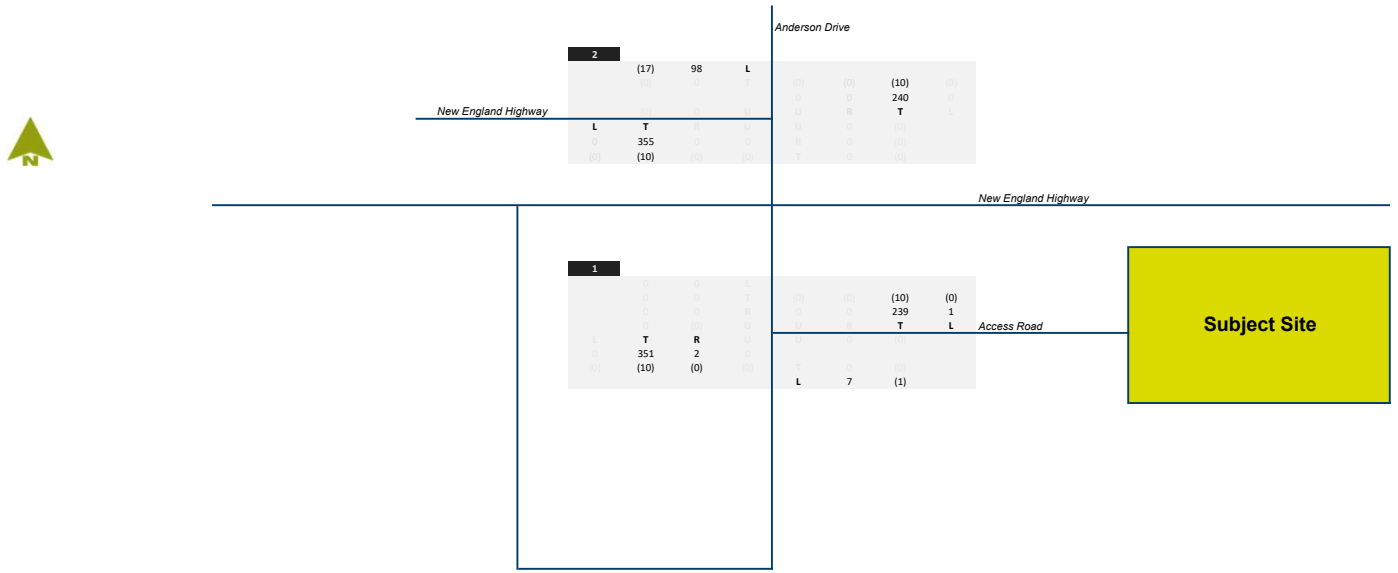
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

2032 Background Growth - AM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

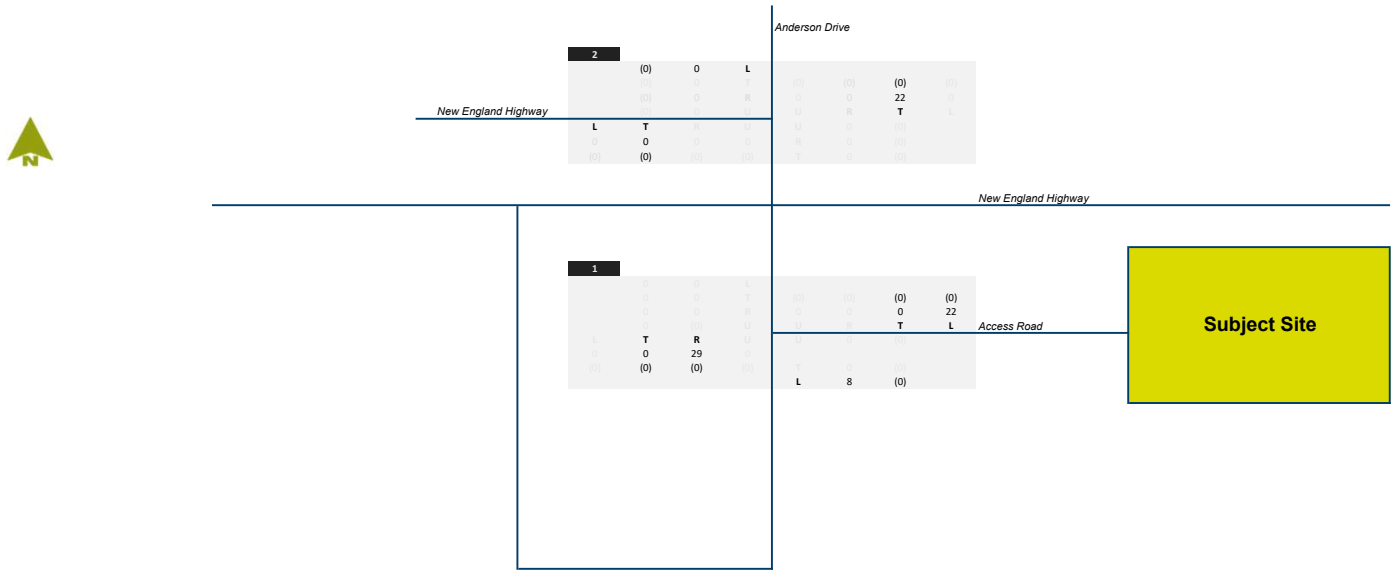
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

2032 Background Growth - PM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

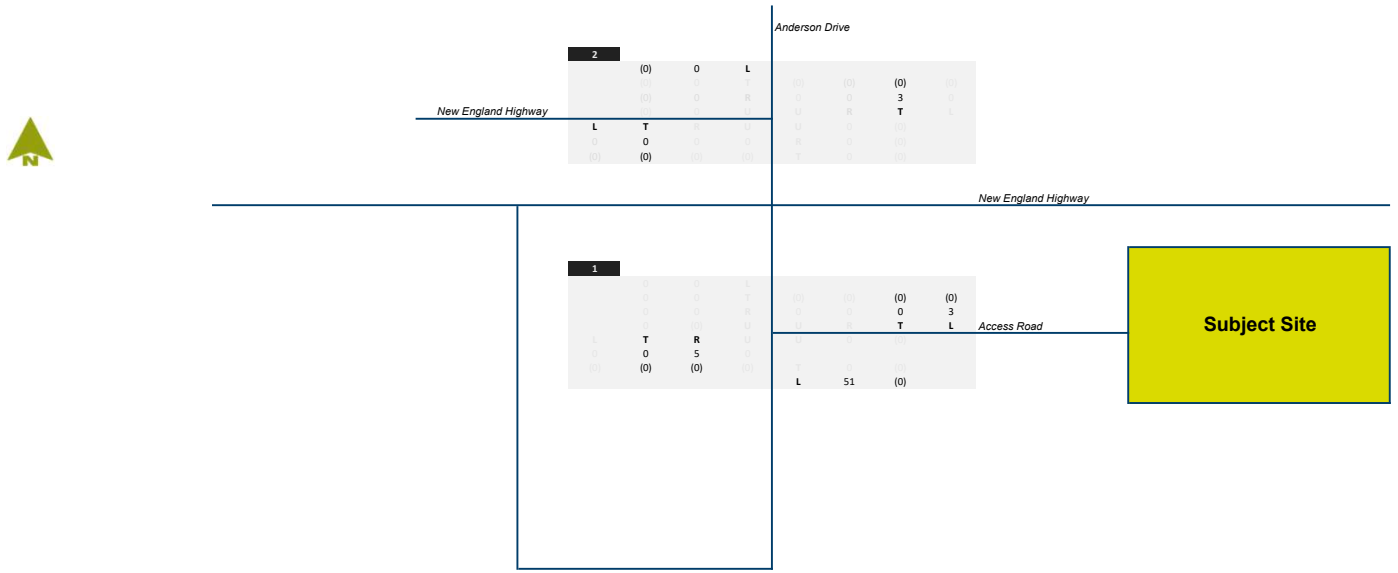
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

Development Trips - AM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

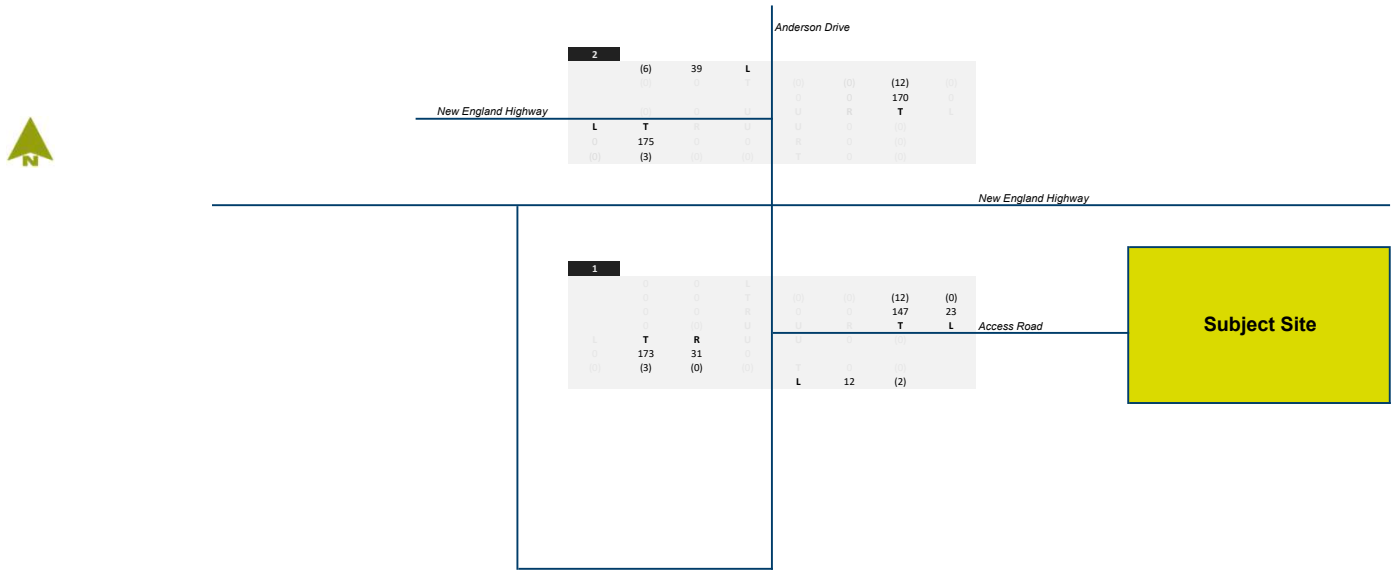
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

Development Trips - PM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

L Left Turn
T Through
R Right turn
U U-turn

00 Light Vehicle Peak Hour Volumes
(00) Heavy Vehicle Peak Hour Volumes

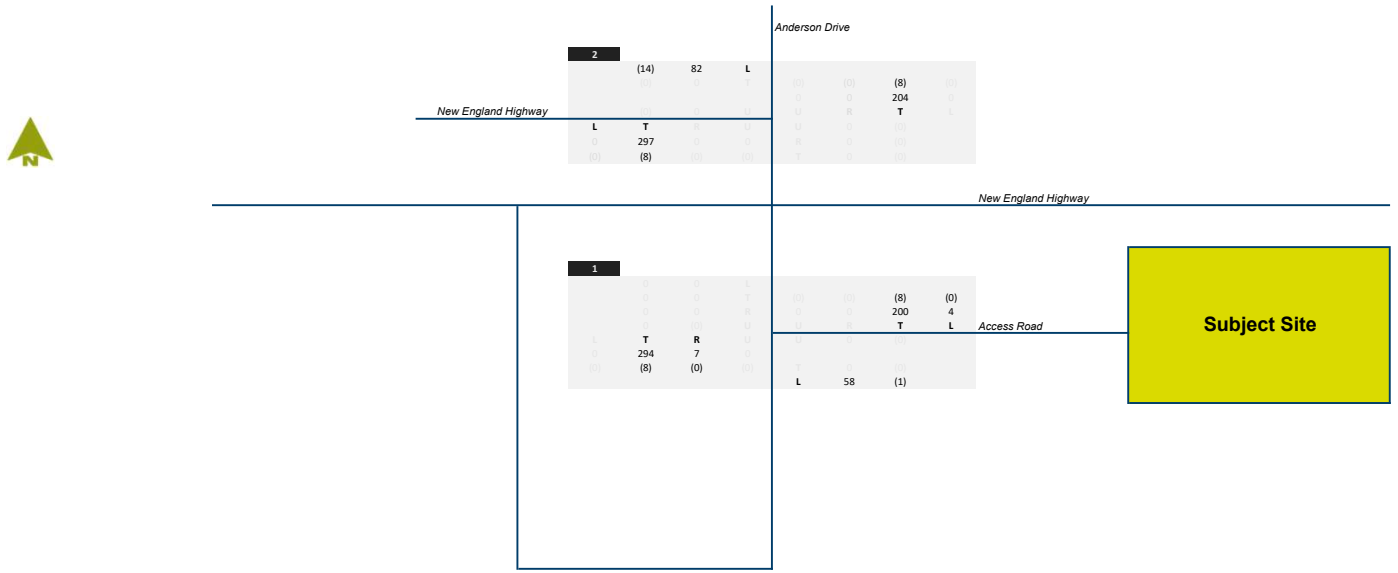
2022 Background with Development

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022

SLR



Legend

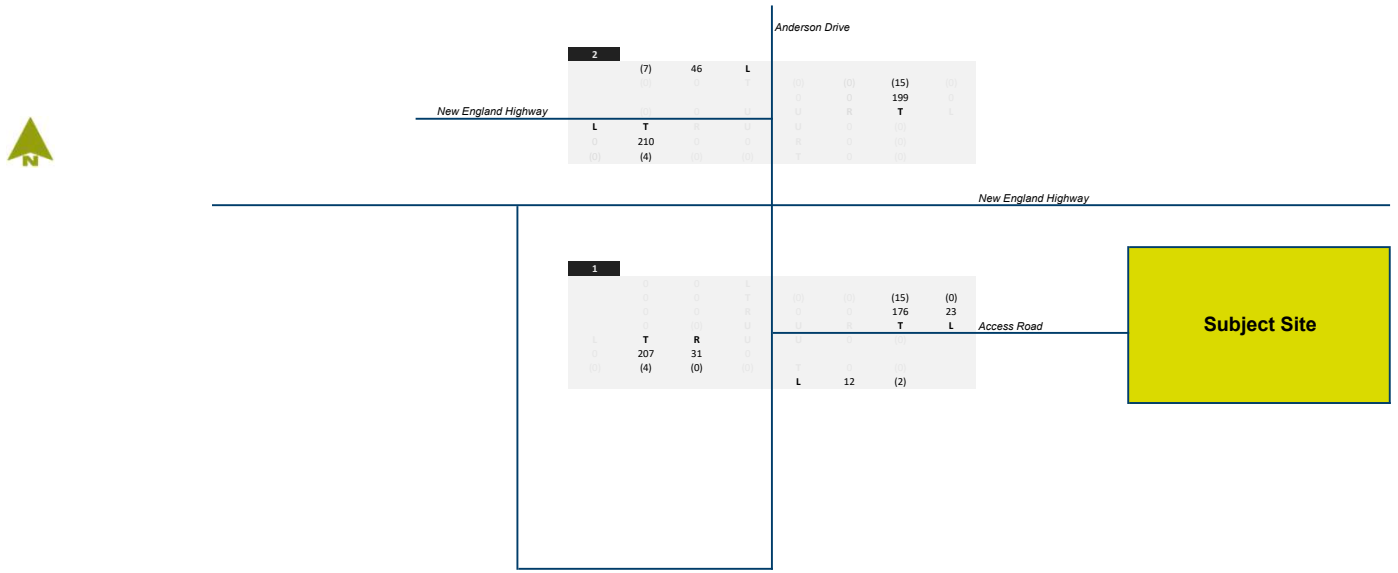
L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

2022 Background with Development

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022



Legend

L Left Turn	**00** Light Vehicle Peak Hour Volumes
T Through	**(00)** Heavy Vehicle Peak Hour Volumes
R Right turn	
U U-turn	

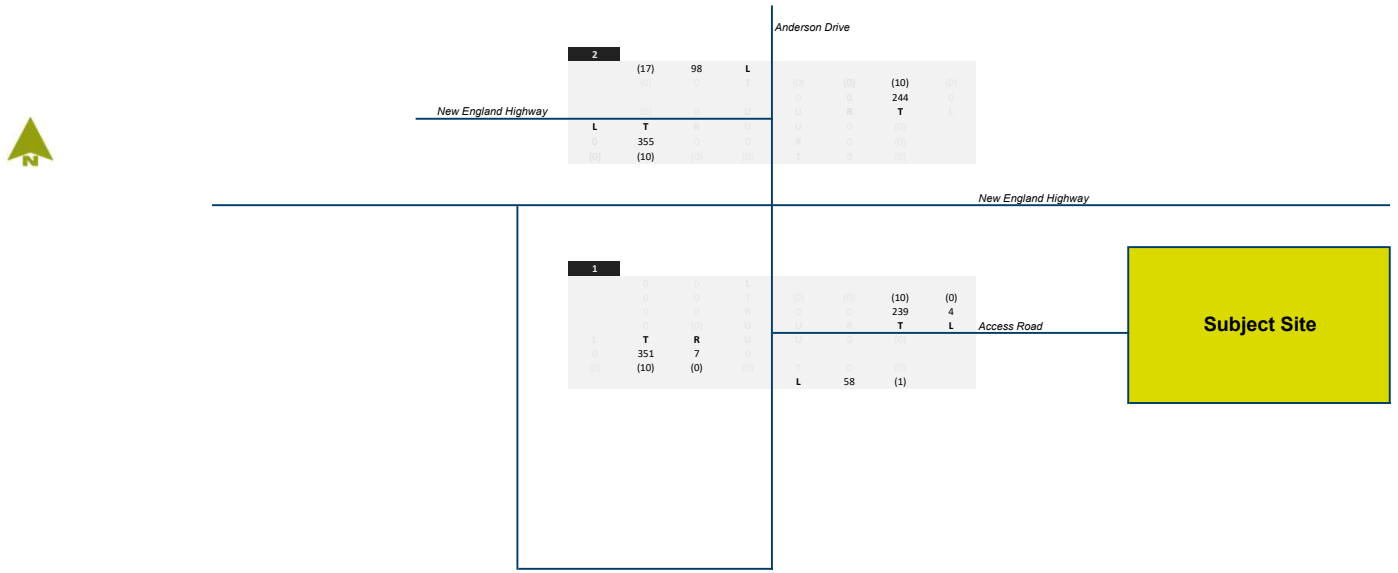
2032 Background with Development - AM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022

SLR



Legend

L Left Turn
T Through
R Right turn
U U-turn

00 Light Vehicle Peak Hour Volumes
(00) Heavy Vehicle Peak Hour Volumes

2032 Background with Development - PM Peak

Aurizon Hexham Depot LVIA - Transport

620.30688.00100

5/07/2022

Attachment E – SIDRA modelling outputs

Table 1 New England Highway / Access Road – SIDRA Summary Output

Scenario	Thursday AM Peak			Thursday PM Peak		
	Max DOS (%)	Critical Delay (s)	95th %ile Queue (m)	Max DOS (%)	Critical Delay (s)	95th %ile Queue (m)
2021 Background (Existing Conditions)	0.094	6.6 (LOS A)	0.2	0.163	6.4 (LOS A)	0.2
2022 Background without Development	0.096	6.6 (LOS A)	0.2	0.166	6.4 (LOS A)	0.2
2022 Background with Development	0.097	6.3 (LOS A)	0.3	0.166	6.3 (LOS A)	1.3
2032 Background without Development	0.115	6.7 (LOS A)	0.2	0.198	6.6 (LOS A)	0.2
2032 Background with Development	0.116	6.4 (LOS A)	0.4	0.198	6.4 (LOS A)	1.4

Table 2 New England Highway Off Ramp / Anderson Drive – SIDRA Summary Output

Scenario	Thursday AM Peak			Thursday PM Peak		
	Max DOS (%)	Critical Delay (s)	95th %ile Queue (m)	Max DOS (%)	Critical Delay (s)	95th %ile Queue (m)
2021 Background (Existing Conditions)	0.096	9.4 (LOS A)	1.3	0.164	10.4 (LOS A)	3.3
2022 Background without Development	0.097	9.4 (LOS A)	1.3	0.167	10.4 (LOS A)	3.4
2022 Background with Development	0.102	9.4 (LOS A)	1.3	0.167	10.4 (LOS A)	3.4
2032 Background without Development	0.117	9.6 (LOS A)	1.6	0.201	10.9 (LOS A)	4.4
2032 Background with Development	0.121	9.6 (LOS A)	1.6	0.202	11.0 (LOS A)	4.4

Ethos Urban

Attachment F – Updated Mitigation Measures

Summary of Mitigation Measures

Section 6.11 of the Modification Report provided a summary of mitigation measures which have been recommended throughout specialist reports, in addition to those already established as part of MOD 1. This summary of mitigation measures has been updated to include any additions as a result of the comments received and the assessment undertaken for this RtS. Additions have been shown in underlined text.

Mitigation Measure	Timing	Responsibility
Acid Sulfate Soils		
• The ASSMP relevant to the SSI is to be adopted for the construction of the Modification Proposal.	Construction	Contractor
Contamination		
• Relevant mitigation measures established as part of MOD 1 are to be implemented. • It is recommended soils are managed in accordance with the Site Management Plan (SMP) (Aurizon 2021)	Construction	Contractor
Soil Salinity		
• Site drainage is to be designed to maintain existing levels of runoff and infiltration where possible.	Design	Contractor
• Relevant mitigation measures established as part of MOD 1 are to be implemented.	Design	Aurizon
Soil and Land		
• Relevant mitigation measures established as part of MOD 1 are to be implemented. • Lengths of slopes should be minimised by limiting the extent of excavations and/or using diversion drains to reduce water velocity over disturbed areas. • Progressive rehabilitation or sealing of works areas.	Construction and Operation	Aurizon
Water		
Construct stormwater drainage of the proposal as per the design.	Construction	Aurizon
Continue groundwater and surface water monitoring and reporting as per the OSGMP.	Construction and Operation	
Maintain the existing stormwater management system as per the existing Operational Stormwater Management Sub-Plan.	Operation	
Update the Operational Stormwater Management Sub-Plan for consistency once construction of the Modification Proposal is complete.	Operation	
Traffic		
A Traffic Access Plan will be prepared and provided within a site wide communication to all existing staff, and further included in induction material for new starters, to mitigate instances of illegal turns when accessing or egressing the development via any vehicle. The existing Hexham TSF Environmental Management Plan will be updated (as required) to be consistent with this Traffic Access Plan.	Operation	Aurizon
Visual Impact		
Retain all existing vegetation along the Hexham LTTSF Site property boundary	Design	Aurizon

Waste		
Existing Waste Management Plan to be updated for construction and operations.	Construction and Operation	Contractor