

Construction Contamination Management Plan



**NSW Long Term Train
Support Facility Turning
Angle (Hexham)
Execution Phase**

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Document Approval/ Sign Off

Position	Name	Signature	Date
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Project Manager

Version Control

Rev	Date	Author	Comments
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1.0 Purpose

This Construction Contamination Management Plan (CCMP) supplements the Project Construction Environmental Management Plan (CEMP) for the construction phase of the NSW Long Term Train Support Facility (TSF) Depot Relocation (the Project).

This CCMP is based on the following assessment reports:

- Support Facility, Maitland and Woodlands Close, Hexham, 12 November 2012, Project 39798.06, Revision 9.
- Douglas Partners (2013b) Report on Assessment of Potential Groundwater Level Impacts, Proposed NSW Long Term Train Support Facility, 15 April 2013, Project 39798.12, Revision 5.
- Douglas Partners (2013c) Report on Acid Sulphate Soil Management Plan, Proposed NSW Long Term Train Support Facility, Woodlands Close, Hexham, 15 April 2013, Project 39798.12, Revision 8.
- GHD (2013a) NSW Long Term Train Support Facility, Contamination Assessment, Implications of Track Lowering on Acid Sulphate Soil and Contamination Management, 15 March 2013, Revision A.
- Section 5.25 Modification to SSI 6090: Hexham Long Term Train Support Facility-Ancillary Depot and Wagon Storage (Ethos Urban 8 April 2022).
- Soil and Water Assessment Operational Depot and Long-Term Wagon Storage, Hexham TSF (GHD, 29 March 2022)

This CCMP also considers the Aurizon Site Management Plan (January 2021) (SMP) which supersedes the Remediation Action Plan (GHD, February 2014).

This CCMP provides:

- Summary of contaminated soil, groundwater and surface water;
- Summary of acid sulphate soil (ASS) conditions;
- Management options for contaminated soil/water and ASS;
- Contingency procedures for unanticipated contamination;
- Validation and characterisation requirements; and
- Monitoring requirements.

This CCMP addresses the relevant Ministers Conditions of Approval (MCoA) as shown in Table 1.1.

Table 1.1 Relevant Ministers Conditions of Approval

MCoA	Task Detail	Where addressed
E63 (f) General	A Construction Contamination Management Plan to detail how contaminated materials, water and soil will be managed to protect human health and the environment. The plan shall include, but not necessarily be limited to:	This document
E63 (f) (i)	Location of areas identified as contaminated;	Section 2.0 and Annexure 2
E63 (f) (ii)	Procedures for the sampling and assessment of excavated material at depth consistent with the requirements of condition E30;	Section 2.1.5
E63 (f) (iii)	Procedures for the sampling and testing of ballast, chitter and tailings consistent with the condition of E32;	N/A
E63 (f) (iv)	Procedures for the classification, remediation, handling and monitoring of contaminated materials, water and soils identified during construction (including asbestos), consistent with the	Section 2.1, 2.2 & 5.0

MCoA	Task Detail	Where addressed
	<i>Remediation Action Plan</i> included in Appendix H in the document referred to in condition B1(c).	
E63 (f) (v)	A contingency plan to be implemented in the case of unanticipated discovery of contaminants;	Section 2.1, Table 3.1
E63 (f) (vi)	A procedure for updating the <i>Remediation Action Plan</i> consequent to amendments in the remediation procedures or the discovery of contaminants during construction;	Section 2.1 & 5.2
E63 (f) (vii)	Program for validating soil quality upon completion of remediation;	Sections 2.1.2, 2.1.3, 2.1.4, 2.1.5 & 2.1.6
E63 (f) (viii)	Mechanisms for the monitoring, review and amendment of this Plan;	Section 5.5
E31	Where unexpected contaminated materials are identified during construction works, these materials would be identified, managed, treated and disposed of in accordance with the procedures outlined in the updated Site Management Plan. Where required, the Proponent shall engage a suitably qualified contaminated land consultant to prepare an addendum to the Validation Report referred to in condition E33 to cover the additional areas of contamination identified and additional remediation measures undertaken. The Proponent shall also engage an accredited NSW Site Auditor to prepare an updated Site Audit Report to assess the addendum Validation Report and submit a copy of both reports to the Planning Secretary and City of Newcastle.	Section 2.1.12
E33	The Proponent shall engage a suitably qualified contaminated land consultant to prepare a Validation Report upon completion of the remediation of the areas identified in the Remediation Action Plan. The Validation Report shall verify that the site has been remediated in accordance with the Remediation Action Plan (if and as amended) and to a standard consistent with the intended land use. The Proponent shall engage an accredited NSW Site Auditor to prepare a Site Audit Report to determine the appropriateness of the Validation Report. The Validation Report and Site Audit Report shall be submitted to the Planning Secretary within six months of completion of remediation works. A copy of the reports shall also be submitted to the City of Newcastle for its information.	Section 2.1.2

Condition E63(f)(iii) has been identified as being not applicable to the Project due to the following:

- Condition E32, referenced in Condition E63(f)(iii), identified as not applying to the Turning Angle project as per condition B4A; and
- Reuse of chitter, tailings and ballast not proposed to occur as part of the Turning Angle project.

1.1. Indicative Construction Activities Schedule

The project is expected to be completed over a nominal duration of 7 months from approval. A range of activities with varying noise and vibration impacts are required in that time and these are summarised in Table 1.2.

Table 1.2 Indicative Construction Stages and Scheduling

Construction Phase	Activity	Indicative Schedule
Mobilisation	<ul style="list-style-type: none"> Tarro interchange dilapidation survey Delineation of sensitive areas Site establishment 	November 2022
Civil Earthworks	<ul style="list-style-type: none"> Clear and grub Strip topsoil Bulk earthworks Civil stormwater and services reticulation 	November 2022 to December 2023
Construction	<ul style="list-style-type: none"> Construction: Stage 1 - Depot Stage 2 - Warehouse of depot Stage 3 – Carpark Stage 4 – Heavy vehicle loading area Stage 5a and 5b – Eastern carpark 	December 2022 – August 2023
Demobilisation	<ul style="list-style-type: none"> Site clean-up and demobilisation 	May 2023

2.0 Site Contamination

2.1. Soil Contamination

A number of previous assessments of contamination and ASS conditions have been conducted at the site. These include assessments by Douglas Partners (2013a, 2013b, 2013c) and GHD (2013a, 2013b, 2019, 2022).

The SMP provides a summary of residual soil, groundwater, surface water contamination and ASS risk based on previous assessments by Douglas Partners, Coffey's, GHD and the findings of the Site Audit Report and Site Audit Statement.

The SMP produced figures identify the location of known residual contamination areas within the TSF project boundary. No contamination has been identified as occurring within the Project boundary. Identified unknown contaminants of concern that may be located within the Project footprint consist of total petroleum hydrocarbons (TPH) C10-C36 and asbestos.

Methodologies are included within the SMP for the management of unexpected contamination where it is encountered during excavation and construction activities. General remediation methodology is provided below. Reference to the SMP should be made for details.

2.1.1. Excavation

Where contamination within the Project footprint is identified which requires disturbance and subsequent remediation, excavators or backhoes will be used for all excavation operations. All excavations undertaken within the contaminated areas will be conducted under supervision of a suitably qualified environmental consultant to ensure all contamination is appropriately managed.

Prior to the commencement of any excavations, the Principal Contractors Site Supervisor shall ensure sediment control measures are constructed around the immediate area of the excavation.

The Site Supervisor shall ensure that at all times the sides of the excavation are stable and provide support to the surrounding ground and infrastructure.

The Site Supervisor shall ensure all excavation works are undertaken in a manner that will minimise the mixing of different material types, i.e. contaminated and clean material.

Based on the findings of the EA and Soil and Water Assessment Operational Depot and Long-Term Wagon Storage, Hexham TSF (GHD, 29 March 2022) all works are proposed to be above the identified groundwater level. If groundwater is encountered and dewatering required any dewatering activities must be undertaken in accordance with the:

- CEMP
- Acid Sulphate Soil Management Plan; and
- Construction Soil and Water Management Plan (CSWMP).

Excavations will continue beneath the water table to the extent practical, if required. If Phase Separated Hydrocarbons (PSH) are observed in excavations, oil absorbent materials will be used to control and remove any persistent PSH.

Upon completion of the excavation the principal contractor shall ensure that plant and equipment is cleaned and decontaminated.

2.1.2. Validation

In the event that contamination is encountered and remediated a suitably qualified contaminated land consultant will be engaged by Aurizon to prepare a Validation Report following completion of the construction project detailing all remediation activities undertaken during the project. The objective of the Validation Report is to verify whether the site has been remediated in accordance with the SMP and to a standard consistent for the intended land use.

An accredited NSW Site Auditor will be engaged by Aurizon to prepare a Site Audit Report which assesses the appropriateness of the Validation Report.

The Validation Report and Site Audit Report will be submitted to the Director-General within 6 months of the completion of remediation works. A copy of the reports will be submitted to the City of Newcastle for information.

Contaminated soils will be either disposed of at a licenced facility or remediated to the relevant commercial / industrial assessment criteria, identified in consultation with a suitably qualified consultant as required by the SMP.

Areas of contamination, including bioremediated soil, will be deemed to be successfully remediated if:

- The 95% Upper Confidence Limit Average (UCLAVG) concentration for contamination in soils remaining after excavation is less than the commercial/industrial health-based assessment criteria.
- No single sample concentration is greater than 2.5 times the relevant criteria.
- The standard deviation is less than half of the selected criteria.

These criteria will be applied to each area of active remediation, noting that there are likely to be areas of the Turning Angle and TSF site where an ongoing management approach will be used.

The minimum target depths to which remediation and validation apply will be dependent on the final design depth, the extent and type of contamination and the results of any additional investigations. In general, localised hotspots should be remediated to the extent practical where they pose a risk to human health or the receiving environment.

2.1.3. Sample Identification

Validation, infill and characterisation soil samples will be identified using a 'V' suffix for validation, an 'I' suffix for infill, or a 'C' suffix for characterisation. The depth will also be recorded as part of the sample number (e.g. 1V-0.0), where the depth component represents the shallowest part of the sample interval.

A detailed sample register will be kept (by the qualified environmental consultant undertaking the validation), recording the sample number, date sampled, location, depth interval, field observations (including soil description) and field measurements (e.g. PID measurements). Duplicate samples will be recorded in the register, as will subsequent validation samples where these are needed to re-validate an area which has not met the assessment criteria and has had further remediation. Field sketches will be prepared showing the area and locations sampled.

2.1.4. Validation of Excavations

Validation sampling will be undertaken by an appropriately qualified environmental consultant to demonstrate that the site has been remediated to a standard that is suitable for the proposed land use. Validation sampling will generally involve the following:

- One sample per 10 linear metres from the sides of each excavation, with at least one sample from each side of any single excavation;

- One sample per 100m² from the base of each excavation (based on a 10m x 10m grid, or at least one sample per 10 lineal metres of trench), with at least one base sample from any single excavation;
- Soil samples collected for validation purposes will be analysed for the particular contaminants previously identified as exceeding (or potentially exceeding) assessment criteria in the area of the excavation;
- Aesthetic considerations will be based on observations (e.g. odour, discolouration) made by the environmental consultant during excavations; and
- Photographic evidence will be taken of validation prior to backfilling or reuse of the excavation for site water management.

2.1.5. Characterisation of Excavated Material or Stockpiles

Characterisation sampling of excavated material or stockpiles (to be disposed to landfill or kept on site), where not previously characterised in-situ, will involve sample collection and analysis by an appropriately qualified environmental consultant at a minimum rate of one sample per 100m³, or at least three samples from each distinct area of excavation or 'batch' of material.

Material exhibiting visual evidence of heterogeneity may require sampling at a higher rate to ensure all characteristic elements of the material are sampled. Procedure B from the Sampling Design Guidelines (EPA 1995) may be used to assess if the number of samples is adequate to show that the average concentrations of contaminants are below the relevant criteria.

Analysis will be undertaken for the particular contaminants previously identified as exceeding the relevant assessment criteria for the 'batch' of material being tested. If necessary for waste classification purposes or for assessment of potential environmental impacts, a TCLP test for selected parameters will be undertaken in conjunction with total concentration analysis.

2.1.6. Validation of Landfarms

Landfarms will be sampled on a monthly basis by an appropriately qualified environmental consultant including 'baseline' sampling after the establishment. Final validation samples will be collected for analysis from a systematic grid at a rate of approximately 1/25m³ from mid-depth of the landfarm material. Intermediate 'progress' sampling may be undertaken at a lesser rate.

2.1.7. Analytical Test Methods and Detection Limits

In general, laboratory analysis will be conducted in accordance with the standard test methods outlined in Schedule B(3) of the NEPC (2013) for soils or its current version. The practical quantitation limits (PQLs) will be set at a level below the relevant assessment criteria.

In all cases, the selected laboratories will be required to be NATA registered for the analyses performed and NATA registration will take precedence over the laboratory's ability to perform the analyses precisely to the methodology described in the above documents.

2.1.8. Backfill Requirements

On completion of the excavation and subsequent validation approval, the excavation will be backfilled with validated material. Validation requirements are detailed in the SMP. Compaction will be undertaken in accordance with the engineering requirements for reinstatement of the site.

2.1.9. Landfarming (bioremediation)

Hydrocarbon contaminated material that is deemed unacceptable is to be used immediately as backfill may be placed in a landfarm for remediation. If landfarming is used, a landfarm will be constructed in an area approved by the Principal Contractor (to be confirmed) in consultation with the Aurizon Project Manager

(PM). Vegetation from within this area would be removed and the area proof-rolled with a smooth drum roller.

The landfarm will drain to a sump for collection of surface water runoff. This water will be tested (and treated if required, see contingency plan in SWMP) prior to return to the excavations. A layer of uncontaminated soil at least 300 mm thick will be placed in the landfarm area. Contaminated material will be spread on the underlay to a nominal 500mm depth and evenly spread. Silt fence will be installed around the landfarm areas to prevent sediment migration.

2.1.10. Reuse of Material on Site

The Site Environment Officer shall ensure that contaminated soil and/or rock material proposed to be reused on site is validated to ensure it is suitable for the proposed land use from a contamination perspective and will not impact adversely on the site environment in accordance with MCoA E32 (and E63(f)(iii)).

All material to be reused on the site where contamination has been identified by previous investigations, or by observations during excavations, shall be validated by sampling and analysis of the material in accordance with the SMP to ensure that the material is not contaminated with samples analysed for chemicals of concern based on the previous site usage/site history of the source area.

Prior to the reuse of materials back onsite, the materials will be characterised to determine whether they are of a quality suitable for the intended reuse and whether the reuse of the materials would result in contaminated runoff. Materials that are not suitable for reuse will be classified in accordance with the NSW EPA Waste Classification Guidelines.

2.1.11. On-Site Containment

If on site containment is selected as a preferred remediation method, investigations shall be carried out on the preferred containment area to confirm the suitability of this area, and to provide input for design.

Determination and selection of an on-site containment location will be undertaken by an appropriately qualified environmental consultant with the input of Aurizon. Design of the on-site containment shall be in accordance with the recommendations of ANZECC (1999) Guidelines for the Assessment of On-site Containment of Contaminated Soil and the NSW EPA (1996) Environmental Guidelines: Solid Waste Landfills or equivalent.

2.1.12. Unexpected Finds Procedure

There is potential for previously unidentified contaminants to be uncovered during the works. This might be by observation of any unusual physical/sensory characteristics of the impacted soil or groundwater, such as changes in colour, changes in texture, visual evidence, or odour.

Unexpected finds may include unexpected discovery of hazardous building materials, such as asbestos containing materials, or unexpected discovery of contaminants in addition to the type already identified on-site, such as surface or buried material with visual or olfactory evidence of contamination.

In the event that unexpected contamination is identified the Aurizon PM is to be notified immediately and excavation/stockpile isolated appropriately to permit characterisation and validation as per the above requirements. Aurizon will:

- Identify, manage, treat and dispose of unexpected contamination in accordance with the procedures outlined in the updated SMP;
- Engage a suitably qualified contaminated land consultant, where required, to prepare an addendum to the Validation Report referred to in condition E33 to cover the additional areas of contamination identified and additional remediation measures undertaken;

- Engage an accredited NSW Site Auditor to prepare an updated Site Audit Report to assess the addendum Validation Report and submit a copy of both reports to the Planning Secretary and City of Newcastle.

2.2. Disposal of Soils and Refuse

2.2.1. Estimated Volumes of Contaminated Material

As historical characterization has not identified any contamination hot spots within the Project footprint all sources of contamination will be considered unexpected finds, quantified as required and managed in accordance with the SMP and this document. The exception to this is a slight zinc EIL exceedance at TPA 1-4 (refer Soil and Water Assessment Operational Depot and Long-Term Wagon Storage, Hexham TSF (GHD, 29 March 2022)) which, given its isolated nature and lack of sensitive environmental receptors is not proposed to be targeted for remediation.

Where soil and refuse wastes are to be removed from site, they must be classified for waste disposal purposes, and disposed in accordance with the requirements of the *Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008* made under the POEO Act 1997, and NSW DECC (2009).

An appropriately qualified and experienced environmental professional should be engaged to oversee the classification of the waste. The Principal Contractor in consultation with the PM shall ensure its transport and disposal at an appropriately licensed landfill.

The Principal Contractor in consultation with the Aurizon PM shall ensure that wastes arising from the construction works are removed and disposed of in accordance with the requirements of the NSW EPA and Work Cover Authority, together with the relevant legislative requirements, namely:

- Work Health and Safety Act 2011 and associated Regulations;
- *Contaminated Land Management Act 1997* and associated Regulations; and
- POEO Act 1997 and associated Regulations.

2.2.2. Waste Classification / Material Characterisation

Natural or fill material which is to be reused in or near its existing location, where contamination has not been previously identified and which exhibits no visual signs of contamination or contaminant odours, does not require testing for the purposes of the SMP (except as may be required for ASS assessment).

Excavated fill material which is transported to a different area of the site from its existing location for either reuse or disposal, should be tested for potential contamination in accordance with the guidelines outlined in the SMP S. Sampling of materials for waste classification will be undertaken as per Section 2.1.5.

Material considered to be Virgin Excavated Natural Material (VENM) should be assessed by an appropriately qualified environmental consultant to confirm that the material meets the requirements of NSW DECC (2009). This may include the need to undertake soil sampling and analysis, which should be undertaken in accordance with NSW DECC (2009) or equivalent.

Reference will be made to the Resource Recovery Exemptions as provided by the NSW EPA for the waste classification of the following types of materials during this project.

- Basalt fines;
- Coal ash;
- Coal washery rejects;
- Railway Ballast;

- Excavated Natural Material (ENM);
- Excavated public road material; and
- Tyres.

The Resource Recovery Exemptions provide guidance on sampling requirements and reuse options for these and other resources.

Building and demolition waste generated from the project (e.g. bricks, concrete, metal, and timber) is expected to classify as General Solid Waste (non-putrescible). These materials will be recycled or reused where possible. This waste should be stockpiled separately from other waste and further advice sought prior to off-site disposal to landfill if required.

2.2.3. Transport

Transportation of contaminated material shall be undertaken in accordance with the following procedures:

- All the works, including vehicle movements and traffic controls, will be in accordance with the Construction Traffic Management Plan (CTMP).
- Wastes shall only be removed for off-site treatment or disposal after the material has been classified..
- Waste tracking shall be undertaken in accordance with NSW EPA requirements (under the requirements of the POEO Act 1997).
- The Aurizon PM shall issue an instruction to the waste transporter, engaged under the national waste contractor agreement, to remove.. All waste will be tracked utilising the EPA online waste tracking system. This online system records the following:
 - The transporter's name and address;
 - The transporter's EPA licence number;
 - The registration number of the vehicle;
 - The type and quantity of waste;
 - The name and address of the person or company the waste was delivered to (the consignee); and
 - The date the waste was delivered to the consignee.

Soil, earth, mud or similar materials shall be removed from roadways by sweeping, shovelling or a means other than washing, on a daily basis as required. Soil washings from vehicle wheels or machinery tracks shall be collected and disposed of in a manner that does not pollute waters. The Principal Contractor in consultation with Aurizon shall be responsible for ensuring that all vehicles/plant leaving a designated contaminated work area are free of contaminated materials.

2.2.4. Material Tracking

The Construction PM shall ensure that all movements of contaminated soil and waste materials are tracked with information including (but not limited to) the following to be documented:

- Date of material movement;
- Original location of material (the source);
- Where material is stored or disposed of;
- Volume of material;
- Nature/description of material;
- Any associated supplementary information (e.g. consultants reports, laboratory results); and
- Truck identification/disposal docket numbers for material disposed of off-site.

The SMP further detailed procedures/requirements for the excavation of contaminated materials, validation requirements, waste classification and disposal/reuse options.

2.3. Groundwater and Surface Water Contamination

The SMP provides a summary of previous surface water and groundwater assessments by Douglas Partners and ERM. The summary indicated that 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.

3.0 Acid Sulphate Soil

A review of the proposed Project construction footprint and disturbance depths indicates that no PASS or ASS will be disturbed as part of construction works.

Where PASS or ASS is to be disturbed impacts will be managed in accordance with the ASSMP/SMP. The ASSMP and SMP detail management strategies for ASS including treatment of ASS soils, neutralisation of leachate, monitoring and treatment of groundwater (as required) and construction recommendations for permanent drains. The ASSMP/SMP further discusses monitoring, validation, acceptance criteria and contingency plans for ASS.

The following provides a summary of ASS management procedures. Reference should be made to the ASSMP/SMP for details.

3.1. Soil Treatment

Neutralisation of ASS/acid generating materials should be undertaken in accordance with the ASSMAC guidelines (ASSMAC 1998), as discussed below.

Excavated ASS/acid generating materials should be contained within a suitable bunded area with an impermeable base and appropriately neutralised prior to stockpiling or reuse on site.

Any bunded treatment areas should be designed to minimise the potential for impact on nearby sensitive receptors. Leachate produced in the bunded area should be contained for monitoring and treatment as discussed below. The design of the treatment area should also consider the construction methodology and staging to ensure that sufficient area is available for staged excavation, treatment and stockpiling.

Suitable neutralising agents for acid sulphate or potential acid sulphate soils include agricultural lime (CaCO_3), calcined magnesia (MgO or Mg(OH)_2), and dolomite ($\text{MgCO}_3 \cdot \text{CaCO}_3$).

It is recommended that Grade 1 agricultural lime is used for the neutralisation of potential acid sulphate soils/acid generating materials excavated during the construction.

The following liming/monitoring procedures for the treatment of ASS/acid generating materials are recommended:

- All excavated soil should be contained within a suitably designed and bunded area and kept moist to minimise oxidation, prior to treatment and neutralisation with lime. Progressive neutralisation will be required to manage the staged construction program which will minimise the area required for treatment.
- The base of excavations within ASS or acid generating materials should be treated with approximately 1 kg/m^2 of agricultural lime.
- Stockpiled soil should be limed at an average rate of about 37 kg/m^3 of soil (27 kg lime/tonne of soil) for neutralisation as soon as practicable following excavation. Lime treatment rates based on historical laboratory testing range from 24 kg/m^3 to 52 kg/m^3 of soil. The average value should be used initially and refined based on monitoring results as construction proceeds. Further detailed testing is required to assess appropriate lime application rates for treatment of ASS and possible acid generating materials (i.e. CWR filling).
- The neutralising agent and ASS should be thoroughly mixed and aerated using, for example, an agricultural lime spreader and excavator. The soil should be treated in layers up to 300mm thick to encourage aeration (i.e. incorporate treatment with progressive reuse of soil or disposal at a suitably licensed landfill).
- Sampling and testing should be undertaken in accordance with the SMP to verify the neutralisation treatment. Depending on the results of testing, reapplication of lime may be necessary to gain adequate neutralization.

Upon verification of treatment, the neutralised ASS may be reused on site for construction (subject to geotechnical and environmental suitability) or permanently stockpiled on site in designated area(s) as discussed below. Reuse and permanent stockpiling of excavated materials should be conducted in accordance with the SMP.

Stockpiled soils will be located above the 1% Annual Exceedance Probability (AEP) flood levels. The location, height and configuration of the final stockpiles will be subject to detailed design and will depend on the final volume of materials excavated. Stockpiling will be conducted in a controlled manner with due regard to environmental controls, which should be included in the Construction Soil and Water Quality Management Plan.

Following the completion of stockpiling the permanent stockpile area should be appropriately contoured and vegetated to minimise erosion.

3.2. Neutralising Leachate

Leachate water collected from a bunded treatment area should be neutralised as necessary before release. Calcined magnesia (magnesium hydroxide, burnt magnesite, or magnesia) is the recommended neutralising agent as it produces a two-step reaction, which proceeds rapidly at acidic pH and slows down as higher pH is approached, and hence reduces the potential for over-neutralisation to occur.

The amount of neutraliser required to be added to the leachate can be calculated from the equation below:

$$\text{Alkali Material Required (kg)} = \frac{M_{\text{Alkali}} \times 10^{-\text{pH}_{\text{initial}}}}{2 \times 10^3} \times V$$

Where: *pH initial* = initial pH of leachate

V = volume of leachate (litres)

M_{Alkali} = molecular weight of alkali material (g/mole)

Note: molecular weight of calcined magnesia (*M_{MgO}*) = 40 g/mole.

The alkali should be added to the leachate as a slurry. Mixing of the slurry is best achieved using an agitator. The leachate water quality should meet regulatory authority requirements, prior to discharge.

The treatment area including the leachate collection system should be designed to accommodate the anticipated volumes of soil/water during construction. This design will be influenced by the construction methodology and staging program with contingencies for wet weather.

3.3. Dewatering

The following considerations are recommended in order to minimise potential adverse impacts resulting from excavation and dewatering of acid sulphate soils during construction.

- Minimise the dewatering depth required for installation (i.e. as close as practicable to the invert level of the excavation);
- Minimise the time and volume of exposed acid sulphate soils (i.e. stage excavation and dewatering);
- Collection of extracted groundwater for temporary storage and treatment as necessary prior to appropriate disposal/release to designated areas subject to regulatory requirements
- Dewatered groundwater will not be discharged from the construction site or applied on site unless in accordance with an EPL. Controlled infiltration of waters could be considered within staged construction zones or for adjacent overland discharge (i.e. coal tailings area), subject to detailed design and regulatory approvals;
- The pH of the extracted water should be monitored prior to discharge. Neutralisation should be undertaken if discharge water pH falls below natural groundwater levels (evaporation/infiltration) or regulatory requirements (stormwater disposal);

- Dose the base of the excavation at a rate of approximately 1 kg/m² of agricultural lime in order to counteract the generation of acidic leachate following groundwater recovery;

Excavations and dewatering should be conducted with due regard to potential soil and water contamination, inflow/seepage rates, and relevant regulatory and statutory requirements. The design of any dewatering system will consider collection, storage, discharge, reuse, disposal and contingencies etc. in order to minimise the risk of adverse impacts on human health and the environment during construction.

Management of waters from dewatering will be integrated with the overall Construction Spoil and Water Management Plan for the project.

3.4. Permanent Drain Construction

Open drains constructed within CWR or where groundwater is intercepted within CWR materials may require additional mitigation measure to mitigate the potential for acid generation (neutralisation of soil, water control structures etc.).

The purpose of in-drain water control structures is to elevate drain water levels, reducing the hydraulic gradient from the groundwater table to the drain, in order to minimise possible acid generation by the oxidation of surrounding potential acid sulphate soils. This in-turn reduces potential acid discharge entering drains and subsequently being discharged to nearby sensitive receptors. Water control structures should be designed by a suitably qualified engineer and may consist of such as drop-boards, concrete weirs and sandbag weirs.

The following is recommended for the construction upgrade of permanent open / unlined drainage channels within CWR on site:

- Minimise the design depth of permanent drainage channels by constructing wide, shallow drains where possible;
- Installation of in-drain water control structures as required;
- The base and sides of permanent drains or basins should be treated to a depth of 0.3m as per excavated material re-compacted and protected against erosion. Alternatively the exposed base and sides of drains/basins could incorporate a lime 'buffer' through sand bagging the face (i.e. using limed sands in sandbags). The liming rate for sandbags should be confirmed following additional investigations of CWR materials.

Monitoring prior to, during and following construction of the drains will be coordinated by Aurizon and be consistent with the Soil and Groundwater Monitoring Program.

3.5. Reporting

A record of treatment of acid generating materials and leachate should be maintained by the contractor and should include the following details:

- Date;
- Location;
- Time of excavation and reuse or disposal (i.e. time stockpile has been exposed);
- Neutralisation/treatment process undertaken;
- Lime rate utilised;
- Results of monitoring of soil, leachate, and groundwater conducted by an appropriately experienced and qualified consultant; and
- Destination of treated material (i.e. permanent stockpiles).
- A record of dewatering activities should also include the following:
- Groundwater quality and pH at commencement of dewatering.

- Monitoring of discharge water and surface waters in the vicinity of discharge (i.e. upstream and downstream).

A record should also be maintained by the Contractor confirming contingency measures and additional treatment if undertaken. The records should ensure materials are tracked from excavation, treatment to disposal/reuse destinations.

A final validation report should be prepared upon completion of the works presenting the monitoring regime, results and confirming that no adverse environmental impact has occurred during the works.

3.6. Acceptance Criteria

3.6.1. Acceptance Criteria - Water

It is noted that current water quality on site (surface water and groundwater) and off-site (Hexham Swamp and Hunter River) do not completely meet ANZECC guidelines and as such indicate a degraded ecosystem. Performance criteria approved by the Department of Planning, Industry and Environment has been included in the SMP/SWMP and should be referenced prior to any discharge of water, subject to regulatory approvals.

3.6.2. Acceptance Criteria - Soil

Further treatment may be required if monitoring of acid generating material reveals any of the following properties:

- pH of soil in water is less than background values (i.e. pH 6.6 to 8.3); and
- pH in water minus pH in hydrogen peroxide is greater than 1 and pH in water is less than background values.

Depending on the results of testing, reapplication of lime may be necessary to gain adequate neutralisation. Care should be taken to ensure over liming does not occur. Additional laboratory testing may be required to confirm that appropriate treatment has occurred, subject to the results of monitoring and the results of additional investigations within CWR and natural soils (to be conducted prior to construction).

3.7. Contingency Plan

Remedial action will be required if the agreed standards or acceptance criteria are not being achieved. Remedial action shall comprise mixing of additional lime through the excavated material and neutralisation of leachate. The required mixing rate to remediate the soil or leachate should be confirmed by monitoring tests.

During periods of heavy or prolonged rainfall, stockpiling of acid generating materials should be appropriately contained/bunded to collect leachate for testing and neutralisation (if required) prior to disposal. Alternatively backfilling of ASS could be undertaken to prevent the migration of leachate.

Sufficient lime should be stored on site during construction for the neutralisation of acid sulphate soils and contingency measures.

If overland discharge of groundwater is proposed, a contingency plan should be in place to allow neutralisation and confirmation monitoring prior to discharge if pH levels are low or fall below natural background levels.

Appropriate management of discharge waters will also be required to address potential WHS and Environmental impact in accordance with statutory and regulatory requirements.

Potential adverse impacts associated with excavations and dewatering should be mitigated through the implementation of the Construction Soil and Water Quality Management Plan (i.e. erosion and sediment

controls, stormwater/drainage management). Any disturbance of soils/waters at the site should be conducted in accordance with the SMP.

4.0 Environmental Controls

4.1. Environmental Control Measures

Table 4.1 details the control measures. The mitigation measures are designed to ameliorate impacts on human health and the environment. The strategies are based on the recommendations of the EA, Minister's Conditions of Approval (MCoA) and the Statement of Commitments (SoC).

Table 4.1 Environmental Control Measures

Environmental Control Measure	Person Responsible	Timing/Frequency
Training and Induction		
Provide an induction to site personnel addressing the requirements of this CCMP and their responsibilities with regard to contaminated soil/water and ASS management.	Contractor	Daily or as required
Provide education of supervisors, operators and sub-contractors on the identification and handling requirements for contaminated soil/water and ASS through Toolbox meetings and on site coaching.	Contractor	As required
Ensure employees and contractors responsible for the identification and handling of contaminated/potentially contaminated soils/water or ASS are appropriately trained.	Contractor	As required
Plant and Equipment		
Equipment will be kept well maintained to prevent contamination/cross-contamination from leaks/spills etc. Appropriate controls should be put in place for refuelling etc.	Contractor	As per plan & maintenance schedules
Equipment used within contaminated/potentially contaminated areas should be appropriately decontaminated prior to use elsewhere on site.	Contractor	As required
Work Practice		
<p>Construction activities associated with the TSF will be undertaken during the following hours:</p> <ul style="list-style-type: none"> • Monday to Friday (inclusive) – 7:00am to 6:00pm • Saturday – 8:00am to 1:00pm • Sundays and public holidays – No works to be undertaken at any time 	Project Manager	Noted
Conduct remediation and management of contaminated/potentially contaminated soils with reference to the SMP.	Contractor	As required
Where additional potentially contaminated materials are encountered, the materials should be assessed, treated or disposed of in accordance with the SMP. Validation of any additional remediation works should be conducted with reference to the SMP.	Contractor	As required
Conduct management of ASS (including all natural soils and CWR materials) with reference to DP (2013c) – ASSMP and SMP.	Contractor	As required
Treated and validated ASS should be reused within designated areas on site in accordance with the ASSMP/SMP	Contractor	As required
Conduct management of groundwater/surface water during construction and dewatering activities with reference to the CSWMP and SGMP.	Contractor	As required
Implement additional management measures where adopted methodologies / practices are not meeting the environmental goals/outcomes outlined in this CCMP, SMP and ASSMP.	Project Manager	As required
Compounds and ancillary facilities will be placed away from sensitive receptors where possible. Contaminated soil management areas and ASS treatment areas will be situated in appropriate	Project Manager	Prior to works commencing

locations (i.e. away from sensitive receptors (such as surface water bodies/shallow groundwater/neighbors, ecological sensitive areas) and ideally in areas outside the construction area (Refer to Aurizon Indicative Project Construction Footprint).		
In times of adverse weather conditions (e.g. high winds or rainfall) assess whether any sites and/or equipment need to be shut down to avoid environmental impacts. Additional requirements may include temporary backfilling of excavations, covering of stockpiles etc. to prevent migration of contamination	Project Manager	As required
Reuse of Material On Site		
Prior to the reuse of materials back onsite, the materials will be sampled and analysed to determine whether they are of a quality suitable for the intended reuse and whether the reuse of the materials would result in contaminated runoff.	Contractor	As required
Excavated material or stockpiles to be reused on-site will be sampled at a minimum of one sample per 100 m ³ , with a minimum of three samples from each excavation or stockpile.	Contractor	As required
Material exhibiting visual evidence of having been mixed will be sampled in accordance with "Procedure B" of the Sampling Design Guidelines (EPA 1995) to ensure sampling is adequate to determine the average concentrations of contaminants.	Contractor	As required
Analysis will be undertaken for the particular contaminants identified as exceeding the relevant assessment criteria for the stockpile or excavation being tested.	Contractor	As required
A TCLP test for selected parameters will be undertaken in conjunction with total concentration analysis (if necessary) for waste classification purposes or for assessment of potential environmental impacts.	Contractor	As required
Materials that are not suitable for reuse will be classified in accordance with the Waste Classification Guidelines (DECCW, 2009).	Contractor	As required
Contingency Procedures		
Should unexpected situations be encountered, the following procedures will be followed: <ul style="list-style-type: none"> • Stop work and make the area secure, including notifying other workers in the immediate area. • Notify the Aurizon PM. • Follow the additional procedures listed below (note that the Aurizon PM must be notified of all unexpected finds). 	Contractor	As required
If potential asbestos containing material is observed, work will cease, and the excavation area will be isolated and managed as per the procedures listed in the SMP.	Contractor	As required
If potential asbestos containing material is observed, then the excavation area should be isolated and managed as per the procedures listed in the SMP.	Contractor	As required
Unexpected potentially contaminated material will be excavated and separately stockpiled in a secure location on strong impermeable plastic sheeting and covered top and sides with securely	Contractor	As required

fitted plastic sheeting.		
The stockpile will be protected by adequate sediment controls to collect runoff and prevent overland stormwater flow from affecting the base of the stockpile.	Contractor	As required
Potentially contaminated materials from different parts of the construction area will be segregated into separate stockpiles. The separate stockpiles should be signposted and the source location of the materials on site recorded.	Contractor	As required
When the potentially contaminated material has been removed, the area from which this material was excavated will also be isolated. Further excavation or other construction work will not occur in that area until advice from a suitably qualified environmental consultant is provided confirming that any contaminated material has been removed and that the area is suitable for further excavation or construction activity.	Contractor	As required
The location from which potentially contaminated materials is excavated and the location of the stockpile of excavated material will be recorded on a site plan. Records will include an outline of the area and depth of the potentially contaminated materials and the volume of material excavated.	Contractor	As required
A suitably qualified environmental consultant will be engaged to provide interim advice based on visual inspection on construction health and safety, material storage and material disposal to allow construction to proceed as soon as practical.	Contractor	As required
A suitably qualified environmental consultant will be engaged to assess the potentially contaminated material and prepare a report advising whether the material is contaminated at levels exceeding the NSW EPA endorsed guidelines for reuse on-site and/or whether the material needs to be disposed of off-site as waste, and the classification of that waste.	Contractor	As required
Where contaminated material is assessed as being unsuitable for reuse on site, the area where the material was excavated will require validation.	Contractor	As required
Remediation procedures will be updated to reflect any unexpected contamination finds during construction.	Senior Adviser Environment	
Community Consultation and Complaint Handling		
A Community Communications Strategy (CCS) will be implemented for handling complaints (including complaints regarding contamination) that includes recording, reporting and acting on complaints.	Senior Adviser Environment	As required
Establish and maintain complaints management system.	Senior Adviser Environment	Prior to works commencing
Community liaison (agreements where applicable) with local communities and affected residents.	Senior Adviser Environment	Prior to works commencing
Consult with potentially affected receivers at an early stage and engage effective communication strategies.	Senior Adviser Environment	Prior to works commencing

Monitoring		
Environmental monitoring and validation during remediation works and management of ASS shall be undertaken in accordance with the SMP, CSWMP and SGMP.	Senior Adviser Environment	As required
During remediation, monitoring and validation of known contamination will be undertaken by a suitably qualified contaminated land consultant who will prepare a validation report at the completion of remediation works to confirm that the site has been appropriately remediated for review by the NSW Site auditor. An addendum to the report will be required for unexpected contaminated materials if/when they are encountered and managed throughout the construction process.	Project Manager	As required
Similarly the monitoring and validation of ASS management will be undertaken by a suitable qualified environmental consultant who will prepare a validation report upon completion of bulk earthworks and as required during subsequent earthworks detailing the management procedures undertaken, validation of soil treatment, monitoring results and placement details for the treated materials.	Senior Adviser Environment	As required
All environmental records including monitoring and complaints records shall be kept for a period of 4 years and produced to an authorised EPA officer on demand. Validation reports will be reviewed by the Site Auditor and submitted to the Director-General and Council.	Senior Adviser Environment	As required
Waste Classification, Resource Recovery, Materials Handling procedures and waste tracking will be monitored by the contractor.	Contractor	As required
Ensure site managers regularly check the site for problems such that solutions can be quickly applied. (Refer to SMP, ASSMP, SWMP & WQMP).	Superintendent	As required
Validation and Site Audit		
A suitably qualified contaminated land consultant will be engaged by Aurizon to prepare a Validation Report following completion of the remediation of areas identified in the SMP.	Senior Adviser Environment	As required
An accredited NSW Site Auditor will be engaged by Aurizon to prepare a Site Audit Report which assesses the appropriateness of the Validation Report.	Senior Adviser Environment	As required
The Validation Report and Site Audit Report will be submitted to the Director-General prior to the laying of track in remediated areas.	Senior Adviser Environment	As required
Reporting and Non-conformance		
Submit monitoring and validation reports to the client (for submission to the Site Auditor, Director-General and Council as required) outlining remediation/management procedures, results and compliance with the SMP/ASSMP as above.	Senior Adviser Environment	As required
Where an exceedance of an action criterion is identified, additional mitigation measures shall be implemented where required (i.e. additional treatment of ASS or additional excavation to	Contractor	As required

remove contaminated materials followed by additional validation testing). Contingency procedures are outlined in the SMP/ASSMP.		
Appropriate records will be maintained by the contractor detailing the tracking of all materials on site, including materials reused on site and materials disposed off-site. Details will include waste classification reports or resource recovery exemption reports where utilised.	Contractor	As required

5.0 Environmental Monitoring and Reporting

5.1. ASS Monitoring

Environmental monitoring and reporting for the management of ASS should be undertaken with reference to the ASSMP (DP, 2013c) and SMP.

The ASSMP/SMP outlines an ASS monitoring program for soil and water quality, which includes:

- Procedures for the excavation, preparation of the treatment area, treatment of ASS, lime application rates, and verification testing requirements;
- Leachate neutralisation;
- Procedures to minimise adverse impacts during dewatering;
- Procedures to minimise adverse impacts from permanent drain construction;
- Monitoring strategies for soil treatment (neutralisation), leachate management, dewatering;
- Acceptance criteria;
- Reporting requirements; and
- Contingency procedures.

5.2. Contaminated Soil Remediation Monitoring

Environmental monitoring and reporting for the management of contaminated soils should be undertaken with reference to the SMP provided in Annexure 10 of the CEMP.

The SMP outlines validation and reporting requirements for remediation of contaminated soils on site and includes:

- Requirements for classification of materials requiring off-site disposal or importation to site;
- Validation methodology for excavations, stockpiles, landfarms;
- Acceptance criteria;
- QA/QC sampling and testing requirements; and
- Reporting requirements during and following construction.

It is noted that further assessment of site conditions will be undertaken prior to construction to better assess the presence and extent of contamination within the site. Review, and if necessary, revision of the SMP and the CCMP will be undertaken following this additional assessment.

Remediation procedures will be updated to reflect any unexpected contamination finds during construction.

5.3. Material Tracking

Environmental reporting by the Aurizon PM for both ASS and contaminated soils should include the tracking of all movements of ASS, contaminated soil and waste materials with information including (but not limited to) the following to be documented:

- Date of material movement;
- Original location of material (the source);
- Where material is stored or disposed of;
- Volume of material;
- Nature/description of material;

- Any treatment and/or validation testing conducted;
- Any associated supplementary information (e.g. consultants reports, laboratory results); and
- Truck identification/disposal docket numbers for material disposed of off-site.

Appropriately demarcation and signage should be erected around temporary stockpiles and treatment areas.

Routine inspections should be conducted by the Aurizon PM to ensure materials are stored, treated and re-used/disposed appropriately and tracked throughout the process.

The SMP further details procedures/requirements for the excavation of contaminated materials, validation requirements, waste classification and disposal/reuse options.

5.4. Reporting

Reporting will be undertaken as described in the CEMP Notification and Reporting. The results of validation monitoring will be recorded and compared against the project specific criteria identified in the ASSMP and SMP. Any complaints or non-compliances will be reported.

5.5. Review and Improvement of the CCMP

The Senior Adviser Environment will review this CCMP and its implementation at least every six months from commencement of construction. The purpose of the review is to ensure that the CEMP, sub-plans (including this CCMP) and operating system is meeting the project's statutory requirements.

The review will consider:

- Clients, site personnel and agency comments;
- Audit findings;
- Environmental monitoring records;
- Complaints;
- Incident reports;
- Corrective actions taken;
- Environmental non-conformance;
- Changes in organisational structure;
- Changes in construction methodology; and
- Changes in legislation and standards.

The Advisor Environment or, if required and engaged, Environment Representative will review the compliance reports and any proposed updates to the CEMP. The Advisor Environment or ER has authority to approve/reject minor amendments to this CEMP. Minor amendments are changes that do not have a detrimental effect on the environment or increase the risk profile. Major changes to the CEMP will require Director-General approval.

6.0 References

- Acid Sulfate Soils Management Advisory Committee (ASSMAC) (1998) Acid Sulfate Soils Assessment Guidelines, Acid Sulfate Soils Management Advisory Committee, NSW Agriculture.
- ANZECC (1999) Guidelines for the Assessment of On-site Containment of Contaminated Soil
- ANZECC (2000) Guidelines for Fresh and Marine Water Quality
- Douglas Partners (2013a) Report on Preliminary Contamination Assessment, Train Support Facility, Maitland and Woodlands Close, Hexham, 12 November 2012, Project 39798.06, Revision 9.
- Douglas Partners (2013b) Report on Assessment of Potential Groundwater Level Impacts, Proposed NSW Long Term Train Support Facility, 15 April 2013, Project 39798.12, Revision 5.
- Douglas Partners (2013c) Report on Acid Sulphate Soil Management Plan, Proposed NSW Long Term Train Support Facility, Woodlands Close, Hexham, 15 April 2013, Project 39798.12, Revision 8.
- GHD (2013a) NSW Long Term Train Support Facility, Contamination Assessment, Implications of Track Lowering on Acid Sulphate Soil and Contamination Management, 15 March 2013, Revision A.
- SSI-6090 Modification 1 - Environmental Assessment Report Revised (Ethos Urban, June 2019)
- Site Management Plan (Aurizon, February 2019)
- JBA (2013) Preferred Project Report and Response to Submissions Project Application MP07_0171, Maitland Road, Hexham, PPR NSW Train Support Facility, June 2013, Ref: 12599.
- NEPC (2013) National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013.
- NSW EPA (1996) Environmental Guidelines: Solid Waste Landfills.
- NSW DECC (2009) Waste Classification Guidelines – Part 1: Classifying Waste, December 2009.
- Section 5.25 Modification to SSI 6090: Hexham Long Term Train Support Facility-Ancillary Depot and Wagon Storage (Ethos Urban 8 April 2022).
- Soil and Water Assessment Operational Depot and Long-Term Wagon Storage, Hexham TSF (GHD, 29 March 2022)

Annexure 1 – Risk Assessment

7	Spoil and Contamination Management Note: To satisfy Condition 62(e)(iii) of MP07_0171 Mod 2	<p>A) Conducting earthworks in an improper manner resulting in regulatory non-compliances, impacts to landholders or harm to the environment.</p> <p>B) Management of identified and unidentified contamination.</p>	<p>Elimination</p> <p>Not applied</p> <p>Substitution</p> <p>Not applied</p> <p>Isolation</p> <p>Not applied</p> <p>Engineering</p> <p>A) Detailed design has identified project footprint, excavation area and likely excavation volumes.</p> <p>A) Erection of appropriate erosion/sediment control structures and control structures to minimise the potential for off-site migration of contaminated soil/water as per the Soil and Water Management Plan</p> <p>B) All PASS contained and neutralised within bunded area.</p> <p>Administration</p> <p>A/B) All engaged consultants are to be appropriately qualified.</p> <p>A) Generalised construction methodology and soil handling procedures detailed in the CEMP and supporting management plans.</p> <p>A) Rehabilitation requirements for disturbed areas specified in the FFMP.</p> <p>B) Spoil characterisation and validation methodology for identified PASS and unidentified contamination detailed in the Site Management Plans and Acid Sulphate Soil Management Plan/Construction Contamination</p>	<p>Guidance: The selected HOC is justified on the basis that the controls form part of the accepted safe system of work for the known operating environment and have valid potential to minimise the identified risk.</p> <p>All credible control options were considered within the hierarchy of control (HOC) as applicable to the accountable sphere of control.</p> <p>Controls considered but rejected: NIL</p>	3	2	M	<p>Elimination</p> <p>Not applied</p> <p>Substitution</p> <p>Not applied</p> <p>Isolation</p> <p>Not applied</p> <p>Engineering</p> <p>Not applied</p> <p>Administration</p> <p>Not applied</p> <p>PPE</p> <p>Not applied</p> <p>Control Effectiveness:</p> <p>SE</p>	<p>Guidance: Risk Controls are subject to ongoing due diligence in accordance with the authorised implementation and review timeframes.</p>	Project Manager and Principal Contractor	02/12/2023
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			<p>Management Plan.</p> <p>B) Management of stockpiles detailed in the SMP/ASSMP/CCMP and Spoil and Waste Management Plan</p> <p>B) Contaminated materials/fill are to be segregated.</p> <p>A/B) All management requirements are to be communicated to site personnel through an induction.</p> <p>PPE</p> <p>Not applied.</p> <p><u>Control Effectiveness:</u></p> <p>SE</p>								
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Annexure 2 – Existing Contaminated Areas



Figure 2 - Hexham TSF Areas of Residual Management