APPENDIX B

CHAIN OF CUSTODY

CHAIN OF CUSTODY

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CLIENT: WSP	**TURNAROUND R** ☐ Standard TAT **(List due date):**		**FOR LABORATORY USE ONLY (Circle)**
OFFICE: L27, 680 George St. Sydney 2001	(Standard TAT may be longer for some ☐ Non Standard or urgent TAT **(List due date):**		Custody Seal Intact? Yes No N/A
PROJECT:	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:		COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: ˚C
PROJECT MANAGER: **CONTACT PH:**		OF: 1 2 3 4 5 6 7	Other comment:

SAMPLER:	**SAMPLER MOBILE:**	**RELINQUISHED BY:**	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
COC emailed to ALS?	**EDD FORMAT (or default): .csv**				
Email Reports to:		DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to:					

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)				ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).																		Additional Information		
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TOTAL CONTAINERS																			Sampled by	Signature	Remarks
			TOTAL																						

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic;
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Pres
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Appendix C Acid Sulfate Soil Management Procedure

Acid Sulfate Soil Management Procedure

1. Purpose

This procedure details the actions to be taken when actual acid sulfate rock (ASR), acid sulfate soils (ASS) or potential acid sulfate Soils (PASS) are encountered during excavation/ construction activities. This procedure is prepared to demonstrate compliance with the following standards and guidelines:

- The Acid Sulfate Soils Manual (1998)
- Acid Sulfate Soils Assessment Guidelines (1998)
- Laboratory Methods Guidelines (2004), and
- EPA Waste Classification Guidelines (2014), Part 4: Acid Sulfate Soils.

2. Scope

This procedure applies to all construction activities undertaken as part of the Project that have the potential to uncover / disturb ASR / ASS / PASS.

3. Induction and training

All site personnel and subcontractors working in areas of high probability ASR / ASS risk will be trained in the relevant parts of this procedure.

4. Procedure

Identification of ASS treatment areas

The design and location of ASR / ASS treatment areas will be marked on PESCPs and any other relevant plans. Potential areas of acid sulfate material are tabulated below. These areas and the type of material will be confirmed via additional geotechnical investigation during the detailed design phase.

Table C-1 Potential areas of acid sulfate material

Area	Approximate Chainage (m)	Construction Activity	ASS probability
Northern and southern banks of the Macquarie Rivulet	18400-18750	Minor excavation and bridge piles	High risk 1-2m
South of Macquarie Rivulet	18750-19500	Minor cuts and excavation for drainage, footings, etc	Low risk above 4m AHD
Norther and southern bank of Frazer Creek	19500-19870	Minor excavation and bridge piles	High risk 2-4m AHD
South of Frazer Creek	19870-21400	Minor excavation for bridge foundations drainage, footings, etc.	Low risk above 4m AHD

Unexpected actual ASR / ASS or PASS encountered during excavation / construction activities

If ASR / ASS / PASS is encountered during excavation/construction activities the Foreman must:

- STOP ALL WORK in the immediate/ affected area and contact the Environmental Officer (EO)
- Recommence works in alternate area where practicable.

The EO is responsible for testing of ASR / ASS / PASS and will undertake testing to determine the acidity (field pH test) and potential for acidity (field 30 per cent peroxide test) of the material encountered.

Any of the following characteristics indicate the presence of ASR / ASS:

- Soil pH of less than four
- A sulphurous smell following soil disturbance
- Pale yellow surface encrustations;
- Excessive iron staining on drain surfaces or stream banks, or iron stained drain water and orange red ochre deposits around water bodies
- Excessive corrosion of concrete and / or steel structures exposed to ground or drainage waters, or rapid corrosion of fresh steel in the soil; and
- Blue-grey, blue-green or grey waterlogged soils which smell of rotten egg gas.

High risk indicators for PASS could include:

- Low position in the landscape
- Soil from beneath the water table
- Heavy textures
- Dark colours; and
- Sulfur odour (rotten egg odour).

Action criteria for management intervention

Table C-2 details the texture based action criteria for management of ASR / ASS disturbance. Where soils containing concentrations at or above the action criteria are disturbed, management of spoil is required.

For the purposes of the Project, both action criteria have been included for reference purposes, ie less than 1,000 tonnes for fine texture soils, and greater than 1,000 tonnes for all soil types. As the project will disturb spoil greater than 1000 tonnes, the action criteria of greater than 1000 tonnes disturbed should be used.

Table C-2 Action criteria based on the ASS analysis for three broad texture categories

Type of material	Clay content	Action criteria 1 to 1000 tonnes disturbed		Action criteria >1000 tonnes disturbed	
Texture range (McDonald et al. (1990)	Approx clay content (%<0.002 mm)	Sulphur trail % S oxidisable e.g. STOS or SPOS	Acid trail mol H+/tonne e.g. TPA or TSA	Sulphur trail % S oxidisable e.g. STOS or SPOS	Acid trail mol H+/tonne e.g. TPA or TSA
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium Texture Sandy loams to light clays	5 – 40	0.06	36	0.03	18
Fine Texture Medium to heavy clays and silty clays	≤40	0.1	62	0.03	18

Source: Ahern *et al.* 1998

Neutralisation of excavated acid sulfate materials (ASM) from earthworks

If field tests are positive or inconclusive, laboratory analysis using the Chromium Suite will be required to determine if the material is in fact ASS and/or the required treatment rates based on the net acidity.

Neutralising agents must be incorporated within all ASR / ASS / PASS. All cut batters shall be coated with fine aglime at the rate of five kg/m and the lime coating should be checked and re-limed as necessary on a daily basis during periods of dewatering during construction excavation. The base of all fill areas where treated material is to be placed shall be treated with a neutralising agent forming a guard layer prior to the placement of any fill soils to neutralise downward seepage of acidic

drainage water. This application may need to be increased depending on stockpile height and actual and potential acidity of the ASM developed through detail assessment.

Aglime rates will be as determined through analytical assessment to establish per cent of sulfur present (S%) to determine an indicative level of treatment as specified in Table C-3. Interpretation of analytical data must be conducted by an appropriately qualified and experienced in dealing with ASS/PASS management.

ASS/PASS must be sufficiently dry before neutralising is commenced so that the lime can be thoroughly mixed through the soil. Where moisture levels in soil are high, the soil must be dried by spreading and leaving open to the atmosphere. Drying can be accelerated by regular aeration by turning with an excavator or backhoe. Drying should be carried out on a guard layer and protected from stormwater ingress.

Mixing of ASS/PASS with neutralising agent shall be carried out by spreading the soil in layers of not more than 300mm to 400mm thick using an agricultural spreader and disc plough, rotary hoe or similar. Care shall be taken to ensure that mixing occurs throughout the depth of the layer prior to placement of new material.

Following the successful treatment of the lot (as determined through the validation testing), the material shall be compacted and the next layer of excavated material to be treated shall be placed over the already treated material. This process shall be continued until the required site elevation is achieved.

Even when neutralised, excavated and processed ASR will not be used for upper pavement layers above Upper Zone Formation (UZF), including Selected Material Zone (SMZ) and verge and other layers with the potential to be exposed.

Table C-3 Treatment levels and aglime required to treat total weight of disturbed ASS (Source: Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002)

Disturbed ASS (tonnes) (=m^3×BD) †	Soil Analysis* – Existing Acidity plus Potential Acidity (converted to equivalent S% units)													
	0.03	*0.06*	*0.1*	*0.2*	*0.4*	*0.6*	*0.8*	*1*	*1.5*	*2*	*2.5*	*3*	*4*	*5*
1	0	0	0	0	0	0.03	0.04	0.05	0.1	0.1	0.1	0.1	0.2	0.2
5	0	0	0	0.05	0.1	0.1	0.2	0.2	0.4	0.5	0.6	0.7	0.9	1.2
10	0	0.03	0.05	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.2	1.4	1.9	2.3
50	0.1	0.1	0.2	0.5	0.9	1.4	1.9	2.3	3.5	4.7	5.9	7.0	9.4	12
100	0.1	0.3	0.5	0.9	1.9	2.8	3.7	4.7	7.0	9.4	12	14	19	23
200	0.3	0.6	0.9	1.9	3.7	5.6	7.5	9.4	14	19	23	28	37	47
250	0.4	0.7	1.2	2.3	4.7	7.0	9.4	12	18	23	29	35	47	59
350	0.5	1.0	1.6	3.3	6.6	10	13	16	25	33	41	49	66	82
500	0.7	1.4	2.3	4.7	9.4	14	19	23	35	47	59	70	94	117
600	0.8	1.7	2.8	5.6	11	17	22	28	42	56	70	84	112	140
750	1.1	2.1	3.5	7.0	14	21	28	35	53	70	88	105	140	176
900	1.3	2.5	4.2	8.4	17	25	34	42	63	84	105	126	168	211
1000	1.4	2.8	4.7	9.4	19	28	37	47	70	94	117	140	187	234
2000	2.8	5.6	9.4	19	37	56	75	94	140	187	234	281	374	468
5000	7.0	14	23	47	94	140	187	234	351	468	585	702	936	1170
10000	14	28	47	94	187	281	374	468	702	936	1170	1404	1872	2340

L	**Low treatment:** (≤0.1 tonnes lime)
M	**Medium treatment:** (>0.1 to 1 tonne lime)
H	**High treatment:** (>1 to 5 tonnes lime)
VH	**Very High treatment:** (>5 to 25 tonnes lime)
XH	**Extra High treatment:** (>25 tonnes lime)

Notes

1. The tonnes (t) of pure fine aglime, CaCO3 required to fully treat the total weight/volume of ASS can be read from the table at the intersection of the weight of disturbed soil [row] with the existing plus potential acidity [column]. Where the exact weight or soil analysis figure does not appear in the heading of the row or column, use the next highest value
2. An approximate soil weight (tonnes) can be obtained from the calculated volume by multiplying volume (cubic m) by bulk density (t/m3). (Use 1.7 if B.D. is not known.) Dense fine sandy soils may have a BD up to 1.7, and hence 100 cubic metres of such soil may weigh up to 170 t. In these calculations, it is necessary to convert to dry soil masses, since analyses are reported on a dry weight basis.
3. Potential acidity can be determined by Chromium Reducible Sulfur (SCR), Peroxide Oxidisable Sulfur (SPOS) and Total Oxidisable Sulfur (STOS). For samples with pH less than 5.5, the existing acidity must also be determined by appropriate laboratory analysis eg. Titratable Actual Acidity (TAA). Soils with retained acidity eg. jarosite or other similar insoluble compounds have a less available acidity and will require more detailed analysis. The amount of treatment required may be reduced if the self-neutralising capacity of the soil is appropriately measured.

Neutralising materials

For management or neutralisation of ASS/PASS soils, medium-fine Aglime will be used. Dolomitic Aglime, or magnesium-blend Aglime, will not be used. In general, a finer grind is better. The Aglime purity should preferably be 90 per cent or better, (that is, neutralising value (NV) greater than 90), unless there is a significant savings to be made by use of less pure Aglime. In the latter case, however, the individual lime dosing rates will need to be increased accordingly. The requirement for greater amounts of Aglime of lower purity should be borne in mind when assessing the supplies of this material, as the cost savings from less pure material may be offset by the need for more, and correspondingly higher total transport costs.

ASS/PASS treatment will occur within an ASS treatment area. Material which is transported to treatment cells must be completely treated and removed from the treatment area before new material is introduced. This will ensure that treated material remains segregated and is not mixed with contaminated material. Aglime or other suitable treatment material will be stored at the treatment area in sufficient quantities to enable the treatment of all ASS/PASS material expected to be treated in the upcoming few weeks/months and will be determined by the expected delivery schedule of treatment material. The management of onsite treatment is the responsibility of the Site Foreman, with assistance from the Environmental Officer (EO).

Aglime is non-corrosive, and requires no special handling – it may be necessary to cover the stockpile with a tarpaulin or cover the stockpile with plastic, to minimise dust generation and prevent wetting, since it is then more difficult to spread. Intermittently, until such time as field testing suggests otherwise, a small quantity of Aglime will be stored on site, in the order of 200 kilograms or so. This will enable the regular treatment of soil and cater for any unexpected occurrences of ‘hotter’ ASS/PASS.

Dolomitic aglime, or magnesium-blend aglime, should not be used as these materials impose environmental risks from overdosing with the potential to damage estuarine ecosystems. A reasonable quantity of calcium hydroxide solution (hydrated lime) shall be kept on site at all times for treatment of acidic waters. The supply shall be stored in a covered and bunded area to prevent accidental release to waters. Neutralising agents must be replenished and or replaced regularly to remain effective against loss by wind or water erosion.

Validation of ameliorated ASR / ASS / PASS

Samples of the treated soil should be taken and laboratory analysed to demonstrate compliance with the performance criteria (ie. verification testing). These performance criteria equate to there being no net acidity in the soil following neutralisation. Soil that has been treated by neutralisation techniques and has not met these criteria must be retreated until the above performance criteria are met.

The objective of ameliorating ASR / ASS / PASS materials is to ensure that there is no chance that net acidity will be produced. Validation testing only occurs when soils have been treated (with a neutralising agent) to prevent any future acidification. If results of the validation testing indicate a failure to comply with the performance criteria, soil may need to be re–treated with an additional application of neutralising agent.

Soils that have been mixed with aglime will be analysed by either the SPOCAS or SCR Suite test methods at a rate of one sample per 250 cubic metre. All validation samples are to be recorded by GPS or survey, clearly marked on a map/sketch or otherwise recorded.

Where large quantities (greater than 1,000 cubic metres) of ameliorated soils are involved and ‘net acidity’ rates are generally low (18 mol H+/t to less than 125 mol H+/t or 0.03 to 0.20 per cent sulfur), a reduced rate of sampling may be appropriate subject to approval. A rate of one sample per 1,000 cubic metre may be suitable for example.

The following performance criteria must be attained for soil that has been treated using neutralisation:

- The neutralising capacity of the treated soil must exceed the existing plus potential acidity of the soil

- Post-neutralisation, the soil pH is to be greater than 5.5
- Excess neutralising agent should remain within the soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity.

If ameliorated ASS is going to be reused on site, due environmental regard for areas of placement should be assessed, documented and approved by the Fulton Hogan Environment Manager (EM). Assessment measures may include:

- Location of proposed placement areas and potential receptors (waterways, sensitive flora and fauna, structures)
- Stability and suitability of materials as select fill (especially clays), and
- Suitability of soil type for plant growth.

In the unlikely event that the treated material is unable to be reused on-site for other purposes, the material will need to be disposed of to an appropriately licensed waste disposal facility. The EM/ EO will liaise with a licensed waste facility and coordinate the process.

Large-scale dewatering or drainage

Earthworks and/or pumping that result in localised drainage or lowering of groundwater and the exposure of sulfidic soils to the ingress of oxygen may generate acidity as a function of soil type(s), sulfide contents, area exposed, and length of time the excavation remains 'dry'. The scale of the dewatering or drainage should be defined by the size of the cone of depression rather than the size of the void. Activities of this type are high-risk, and should not be undertaken without technical risk assessment by qualified personnel and the formulation of management measures sufficient to reduce risk to levels acceptable by the administering authorities.

Neutralising acid leachate and drain water using lime

The liming rate for treating acid water should be carefully calculated to avoid the possibility of "overshooting" the optimum pH levels of 6.5 to 8.5. This can occur quite easily if more soluble or caustic neutralising agents such as hydrated lime (pH 12) or magnesium hydroxide (pH 12) are used. It should be noted that when neutralising acid water, no safety factor is used. However, monitoring of pH should be carried out regularly during neutralisation procedures.

Agricultural lime (pH 8.2) is the safest neutralising agent. It equilibrates around a pH of 8.2 that is not generally harmful to plants, stock or humans and most aquatic ecology species. The main shortcoming associated with the use of lime is its insolubility in water.

When using alkaline materials, strict protocols must be established for the use, handling and monitoring of these materials. Prior to any ASR / ASS / PASS management, appropriate personal protective equipment (PPE) is to be worn as per relevant SDS (eg for Lime). This may include:

- Eye goggles and/or face masks
- Hard Hat
- Rubber boots, gloves
- Appropriate clothing (e.g. long sleeved shirts).

Calculating the quantity of lime

The current pH is measured with a recently calibrated pH detector. The desired pH is usually between 6.5 and 8.5 with pH 7 is normally targeted. The volume of water can be calculated by assuming one cubic metre of acid water is equivalent to one kilolitre (1000 litre) and 1,000 cubic metre is equivalent to one megalitre (ML).

As a general guide, Table C-4 shows minimum quantities of pure lime, hydrated lime or sodium bicarbonate needed to treat dams or drains of one ML (1,000 cubic metre) capacity.

Table C-4 Quantity of pure neutralising agent required to raise from existing pH to pH 7 for one megalitre of low salinity acid water

Current water pH	[H+] {mol/L}	H+ in 1 Megalitre {mol}	Lime to neutralise 1 Megalitre {kg pure CaCO3}	Hydr. lime to neutralise 1 Megalitre {kg pure Ca(OH)2}	Pure NaHCO3/ 1 Megalitre {kg }
0.5	0.316	316,228	15,824	11,716	26,563
1.0	0.1	100,000	5,004	3705	8390
1.5	0.032	32,000	1,600	1185	2686
2.0	0.01	10,000	500	370	839
2.5	0.0032	3,200	160	118	269
3.0	0.001	1,000	50	37	84
3.5	0.00032	320	16	12	27
4.0	0.0001	100	5	4	8.4
4.5	0.000032	32	1.6	1.18	2.69
5.0	0.00001	10	0.5	0.37	0.84
5.5	0.0000032	3.2	0.16	0.12	0.27
6.0	0.000001	1	0.05	0.037	0.08
6.5	0.00000032	.32	0.016	0.12	0.027

Notes on Table C-3:

- 1 m3 = 1,000 litre = 1 kilolitre = 0.001 megalitre
- Agricultural lime has very low solubility and may take considerable time to even partially react
- Hydrated lime is more soluble than aglime and hence more suited to water treatment. However, as Ca(OH)2 has a high water pH, incremental addition and thorough mixing is needed to prevent overshooting the desired pH. The water pH should be checked regularly after thorough mixing and time for equilibration before further addition of neutralising product
- Weights of lime or hydrated lime are based on theoretical pure material and hence use of such amounts of commercial product will generally result in under treatment
- To more accurately calculate the amount of commercial product required, the weight of lime from the table should be multiplied by a purity factor (100/ Neutralising Value for aglime) or (148/ Neutralising Value for hydrated lime).
- Calculations are based on low salinity water acidified by hydrogen ion, H+ (acid) and do not take into account the considerable buffering capacity or acid producing reactions of some acid salts and soluble species of aluminium and iron. For example, as the pH increases towards 4, the precipitation of soluble ferric ion occurs, liberating more acid:
- $Fe3+ + 3H2O \rightarrow Fe(OH)3 + 3H+$
- If neutralising substantial quantities of ASS leachate, full laboratory analysis of the water will be necessary to adequately estimate the amount of neutralising material required.

Application of lime to water

To increase the efficiency, lime should be mixed into a slurry before adding. A slurry can be prepared in a concrete truck, cement mixer or large vat with an agitator. Methods of application of the slurry include:

- Spraying the slurry over the water with a dispersion pump
- Pumping the slurry into the water body with air sparging (compressed air delivered through pipes) to improve mixing once added to water
- Pouring the slurry out behind a small motorboat and letting the motor mix it in
- Incorporating the slurry into the dredge line (when pumping dredge material)
- Using mobile water treatment equipment such as the ‘Neutra- mill’ and ‘Aqua Fix’ to dispense neutralising reagents to large water bodies.

A change in pH will not be instantaneous. The rate of neutralisation will vary with the solubility, fineness of the lime, the application technique and the acidity (pH) of the water. The finer the lime (preferably microfine with the consistency of white dust) and the more agitated the water, the faster the lime will dissolve and become effective. The pH must be carefully monitored even after the desired pH has been reached. If the water has not reached the desired pH within two weeks, more lime may need to be added. Before additional lime is added, the lack of success should be investigated. Issues to consider may include:

- The quality of the lime being used
- The effectiveness of the application technique
- The existence of additional sources of acid leaching into the water body further acidifying the water, and
- The lime has become lumpy and is sitting on the bottom

Neutralisation may be faster if higher rates are used, but is not recommended as it is expensive and resource wasteful. Moreover, over-dosing may result, though this is unlikely to be a concern with agricultural lime.

Appendix D Heavy rainfall event procedure

Heavy Rainfall Event Procedure

Purpose

To detail the actions to be taken in the event of a 'heavy' or 'violent' rainfall forecast as defined by the Australian Government Bureau of Meteorology. The procedure outlines how to monitor rainfall forecasts and prepare site to minimise impacts as much as practicable.

For management measures and procedures to be implemented prior to a flooding event, including timeframes for securing work sites and moving plant and equipment, refer to the Flooding and Hydrology Management Sub-plan (FHMP).

Table D-1 Definition of rain or showers intensity

Category	Description
Light	Up to 2 mm per hour. Individual drops easily identified, puddles form slowly, small streams may flow in gutters.
Moderate	2.2 mm to 6 mm per hour. Rapidly forming puddles, down pipes flowing freely, some spray visible over hard surfaces.
Heavy	6.2 mm to 50mm mm per hour. Falls in sheets, misty spray over hard surfaces, may cause roaring noise on roof.
Violent	Over 50mm per hour. Gutters and downpipes overflowing, spray to height of several centimetres over hard surfaces, may cause roaring noise on roof.

Source: Australian Government Bureau of Meteorology website http://www.bom.gov.au/info/wwords

Induction and training

All Fulton Hogan Superintendents, Foremen and Engineers will be trained in this procedure.

Procedure

1. Monitoring of 'heavy' or 'violent' rain or shower events (through the Australian Government Bureau of Meteorology):
2. On each working day, the Environmental Manager (EM)/ Environment Officer (EO) or delegate will log on to the Australian Government Bureau of Meteorology website http://www.bom.gov.au/weather/nsw review the weather forecast for the next three days and notify the Project team of the same by email. When rain or showers are described as 'heavy' or 'violent', the EM/EO or delegate will highlight that:
    - rain or showers are described as 'heavy' or 'violent' (as applicable)
    - the Heavy Rainfall Event Procedure must be followed.
3. The EM/ EO or delegate will keep a record of all weather forecast emails.
4. The daily weather forecast may be discussed at Prestart Meetings as deemed required by the Fulton Hogan Foreman/ Superintendent.
5. When rain or showers are described as 'heavy' or 'violent' the Fulton Hogan Superintendent will notify the Project team of personnel who will monitor and maintain erosion and sediment controls if required.
6. The Foremen will ensure that there is an adequate supply of erosion and sediment control measures on site.
7. Prior to the 'heavy' or 'violent' rainfall or shower event, the Foremen and the EM/ EO or delegate will inspect erosion and sediment control measures, focusing on the critical areas first. These may include stockpile areas, chemical storage areas and sediment basins.
8. Additional temporary erosion and sediment controls will be installed as required.

Appendix E Stockpile Management Protocol

Stockpile Management Protocol

Purpose

This protocol provides a process for the establishment of *temporary* stockpile areas within the approved project boundary and any approved ancillary facility to ensure that environmental impacts associated with stockpiling are minimised during construction.

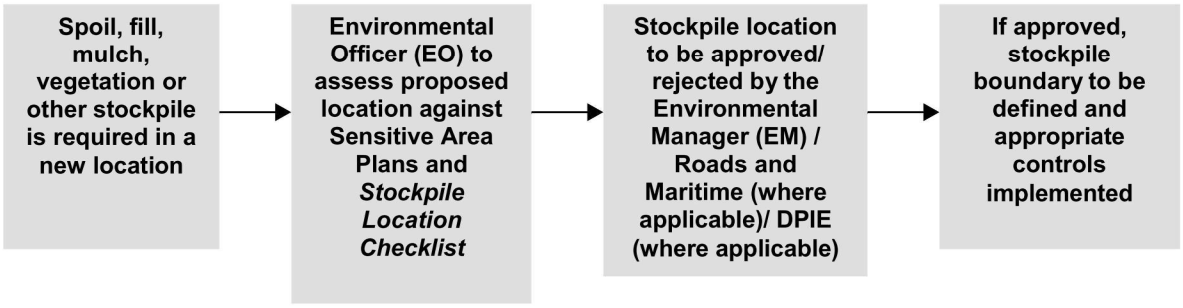
Stockpile sites may typically be required to store material including, but not limited to:

- Excavated materials to be used in fill embankments and other design features
- ASS subject to treatment prior to reuse
- Excavated material unsuitable for reuse in the formation
- Excess concrete, pavement, rock, steel and other material stored for either future use in the Project or prior to removal from site, and
- Topsoil, mulch, excess timber for landscaping and revegetation works.

Scope

This protocol and associated *Stockpile location checklist* describe the environmental criteria/ factors to be considered to ensure stockpiles are located in areas where potential environmental harm is minimised.

To avoid duplication, refer to the relevant Sub-plan e.g. AQMP, WEMP, FFMP, NVMP, HMP and this SWMP for the mitigation measures that will be implemented to avoid/ minimise air quality; waste management; flora and fauna; noise; heritage; and erosion and sediment impacts respectively from stockpiles.



Induction and training

All site personnel and subcontractors will be trained in this procedure.

Procedure

Proposed stockpile information

Prior to requesting the assessment of a stockpile location from the EO, the person requesting the new stockpile location should check approved stockpile locations to ensure current approved stockpile sites cannot be better utilised. Minimise the number of stockpiles sites wherever practicable.

If existing sites cannot be used, the expected quantity of material, expected dimensions required, expected stockpiling timeframes, destination of the stockpiled material, whose land the stockpile will be located on and the type of material to be stockpiled must be detailed. Once this information is known, the EO shall be contacted for an assessment of the proposed stockpile location.

Assessment of stockpile site

The EO shall utilise the **Stockpile Location Checklist** (included in this Protocol, Table E-1) to assess the stockpile location.

Note stockpiles within the approved project boundary are intrinsic to and undifferentiated from the bulk earthworks operations, these stockpiles are assessed in accordance with the section below of this protocol below.

Approval of stockpile site

Stockpiles within the approved project boundary

The EO shall give the completed *Stockpile Location Checklist* (Table E-1) to the EM for review and assessment. Following this review, the EM shall either approve or reject the proposed stockpile location and notify the EO of the decision.

A register of all stockpile sites (Table E-2, included in this Protocol) shall be kept on file by the EO and they shall also ensure that any additional erosion and sediment control measures are included in the relevant progressive erosion and sediment control plan (PESCP).

Preparing stockpile site

If the proposed stockpile site is approved, the boundaries will be agreed between the person proposing the stockpile and the EO (or Roads and Maritime where required). The proposed stockpile site will be marked out and appropriate erosion and sediment controls installed. Stockpile sites will also be signposted to clearly identify and delineate between other stockpiles. The erection of signs will be agreed with the Site Foreman.

Details of stockpile management in regard to erosion and sediment control will be included in the relevant ESCP/ PESCP.

Mulch stockpiles

Locate and manage mulch stockpiles to minimise and manage tannin generation. Refer to Appendix F of this SWMP for **Roads and Maritime Environmental Direction: Management of Tannins from Vegetation Mulch.**

Stockpile location checklist

Proposed Stockpile number:	
Chainage:	
Location sketch is attached? (mandatory)	☐ Yes
Stockpile type and dimensions (HxWxD):	

The location of stockpile sites will be determined following review of the following documents and requirements:

- CEMP and Sub-plans including review of relevant mitigation measures
- Sensitive Area Plans
- Stockpile Management Protocol
- Revised environmental management measure REMM SW02
- Roads and Maritime Specification D&C G36, G38 and G40
- Roads and Maritime Stockpile Site Management Guideline.

Where proposed sites do not comply with the criteria below, provide justification and additional mitigation measures to demonstrate how potential impacts will be managed.

Table E-1 Stockpile location criteria

Criteria		Source of requirement	Does the proposed site meet the criteria?	If proposed site does not meet the criteria, provide justification/ additional mitigation measures to demonstrate how potential impacts will be managed
Vegetation	Site should minimise damage to natural vegetation and trees	G40 cl 5.2		
	Site should be located outside of the 'dripline' of trees	G 40 cl 2.4.1(ii)		
	Site should be located outside of the tree protection zone of trees or native vegetation identified for retention. Refer to AS 4970.	G 38 cl 3.2		
	Site should avoid clearing native *Ficus* and *Eucalyptus* species	SWTC App 14 cl 14.3		
	Site must not result in any clearing of native vegetation beyond that which is otherwise required for the project.	SWTC App 4 cl 4.21		
	Site should be located so that the removal of threatened species, endangered ecological communities (EECs) or roosting habitat for listed threatened fauna species is not required	SWTC App 4 cl 4.21		

Criteria		Source of requirement	Does the proposed site meet the criteria?	If proposed site does not meet the criteria, provide justification/ additional mitigation measures to demonstrate how potential impacts will be managed
Drainage and water quality	Site should be located away from drainage lines and watercourses	G40 cl 5.2		
	Site should be located at least 50 m from a waterway unless an ESCP/PESCP is prepared and implemented so as not to adversely affect water quality in the waterway[1]	SWTC App 4 cl 4.21		
	Site should be located at least five metres from likely areas of concentrated water flows and at least 10 metres from waterways that are classified as Class 1 and Class 2 from the DPI Fisheries guideline "Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings"	G 38 cl 3.2 SWTC App 4 cl 4.21		
	Site should be located on land with a slope less than 10 per cent.	SWTC App 4 cl 4.21		
Dust and noise	Site should be located away from dust sensitive locations	G36 cl 4.4.2(o)		
	Site should be located away from noise sensitive locations	G36 cl 4.6.1(f)		
Access	Site must be positioned with ready access to the road network or direct access to the construction corridor	SWTC App 4 cl 4.21		
	Site must be positioned so that the stockpiled material is accessible at any time	G40 cl 5.2		
Heritage	Site be located in areas of low heritage conservation significance (including areas identified as low Aboriginal Cultural value) so as to not impact upon heritage sites beyond those already impacted by the Project.	SWTC App 4 cl 4.21		
Flooding and hydrology	Where stockpiles are to be located in the floodplain, site located and sized to ensure temporary impacts are not greater than those specified in the design criteria.	REMM HF02 G 38 cl 3.2		

[1]**"Waterway" is defined in SWTC Appendix 4 Clause 4.21(a)(ii) as "any Class 1 or Class 2 fish habitat waterways (as described in the Department of Primary Industries Fisheries guidelines); and waters that are used for the purpose of human consumption."**

Prepared by Environment Officer: ..... Date:.....
Environmental Manager: ..... Date:.....
Approved / Rejected (please circle) by: ..... Date: .....

Table E-2 Approved stockpile location register

Stockpile number/ identifier	Date approved	Location description	Chainage	Issued To	Updated PESCP? (yes/ no/ not required)