


TWEED VALLEY HOSPITAL

– STAGE 2

MANAGEMENT PLAN – SOIL AND WATER

11/08/2020 | Revision No: 3.3



Revision	Description	Appr.	Date		Client:	Project:	Project No.:	Drawing Title:
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							Project Address: 771 Cudgen Rd, Cudgen	ACONEX REFERENCE: LLB-PMP-032

Sub Plan Revision Status				
Date	Revision (in numbers)	Purpose and Summary of Amendments	Reviewed by	Approved by
30/01/17	2	General update including LLB GMR and legislative amendments.	Tracey Wallbridge	Brian Falls
09/07/19	3.0	Project Specific – Preliminary	Monique Windley	Luis Biaggini
12/07/19	3.1	SSD Requirements Addes	AW	Luis Biaggini
24/07/20	3.2	Updated SSD2 requirements	DC	Luis Biaggini
11/08/20	3.3	Updated with HI/TSA comments	DC	Luis Biaggini

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1. OVERVIEW

The Tweed Valley Hospital Project broadly consists of:

- Construction of a new Level 5 major regional referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region (in conjunction with the other hospitals and community health facilities across the region);
- Delivery of the supporting infrastructure required for the Tweed Valley Hospital, including green space and other amenities, roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

1.1 Stage 2 Hospital Main Works and Operation

The Stage 2 SSD component seeks consent for the Main Works and Operation of the Tweed Valley Hospital, including:

- **Construction of Main Hospital Building**
 - Main entry and retail area
 - Administration
 - Community health
 - In-Patient units
 - Outpatient clinics and day only units
 - Child and Adolescent Services
 - Intensive Care Unit
 - Mental Health Unit
 - Maternity Unit and Birthing Suites
 - Renal Dialysis
 - Pathology
 - Pharmacy
 - Radiation Oncology as part of integrated Cancer Care
 - Emergency Department
 - Perioperative Services
 - Interventional Cardiology
 - Medical Imaging
 - Mortuary
 - Education, Training, Research
- Back of House services
- Rooftop Helipad
- **Construction of Support Buildings, referred to as the 'Health Hub', containing:**
 - Oral Health
 - Community Health
 - Aboriginal Health
 - Administration
 - Education, Training and Research
- **Internal Roads and carparking, including multi-deck parking for staff, patients and visitors;**
- **Construction of a temporary building for the 'Tweed Valley Skills Centre'**
- **External road infrastructure upgrades and main site access**
- **Environmental and wetland rehabilitation, including rehabilitation of existing farm dam as outlined in the Biodiversity Development Assessment Report (BDAR) prepared for the Concept Proposal and Stage 1 works**
- **Site landscaping**
- **Signage**
- **Utility and service works**

The works outlined above comprise five key components, which are subject to various funding allocations and may be delivered independently to each other. Stage 2 has therefore been defined in the following sub-stages:

Stage 2A – Main Hospital Building complete with supporting roads, services infrastructure and landscaping

Stage 2B – Main Hospital Building incremental expansion areas

Stage 2C – Health Hub

Stage 2D – Tweed Valley Skills Centre

Stage 2E – Multi-deck car park.

Refer to the Staging Report for details of staging.

2. SSD CONDITIONS

State Significant Development Conditions

Name of this Plan (as per SSD 2 Conditions): Construction Soil and Water Management Plan (CSWMSP)

B18. The Construction Soil and Water Management Plan (CSWMSP) and the plan must address, but not be limited to the following:

<p>(a) be prepared by a suitably qualified expert;</p>	<p><u>Plan prepared by:</u> Monique Windley – Lendlease Site Environmental Engineer</p> <p><u>Plan prepared in accordance with recommendations made in:</u> Robert Bird Group Drawings – Sediment and Erosion Control Plan Tweed Valley Hospital Development - SEAR's Report Water Sources – Bonacci Tweed Valley Hospital Development - Biodiversity Development Assessment Report - Greencap Tweed Valley Hospital Development - Biodiversity Management Plan - Greencap</p> <p><u>Plan Reviewed by:</u> Ecoteam - Review Appendix K for evidence of consultation</p>
<p>(b) be consistent with the CSWMP prepared for the Stage 1 works of SSD-9575;</p>	<p>This plan has been developed and reviewed against Stage 1 (SSD-9575) CSWMP.</p>
<p>(c) describe all erosion and sediment control measures to be implemented during construction, generally in accordance with:</p> <p>(i) RBG-CV-DWG-RIE-81-300 Rev 2 - Erosion and Sediment Control Plan dated 12/09/2019;</p>	<p>(i) RBG drawing RBG-CV-DWG-RIE-81-300 has been superseded with RBG-CV-DWG-RIE-81-300[E] (refer Appendix B). This is a live document which will be updated in this management plan as the revisions change.</p> <p>(ii) Refer to Appendix B: Sediment and Erosion Control Plan. Scope includes provision of a sediment and erosion control identifying</p>

<p>(ii) the publication Managing Urban Stormwater Soils and Construction, 4th Edition published by Landcom ('Blue Book');</p> <p>(iii) the measures proposed in Stormwater Management Plan Issue E prepared by Robert Bird Group dated 19 September 2019; and</p> <p>(iv) the recommendations in Section 3.2.4 of the Stage 2 SSD Biodiversity Assessment Report prepared by Greencap dated September 2019 (BDAR).</p>	<p>standard measures to be implemented in line with the 'blue book' requirements.</p> <p>(iii) Refer Section 3: Erosion and Sediment Control During Construction for reference to RBG Stormwater Management Plan.</p> <p>(iv) Refer Section 3: Erosion and Sediment Control During Construction and Stormwater Detention and Dewatering for reference to Section 3.2.4 of the Stage 2 SSD Biodiversity Assessment Report.</p>
<p>(d) include an Acid Sulfate Soils Management Plan, including measures for the management, handling, treatment and disposal of acid sulfate soils, including monitoring of water quality at acid sulfate soils treatment areas (if any);</p>	<p>Refer to Acid Sulfate Soils Section</p>
<p>(e) provide a plan of how all construction works will be managed in a wet-weather events (i.e. storage of equipment, stabilisation of the Site);</p>	<p>Refer to Section 2: Scope of Project and Sub Plan</p> <p>Subheading: Wet Weather Site Preparation</p>
<p>(f) detail all off-site flows from the Site; and</p>	<p>Refer Appendix O for Offsite flows from the site</p>
<p>(g) describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including, but not limited to 1 in 1-year ARI, 1 in 5-year ARI and 1 in 100-year ARI;</p>	<p>Due to the RL of the site, the likelihood of the site flooding is extremely low. In the event of large wet weather events, the site will be following the same wet weather events site preparation detailed in Section 3: Stormwater Detention and Dewatering</p>
<p>(h) include details of all off-site flows from the Site to demonstrate that the peak flows from the Site into the wetland do not exceed the pre-development flows during construction works;</p>	<p>Refer to Appendix B: Sediment and Erosion Plan.</p> <p>The purpose of the detention basins is specifically to allow the project post-development peak flows of stormwater to as closely as possible match to the pre-development peak flows rather than to manage the overall volume of water discharging from the site. However, the detention basins will allow infiltration so that in dry spells the runoff will mirror the existing case, where most of the surface water would soak</p>

	into the ground rather than runoff into the receiving watercourse. Both the original Bonaci report and the Robert Bird Group (RBG) report, show the bioretention basins will reduce the annual average Total Nitrogen (TN) discharged from the Site. Other pollutants will also be reduced from the existing case.
(i) include details of maintenance and monitoring programme in relation to the four sediment basins (stormwater retention and water quality treatment devices), recording and reporting details, relevant contact information and Work Health and Safety requirements to ensure that the proposed stormwater quality measures remain effective for the duration of Stage 2 works;	The management regime of the sedimentation basins is detailed in the Bonnaci drawing – Appendix E: Sedimentation Basin Inspections and Maintenance. Plan to be updated upon receipt of revised document.
(j) management measures for cane toad <i>Rhinella marina</i> around sediment basins during construction works in accordance with the Stage 2 Biodiversity Management Plan prepared by Greencap dated September 2019 (as updated by conditions of this development consent) (Stage 2 BMP);	Refer Section 3: Planning and Site Establishment for Cane Toad management.
(k) monitoring methods for aquatic weeds (particularly salvinia <i>Salvinia molesta</i>) in sediment basins in accordance with the recommendations of Stage 2 BMP;	Refer Section 3: Stormwater Detention and Dewatering for aquatic weed monitoring requirements.
(l) provide details of the water quality monitoring techniques to be adopted to ensure that the pre-development water quality levels are maintained (except large flood events including, but not limited to 1 in 1-year ARI, 1 in 5-year ARI and 1 in 100-year ARI) during construction works. The water quality monitoring locations and targets must comply with the recommendations of the BDAR; and	Refer to Appendix F: Water Monitoring Locations and Sample Tests
(m) details of a water quality monitoring program including periodic review programs;	Monthly water quality sampling/ reporting and annual reporting conducted as per Stage 1 (SSD-9575) Requirements.

B12: Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

<p>(a) detailed baseline data;</p>	<p>Location of Data: Tweed Valley Hospital Baseline Water Quality Monitoring 19/11/2018, 26/11/2018, 12/12/2018.</p> <p>Prepared By: Greencap</p>
<p>(b) details of:</p> <p>(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);</p> <p>(ii) any relevant limits or performance measures and criteria; and</p> <p>(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;</p>	<p>i) Refer to Section 2: Scope of Project and Sub Plan.</p> <p>Subheading: Legislation, Approval and Guidelines</p> <p>ii)</p> <ul style="list-style-type: none"> AS/NZS 5667.1:1998 Water Quality – Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1); AS/NZS 5667.4:1998 Water Quality – Sampling Part 4: Guidance on sampling from lakes, natural and manmade (AS/NZS 5667.4); and AS/NZS 5667.6:1998 Water Quality – Sampling Part 6: Guidance on sampling of rivers and streams (AS/NZS 5667.6). <p>iii) Refer to Appendix F: Water Monitoring Sampling Parameters</p>
<p>(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;</p>	<p>Refer to Section 3: Implementation of the Sub Plan</p>
<p>(d) a program to monitor and report on the:</p> <p>(i) impacts and environmental performance of the development; and</p> <p>(ii) effectiveness of the management measures set out pursuant to paragraph (c) above.</p>	<p>Refer to Appendix F: Water Monitoring Locations and Parameters</p>
<p>(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;</p>	<p>Monitoring parameter exceedances which indicate increasing trends and are not generally consistent with background data will trigger investigation and adaptive management actions.</p>

(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Quarterly Review of Management Plans or after incidents.
(g) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii) complaint; (iii) failure to comply with statutory requirements; and	i and iii) Refer to Section 5.3 of the Construction Environmental Management Plan (CEMP) ii) Refer to Community Consultation Plan
(h) a protocol for periodic review / update of the plan and any updates in response to incidents or matters of non-compliance.	Quarterly or as required.

3. SCOPE OF PROJECT AND SUB PLAN

Project Details	
Scope of the Sub Plan	<p>This Stormwater, Erosion and Sedimentation Management Sub Plan provides strategies and mitigation measures to manage disturbed areas of the site. It outlines appropriate measures to ensure that activities including excavated soil, stormwater, erosion, and sedimentation are managed appropriately during site establishment and construction of the project. It describes measures to be implemented during relevant construction activities and defines discharge protocols and treatment procedures that enable control of the impacts of the construction activities on potentially affected areas of adjacent water bodies.</p> <p>Refer to Section 1.1 and 3.1 of the Project EHS Management Plan for clarification on how the EHS Sub Plans form part of the Lendlease Building (LLB) EHS management system.</p>
Objectives of the Sub Plan	<ul style="list-style-type: none"> • To avoid erosion, contamination and sedimentation occurring, resulting from construction activities with a concentration on controls to minimise dust and vehicular mud-tracking. • To control the quality of stormwater leaving the construction site, so that no unacceptable impact will intrude upon the natural watercourses and/or stormwater drains. • To minimise disturbance of the surrounding hydrological regime • To maximise opportunities for stormwater recycling on site. • To effectively manage the bulk excavation and associated dewatering activities to minimise impact on any adjacent water bodies. • Erosion and sediment controls are to be effective and properly maintained always. • Water treatment procedures to treat collected /retained stormwater to achieve acceptable water quality criteria. • To monitor the effects of activities and the effectiveness of mitigation measures • Align control measures with sediment and erosion plans prepared by consultants • Include items raised in the Biodiversity Management Plan
Scope of Works	<p>This Sub Plan has been prepared based on the following scope of works:</p> <ul style="list-style-type: none"> • Stage 2 site establishment including temporary fence installation, office and compound setup; • Remaining Civil Works, including tie-ins, final surfacing, etc; • Monitoring and maintenance of existing sedimentation basins;

	<ul style="list-style-type: none"> • Construction of the multi-level Main Works Stage. This new build will include a new emergency department, helipad, IPUs, ICU, MAU, expanded rehab and ambulatory care facilities and operating theatres • Conversion of existing sedimentation basin into bio detention basins; • Landscaping, Regeneration and Maintenance Works.
Key Issues and Risks	<p>The site is situated along Cudgen Road, Kingscliff. The site is positioned directly north of the TAFE Kingscliff Campus.</p> <p>The site topography consists of a plateau adjoining Cudgen Road and a steep fall towards the northern wetland. The soil is generally a silty clay with ballast rock underground at low depth. The site generally drains quickly to the north boundary. Large sedimentation ponds have been constructed on the site (by others).</p> <p>The works required on site will involve significant ground disturbance creating the potential for erosion, sedimentation, runoff and environmental pollution, if appropriate controls are not implemented and maintained. The activities with the greatest potential to impact on the local environment and community from a stormwater, erosion and sedimentation perspective are:</p> <ul style="list-style-type: none"> • Stage 2 site establishment and operation including storage areas; • Stockpiling during landscaping and remaining in-ground infrastructure works; • The loading and haulage of materials off-site; • Stormwater and groundwater detention and dewatering; and • Waste disposal (spoil, sediment and water). <p>The impacts of these works may include:</p> <ul style="list-style-type: none"> • Cause of potential flow into stormwater system and/or adjacent surface water bodies from sediment laden water originating from the site. • Pollution of local ecosystems and waterways due to uncontrolled site runoff; • Pollution associated with the discharge of sediment laden or contaminated water during dewatering activities; • Vehicles exiting construction site potentially depositing dust/dirt/mud on public roads after rain periods. • Localised flooding during high intensity storm events. <p>The implementation of the control measures identified in the EHS Plan and Construction Soil & Water Management Sub Plan are intended to prevent or mitigate these impacts.</p>

Legislation
and
Guidelines

Federal/National:

The 'Blue Book' (Managing Urban Stormwater Soils and Construction) – Landcom, Fourth Edition (2004)

'White Books' - IECA 2008. Best Practice Erosion and Sediment Control. Books 1-6. International Erosion Control Association (Australasia)

Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000

Australian Guidelines for Water Quality Monitoring and Reporting 2000

State: NSW

NSW Water Quality Objectives for the Tweed River Catchment for Aquatic Ecosystems (Tweed 2006)

Local:

- Local Government Act 1993

Lendlease Requirements:

- GMR: 4.13 Degradation or Pollution of the Environment
- GMR: 4.15 Uncontrolled Release of Stored Energy (non-electrical))
- Lendlease Building Workplace Delivery Code (WDC)

Other Related Plans

Acid Sulfate Soils Management Plan

Summary of Site Controls	<p>Works must be planned and implemented in accordance with the Lendlease GMRs, the Project EHS Plan, this Sub Plan and the Lendlease Building WDC. These documents detail Lendlease's approach and commitment to pro-active and responsible site management.</p> <p>Site specific controls, monitoring, reporting and performance measurements have been identified in this Sub Plan to prevent or minimise the impacts of construction on the environment and community. These include but are not limited to:</p> <ul style="list-style-type: none"> • Preventing erosion through minimal ground disturbance; • The installation of erosion and sedimentation controls; • Covering of stockpiles (where possible); • The use of controls to trap sediment close to its source and prevent migration off site; • The control and maintenance of site access and egress points to prevent tracking and off-site pollution; • The identification of acceptable detention, testing, treatment and dewatering processes; and • Daily surveillance and weekly inspections, <p>A Stormwater, Erosion and Sedimentation Management Diagram (EMD) will be prepared prior to any site activities commencing including clearing and earthworks.</p> <p>Construction stage stormwater, erosion and sedimentation requirements must be included in relevant specifications, contract agreements, quality assurance documents, and subcontractor work method statements.</p> <p>Site inspections, monitoring and reporting will be undertaken by Lendlease and subcontractors as detailed in the EHS Plan and the following implementation table.</p>
Wet Weather Site Preparation	<p>In the event of upcoming severe (above 10mm/day) wet weather or other meteorological event (extreme winds, cyclones warnings) a notification will be issued by the Regional EHS Representative to all Site Managers.</p> <p>It will be the Site managers responsibility to hold inform the EHS Committee with subcontractor representatives of this alert and ensure that a meeting is held to address all risks and adequacy prepare the site for this event.</p> <p>Prior to the event the Site Manager and/or EHS Manager will inspect the area of each trade, with the company of the subcontractor EHS representative and document mitigation measures within their site diary and response back to the site manager.</p> <p>In preparation for the wet weather event activities that will likely include, but are not limited the following:</p> <ul style="list-style-type: none"> - Pumping out of Sedimentation Basins - Covering of Stockpiles (where possible) - Inspections and repair of all Silt Fences and other control devices

	<ul style="list-style-type: none">- Protection of materials and adequate storage of chemicals.															
Flocculant	Refer to Appendix D for approved Flocculant to be used to treat water on site.															
Sedimentation Bains Maintenance	Refer to Appendix E for details on the maintenance regime of the Sedimentation Basins.															
Water Monitoring Program	Refer to Appendix F for water monitoring locations, frequency and parameters.															
Groundwater Locations	<p>Extracted from <i>Morrison Geotechnic</i> Geotechnical Report, the below tables details the groundwater levels encountered during geotechnical boring activities. Refer to Appendix I for location of boreholes.</p> <table><tr><th>Borehole</th><th>Groundwater Depth (m)</th><th>Groundwater Level (RLm)</th></tr><tr><td>BH1</td><td>11.2</td><td>12.0</td></tr><tr><td>BH6</td><td>12.2</td><td>14.8</td></tr><tr><td>BH7</td><td>11.4</td><td>14.0</td></tr><tr><td>BH25</td><td>14.4</td><td>11.4</td></tr></table> <p>Additional wells to be installed during soil investigation works to guage and identify contamination of groundwater. Details in Appendix J.</p>	Borehole	Groundwater Depth (m)	Groundwater Level (RLm)	BH1	11.2	12.0	BH6	12.2	14.8	BH7	11.4	14.0	BH25	14.4	11.4
Borehole	Groundwater Depth (m)	Groundwater Level (RLm)														
BH1	11.2	12.0														
BH6	12.2	14.8														
BH7	11.4	14.0														
BH25	14.4	11.4														

4. IMPLEMENTATION OF THE SUB PLAN

Control Measure	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measurement
Planning and Site Establishment					
Include information in the Site Induction about the risks and potential impacts of stormwater runoff, erosion and sedimentation on the local environment and community.	Prior to works commencing and ongoing	Revise Lendlease standard induction package to include site specific information. Deliver induction material.	CM SM	WMS prepared by subcontractors to address stormwater, erosion and sedimentation	Site induction delivered to all workers on site.
Prepare a stormwater, erosion and sediment Environmental Management Diagram (EMD) showing the location of stormwater inlets, drains, stockpile locations and erosion and sediment control measures.	At site establishment and prior to works commencing	Review Environmental Management Diagram (EMD Appendix 1). Prepare diagram showing details of stormwater infrastructure and controls. Provide controls for all disturbed areas of the site and around/ within existing stormwater infrastructure.	CM SM	EMD reviewed. Diagram prepared prior to works commencing. Diagram updated every 6 weeks.	Diagram prepared containing all relevant details and communicated. Diagram updated to reflect changes in site conditions. Controls implemented in accordance with the EMD.
Limit ground disturbance to the area required for immediate construction.	Areas of clearing identified prior to works commencing	Detail excavation requirements on staging/sequencing program. WMS prepared by subcontractor. Identify and fence off trees/vegetation to be retained. Communicate details.	SM/Foreman/E HS	Review of program. Daily surveillance to assess condition of fencing. Weekly/monthly inspection checklist.	No unnecessary land disturbance. Vegetation protection fencing, and signage maintained.

				Inspection after a rain event.	
Install stormwater, erosion and sediment controls as per the EMD, including maintenance and monitoring existing sedimentation ponds.	Prior to works commencing	Undertake a site inspection to verify the correct location of controls. Install controls in accordance with EMD, design/engineer's documentation.	SM	Daily surveillance to assess effectiveness and condition. Weekly/monthly inspection checklist.	EMD reviewed every 6 weeks. Controls modified, or new controls installed as required.
Establish stable site exit points, parking areas, internal roads and turning areas to prevent the tracking of material off-site onto public roads.	Prior to works commencing. Maintain always	Retain existing hard surfaces where possible. Construct stable site entry/exit points and roadways using appropriate materials. Obtain clearance certificates for any imported (stabilising) material before receiving it on site.	SM Foreman	Daily surveillance and maintenance. Weekly/monthly inspection checklist. Inspection of imported materials.	No tracking onto public roads or dust. Clearance certificates for all imported materials.
Install a vehicle/wheel wash bay or shaker facility at the site exit.	Prior to construction commencing	Assess requirement in IHRA. Maintain shaker grid/wheel wash or employ high pressure drive-thru wash bay for site heavy duty plant. WMS to be prepared by subcontractor including a maintenance program. Engage sweeper. Limited hosing of hard surfaces only.	SM/Foreman	Daily surveillance. Weekly/monthly inspection checklist.	No mud/silt tracked onto roadways.

Provide sediment basins/detention areas/tanks to capture/store site runoff.	Prior to commencing works	Size and construct sediment basins/detention areas to meet authority requirements (i.e. project approval or Blue Book) as required. Operate and maintain in accordance with design/engineering documentation.	CM/SM	Daily surveillance to assess condition and capacity. Weekly/monthly inspection checklist. Inspection during and immediately after rain.	Appropriately designed and maintained detention areas/facilities. No overtopping under design conditions.
Prevention of Cane Toads (<i>Rhinella marina</i>) to sediment basins.	Prior to commencing works	Install exclusion fencing around sediment basins to deter toads in accordance to Section 3.4 of the Stage 2 BMP.	SM/Foreman	Daily surveillance to assess condition and capacity. Weekly/monthly inspection checklist. Inspection during and immediately after rain.	Appropriately installed and maintained during construction
Erosion and Sediment Control During Construction					
Maintain erosion and sediment controls in an operable condition in accordance to Section 7.0 of the Stormwater Management Plan (RBG-CV-RPT-00-002[E]) prepared by RBG and Section 3.2.4.1 of the Stage 2 BMP (Sept 19 issue). This shall include maintenance and monitoring existing sedimentation ponds.	At all times and after rain events	Check the condition of controls. Remove accumulated sediment and debris and dispose. Undertake maintenance as required. Install new controls as new work areas open.	SM/Foreman	Daily surveillance. Weekly/monthly inspection checklist. Post rain inspections. EMD updated.	Silt collected at base of fence. No breach of fence line. Erosion and Sediment controls are well kept with minimal damage.
Maintain stormwater pipes, pits and other controls (eg plugs).	At all times	WMS prepared by subcontractor.	SM/Foreman	Daily surveillance.	Free flowing pipes capable of discharging maximum flows.

		<p>Check the condition and operation of stormwater infrastructure and controls.</p> <p>Remove debris and sediment and dispose.</p> <p>Monitor for blockages.</p>		Weekly/monthly inspection checklist.	
Cover all loads leaving site to minimise the potential for spillage and tracking.	At all times	<p>WMS prepared by subcontractor to address covering of loads and prevention of tracking.</p> <p>Loads and the condition of trucks/tailgates checked by subcontractor before leaving site.</p>	SM/Foreman	<p>Daily surveillance.</p> <p>Weekly/monthly inspection checklist</p>	<p>No uncovered loads</p> <p>No non-conformances identified.</p>
Locate stockpiles away from drainage lines, watercourses, sensitive ecosystems and flood prone areas.	At all times	<p>Stockpile locations identified on EMD diagram.</p> <p>WMS prepared by subcontractor addresses stockpile management.</p>	SM/Foreman	<p>Daily surveillance.</p> <p>Weekly inspection checklist.</p>	<p>No uncontrolled stockpiles.</p> <p>No stockpiled material runoff into the stormwater system.</p>
Cover soil stockpiles and provide bunding and sediment controls around the base.	At all times	<p>WMS prepared by subcontractor to address.</p> <p>Subcontractor to implement as part of soil management and monitoring on site.</p>	SM/Foreman	Weekly/monthly inspection checklist.	<p>Pre-construction check.</p> <p>No release of material.</p> <p>Bunds and sediment controls in working order, no breaches.</p>
Stabilise stockpiles with a soil binder, sealant or sterile cover crop (grass).	Maximum 1 month after stockpile placement (if	Establish appropriately located and sized stockpiles in designated areas only.	SM/Foreman	Weekly/monthly inspection checklist.	No erosion or dust generated from stockpiles.

	the material is remaining on site)	Stabilise in accordance with manufactures specifications and application procedures. Stabilise or cover stockpiles left for >4 weeks.			
Maintain erosion and sediment controls until the potential for erosion and sedimentation has been eliminated.	At all times	Maintain controls in accordance with SESC diagram. Do not remove controls prior to any area being deemed stable.	SM/Foreman/EHS	Weekly/monthly inspection checklist Inspections during rain events.	Controls effective and in good condition. No uncontrolled discharges of sediment off-site or into waterways.
Regular monitoring of weather and news updates to ensure site is adequately managed.	During Construction	Set up alert notification.	SM	Daily review and if necessary notification in daily builder's briefs.	Minimal impacts during adverse meteorological conditions and extraordinary events Inspections of Water ways
Stormwater Detention and Dewatering					
Inspect basins/tanks, detention facilities and stormwater treatment devices and remove any build-up of debris.	Ongoing. Within 24hrs of a rain event	Retain capacity in detention facilities for storm events. Inspect the site within 24hrs of a 1 in 5-year Average Recurrence Interval (ARI) event including sediment basins/detention	SM	Inspection within 24hrs of nominated rain event. Weekly/monthly inspection checklist.	Detention areas and capacity of facilities maintained in operational condition. No uncontrolled discharges under design conditions.

		<p>areas and stormwater treatment devices.</p> <p>WMS to be prepared by sub-contractor to address inspection, testing and dewatering.</p>			
Test, treat and reuse collected stormwater on-site for dust suppression, truck and plant washing (in designated areas only).	Ongoing	<p>WMS prepared by subcontractor to address this option.</p> <p>Undertake water quality testing and treatment of stormwater.</p> <p>Meet required water quality criteria prior to reuse.</p>	CM	<p>Metering and recording of stormwater reused on site.</p> <p>Water quality test results from a NATA accredited laboratory.</p>	<p>Water treatment and dewatering undertaken in accordance with documented site procedure, Section 3.2.4.1 of the Stage 2 BMP, and Workplace Delivery Code.</p> <p>No discharge to exceed authority criteria.</p>
Test, treat and discharge collected stormwater on-site.	Ongoing	<p>WMS prepared by subcontractor to address this option.</p> <p>Disperse water onsite into filtration zones nominated in Appendix M.</p> <p>A permit issued by Lendlease is required to discharge onsite refer to Appendix N</p> <p>Both the procedure and permit have been endorsed by the Civil/Stormwater Consultant, the Water Quality Consultant, the contractor and Client.</p>	SM Subcontractor	<p>Metering and recording of stormwater reused on site.</p>	<p>Water treatment and dewatering undertaken in accordance with documented site procedure, Section 3.2.4.1 of the Stage 2 BMP, and Workplace Delivery Code.</p> <p>No discharge of non-compliant water or off-site pollution.</p>

Test, treat and discharge collected stormwater off-site if it cannot be reused on site.	Ongoing	<p>WMS prepared by subcontractor to address this option.</p> <p>Confirm that water quality testing, treatment and dewatering methods satisfy the requirements of the relevant statutory authority.</p> <p>Undertake water quality testing and treatment of stormwater.</p> <p>As a minimum:</p> <p>No chemical contamination and water quality must comply with any specific requirements of the Statutory Authority criteria.</p> <p>A permit issued by Lendlease is required to discharge to offsite / stormwater system</p> <p>Following a rainfall event with no risk of uncontrolled discharge:</p> <p>Meet specified water quality criteria detailed in Appendix G prior to discharge.</p> <p>Flocking using approved products.</p> <p>Following a rainfall event where there is a risk of an uncontrolled discharge:Flocking using approved products.</p>	SM Sub-contractor	Water quality test results from a NATA accredited laboratory.	<p>Water treatment and dewatering undertaken in accordance with documented site procedure, Section 3.2.4.1 of the Stage 2 BMP, and Workplace Delivery Code.</p> <p>No discharge of non-compliant water or off-site pollution.</p>
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		Water quality must meet the following criteria (Tweed Council D7): pH is between 8.5 and 6.5 Suspended solids are less than 50 mg/L,			
To avoid any potential changes in pH and impacts on threatened aquatic species, other commercially available flocculants that work as effectively as a gypsum replacement yet do not create the large changes in pH will be used on the Site.	When treating the Sediment basins	Contractor responsible for maintenance of basins is to submit product data sheets to Lendlease for approval prior to use.	CM/SM/SE	Regular inspections of product use and monthly water monitoring.	Zero change in pH Reduced impact on aquatic species.
Monitoring the sediment/bio-detention basins for aquatic weeds in particularly salvinia molesta	Weekly	Conduct weekly inspections of the sediment basins for early growth of aquatic weeds. If Salvinia molesta is present, follow directions from section 2.3.2.6 of the Stage 2 BMP for recommended weed removal.	SM/ Foreman	Weekly Inspections	No early signs of aquatic weed presence.
Site Stabilisation					
Implement site stabilisation works and landscaping progressively to rehabilitate disturbed ground.	Progressively during construction	Stabilise and seal disturbed areas in accordance with the design/engineering/landscape plans and scope of works.	CM/SM/EHS	Weekly/monthly inspection checklist Project planning and design meetings.	Stabilisation of all disturbed work areas. No uncontrolled runoff containing sediment or contaminants.

5. ACID SULFATE SOILS

Project Details	
Scope of the Sub Plan	<p>This Acid Sulfate Soil Management Sub Plan provides strategies and control measures to assist in the identification and management of acid sulfate soils (ASS) where they are identified on site during site establishment and/or construction. It also describes measures for the testing, monitoring, treatment and disposal of ASS.</p> <p>Refer to Section 1.1 and 3.1 of the Project EHS Management Plan for clarification on how the EHS Sub Plans for part of the Lendlease Building (LLB) EHS management system.</p>
	<p>It is not expected that Acid Sulfate Soils will be uncovered during works, as there will be no excavation in known risk areas – Refer to Appendix L.</p>
Objectives of the Sub Plan	<ul style="list-style-type: none"> • To avoid or minimise disturbance to acid sulfate soils. • To prevent impacts on aquatic ecosystems and groundwater where acid sulfate soil disturbance is unavoidable. • To ensure that where acid sulfate soils are left in-situ or replaced, the site is suitable for future uses and there are no long-term environmental impacts on the quality of soil or groundwater.
Scope of Works	<p>This Sub Plan has been prepared based on the following scope of works:</p> <ul style="list-style-type: none"> • Site establishment including in-ground works; • Clearing of vegetation; • Excavation and stockpiling of material for reuse; • Installation of in-ground infrastructure services; • Piling. • Site establishment including vegetation removal, topsoil stripping and office and compound setup; • Excavation of site there is an exercise of cut and fill to the main building pad required. From bore log reporting in those areas there is no indication of acid sulphates to that area.

	<ul style="list-style-type: none"> • Piling there will be a series of piling required to support the structure those being bore piles and (CFA) continuous flight auger piles • Dewatering as needed after a wet weather event • Other areas include trenching for services, construction of new drainage lines, diversion of drain/waterway etc
Summary of Site Controls	<p>Works must be undertaken in accordance with the Lendlease GMRs, the Project EHS Plan, this Sub Plan and the Lendlease Building WDC. These documents detail Lendlease's approach and commitment to pro-active and responsible site management.</p> <p>Site specific controls, monitoring, reporting and performance measures have been identified in this Sub Plan to prevent or minimise the impacts of ASS disturbance and handling on the environment and community. Additional controls have been identified in the ASS Management Plan prepared by contamination consultant</p> <p>These include but are not limited to: Accurately identifying the potential for and extent of ASS disturbance associated with construction activities;</p> <ul style="list-style-type: none"> • Providing bunded areas for the storage and treatment of ASS; • Managing acid leachate; • Reusing or disposing of ASS. <p>Requirements for the management of ASS must be included in relevant specifications, contract agreements, quality assurance documents, and subcontractor work method statements.</p> <p>Site inspections, monitoring and reporting will be undertaken by Lendlease and subcontractors as detailed in the EHS Plan and the following implementation table.</p>
Resources and Guidelines	<ul style="list-style-type: none"> - 1998 ASSMAC Guidelines - National Acid Sulfate Soils Guidance - National acid sulfate soils sampling and identification methods manual June 2018

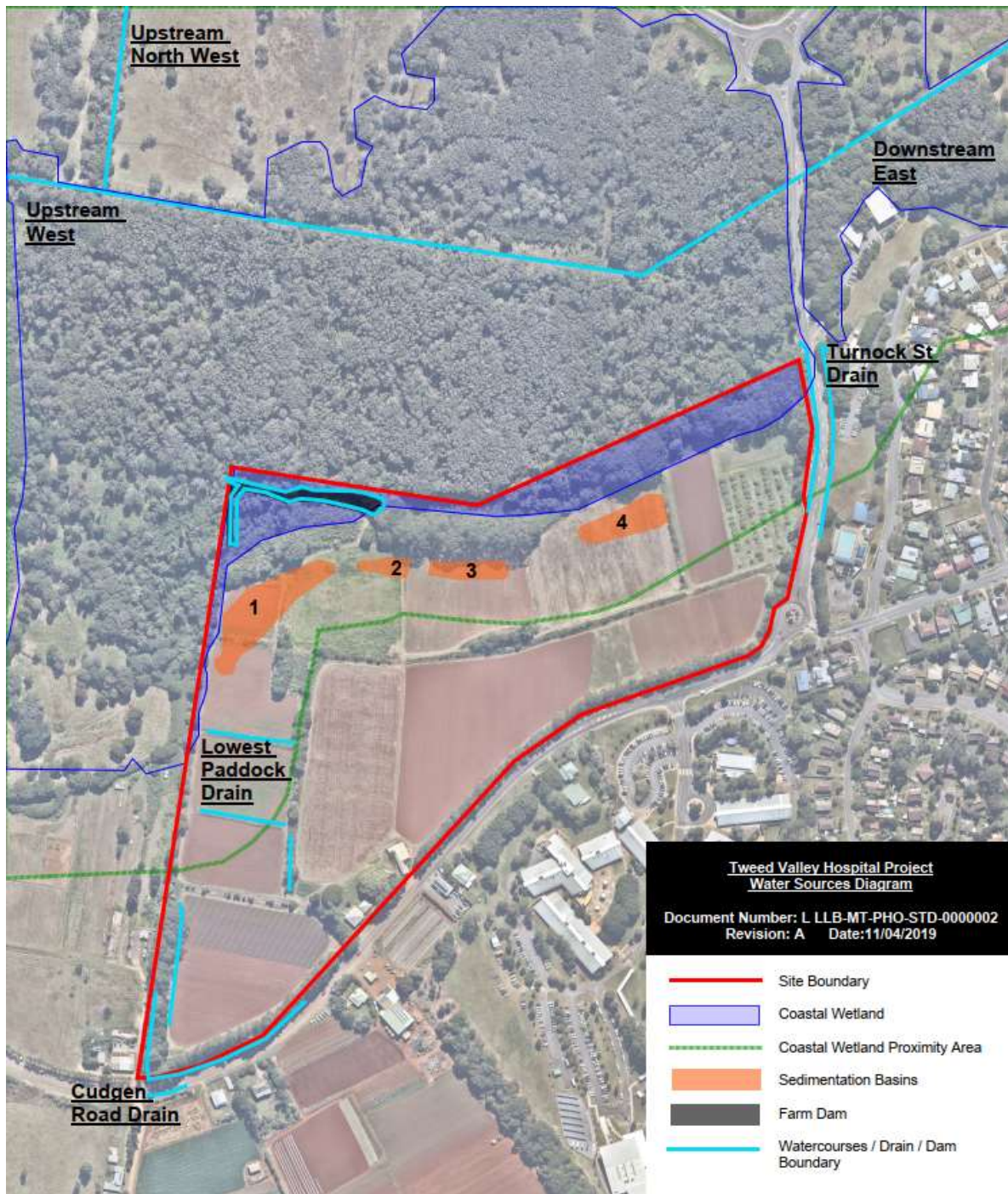
6. IDENTIFICATION OF ACID SUPHATE SOILS

Item	Required Action	Notes
1	<p>Visually inspect material being excavated.</p> 	<p>ASS material may have all or some of the following characteristics:</p> <ul style="list-style-type: none"> • A distinct, sulphurous or tar like smell; • Blue or green material (water is generally very blue/green and clear because sediment has dropped out of it); • Pale yellow staining or mottling within the excavated material; • Water-logged soil; • Soft buttery (often sticky) blue grey or dark greenish grey muds; • Mid to dark grey estuarine silty sands or sands; • Dark grey to black to black bottom sediments of estuaries.
2	<p>If potentially Acid Sulfate Soils are suspected in excavations, piles or material being removed, immediately stop work and contact the Lendlease Environment Manager and a specialist consultant for confirmation of identification.</p>	<p>Nathan Brown Regional EHSQ Manager QLD & NT 0428 343 674</p>
3	<p>Immediately bund any material that has been excavated while testing and confirmation of material classification is undertaken.</p>	<p>Bund must consist of an impervious floor and walls. Blind sump should be provided to capture and allow for the treatment (naturalisation) of acid leachate.</p>
4	<p>Undertake visual assessment and testing to determine if materials are acid sulfate soils.</p>	<p>Testing must be undertaken in accordance with relevant State Government guidelines and by a NATA accredited laboratory.</p>
5	<p>If material is identified as acid sulfate soil, develop and agree specific immediate site actions and prepare a detailed management plan in consultation with the specialist consultant, Client and Lendlease Environment Manager.</p>	<p>Agree on immediate action to deal with ASS detected. Document agreed action and work method statement.</p>

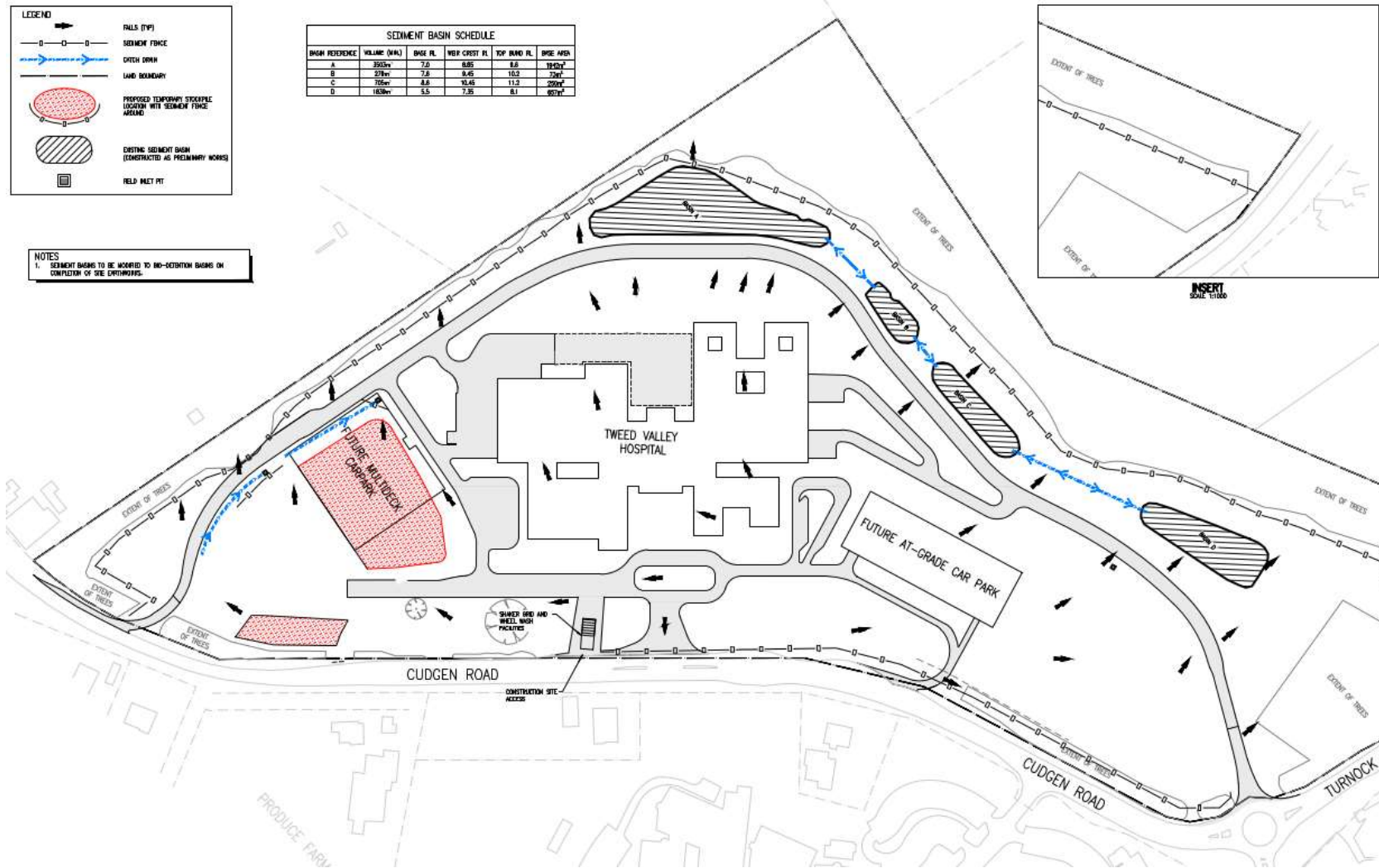
Control Measure	Timing	Methodology	Responsibility	Monitoring and Reporting	Performance Measurement
ASS Management Planning					
Include information in the Site Induction about the risks and potential impacts of ASS disturbance on the environment.	Before works commence and ongoing	Revise induction package to include site specific information.	CM SM	Subcontractor WMSs address ASS management.	Site induction delivered to all workers on site.
Avoid ASS disturbance through design and work method selection.	Design and work planning prior to commencing	Review project design (piling, excavation, footings, services etc) to identify opportunities to: <ul style="list-style-type: none"> • Avoid ground disturbance within ASS areas • Limit disturbance to specific depths and/or • Adopt construction techniques that prevent oxidation. 	CM Design consultant	Design review completed.	Design altered to reduce ASS disturbance. Construction technique altered to prevent oxidation.
Prepare an ASS Environmental Management Diagram (EMD). – Appendix L	Prior to works commencing. Ongoing review.	Prepare EMD (Appendix 2) showing areas of ASS.	CM	Review EMD prior to works commencing. EMD referenced in the planning of the site and new works.	Diagram covers all key areas and site-specific operation.
Limit ground and ASS disturbance as far as practicable.	Prior to works commencing	Identify excavation footprint, service and stormwater locations/depths. Fence off areas to be left undisturbed. Detail excavation requirements on staging program.	CM/SM	Daily surveillance. Weekly/monthly inspection checklist. Review of program.	No over excavation of ASS.

		Incorporate requirements into WMS prepared by relevant subcontractors.			
ASS Handling (Sampling, Tracking and Stockpiling)					
Minimise the need to handle and stockpile excavated materials.	At all times	<p>Pre-test and validate soils to enable direct transport off-site (rather than stockpiling).</p> <p>Load directly into appropriately lined trucks (to prevent spillage/leakage).</p> <p>Cover all loads.</p>	SM/ Foreman	<p>Include requirements in tenders for sub-contractors.</p> <p>Daily surveillance of activities.</p> <p>Vehicle inspection at gate prior to entering and leaving the site.</p>	<p>Oxidation prevented where possible.</p> <p>ASS separated out.</p> <p>No loss of material.</p> <p>Controls maintained and effective.</p> <p>Leachate neutralised under controlled conditions.</p>
Avoid excavation and handling during periods of extreme wet weather.	At all times.	<p>Only enter areas that need to be worked.</p> <p>Maintain site access controls and clean roadways.</p> <p>Stop work until conditions are more favourable.</p>	SM	<p>Constant surveillance during unfavourable conditions.</p> <p>Monitor meteorological reports.</p>	<p>No works performed during high rainfall events.</p> <p>No complaints.</p>

APPENDIX A: WATER SOURCES DIAGRAM



APPENDIX B: SEDIMENT AND EROSION PLAN



APPENDIX C: NOT USED

APPENDIX D: APPROVED FLOCCULANT – SDS TURBICLEAR

SDS Turbiclear™



SAFETY DATA SHEET - Turbiclear™



ABN: 49 158 485 039

PO Box 199 | Peregrin Beach QLD 4573
Unit 7, 8 Grebe St | Peregrin Beach QLD 4573

t 07 5471 2290 | f 07 5302 6680
e info@turbid.com.au | w turbid.com.au

1. IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Name: **Turbiclear**
Chemical Name: **Aluminium chlorohydrate, ACH (83-85% basic)**
Supplier: **TURBID PTY LTD**

Emergency Contact Information

Telephone: (07) 5471 2290
Fax: (07) 5302 6680
Email: info@turbid.com.au
Address: 7/8 Grebe St, Peregrin Beach QLD 4573
Poisons Information Centre: Phone 13 11 26 from anywhere in Australia

2. HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

Classified as: NOT HAZARDOUS according to the criteria of Safe Work Australia
Classified as: NON-DANGEROUS GOODS by the criteria of Australian Dangerous Goods Code (ADG Code) for transport by road and rail.
Risk phrases: Not Hazardous – No criteria found
Safety phrases: S23: Do not breathe mist, S25 Avoid contact with eyes, S36 Wear suitable protective clothing
ADG Classification: None allocated. Not a Dangerous Good according to Australian Dangerous Goods (ADG) Code, IATA or IMDG/IMSBC criteria.
UN Number: None allocated
None allocated: NONE. Not hazardous.

HAZARD STATEMENT: H335: May cause respiratory irritation.

PREVENTION
P102: Keep out of reach of children.
P262: Do not get in eyes, on skin, or on clothing.
P281: Use personal protective equipment as required.

RESPONSE
P362: Take off contaminated clothing and wash before reuse.
P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P302+P352: IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P332+P313: If skin irritation occurs: Get medical advice.
P337+P313: If eye irritation persists: Get medical advice.

RESPONSE (cont)	P370+P378: Not combustible. Use extinguishing media suited to burning materials
STORAGE	P403+P233: Store in a well-ventilated place. Keep container tightly closed.
DISPOSAL	P501: If they can not be recycled, dispose of contents to an approved waste disposal plant and containers to landfill (see Section 13 of this SDS).

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Reference in AICS: YES

Name	CAS Number	Proportion	TWA (mg/m ³)	STEL (mg/m ³)
Aluminium chlorohydrate ACH	1327-41-9	40 to 60 %	2	Not set
Water	7732-18-5	To 100%	Not set	Not set

This is a commercial product whose exact ratio of components may vary slightly. Minor quantities of other non hazardous ingredients are also possible.

The SWA TWA exposure value is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. The STEL (Short Term Exposure Limit) is an exposure value that may be equalled (but should not be exceeded) for no longer than 15 minutes and should not be repeated more than 4 times per day. There should be at least 60 minutes between successive exposures at the STEL. The term "peak" is used when the TWA limit, because of the rapid action of the substance, should never be exceeded, even briefly.

4. FIRST AID MEASURES

Eye contact:	Flush with water for 15 minutes. Seek medical attention.
Skin contact:	Irritation unlikely, However if irritation does occur, flush with lukewarm, gently flowing water for 5 minutes
Inhalation:	Remove from source of mist, allow patient to stabilize breathing in fresh air. If symptoms persist seek medical attention.
Ingestion:	Rinse mouth with water. Do not induce vomiting. If in doubt seek medical advice.

5. FIRE FIGHTING MEASURES

Extinguishing media:	Compatible with water, foam, CO2 and dry chemical. Fires can be attacked with extinguishers to suit local flammable/combustible materials
Flash point (°C):	Material is non-flammable and non-combustible.
Auto ignition point (°C):	Not applicable.
Explosion Limits In Air (% by volume):	Not applicable.
Special Procedures:	None.
Unusual hazards:	None known.
Conditions to avoid:	None known.
Materials to avoid:	May emit some chlorine gas when in contact with very strong oxidizing agents; some heat liberated when in contact with strong acids.
Decomposition products:	Severe overheating may produce hydrogen chloride gas and aluminium oxide once water has been driven off.
Hazardous polymerization	Will not occur.

6. ACCIDENTAL RELEASE MEASURES	
General Response:	Personnel involved in the clean-up should wear appropriate protective clothing as listed in section 2. Slippery when spilt.
Clean Up Procedure:	Spillage into waterways will result in some lowering of the pH and the formation of aluminium hydroxide, which has a very low toxicity. Prevent drain or sewer contamination with absorbent such as sand or sawdust etc. Collect for disposal.
7. HANDLING & STORAGE	
Handling:	Observe good personal hygiene practices and recommended procedures. Wash thoroughly with soap and water after handling.
Storage:	Do not store in metal containers other than stainless steel. When storing in stainless steel, Store in a cool, dry, well-ventilated area.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION	
National Exposure Standards	None Established
Engineering Controls:	Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations
Personal Protective Equipment:	None required
Respiratory Protection:	General exhaust ventilation should be adequate.
Eye Protection:	Safety Glasses
Skin and body protection:	Disposable latex gloves, overalls or apron as appropriate. Rubber boots can be used in wet conditions but mainly as protection from the water
9. PHYSICAL AND CHEMICAL PROPERTIES	
Appearance:	Clear to slightly hazy aqueous solution
Odour:	None
Boiling point (°C):	100-110°C
Melting point (°C):	Not available
Specific Gravity (H ₂ O = 1):	1.36 - 1.39 at 25°C
pH	3.0 – 3.5 at 25°C
Vapour pressure (kPa):	Not applicable
Relative vapour density:	Not applicable
Volatile by weight (%):	Roughly 50 (prolonged drying leads to product change)
Solubility in water:	Completely miscible
Evaporation rate:	Not applicable
10. STABILITY AND REACTIVITY	
Chemical Stability	Stable
Conditions to avoid:	Oxidizing agents may cause exothermic reactions. Keep containers tightly closed
Decomposition products:	Severe overheating may produce hydrogen chloride gas and aluminium oxide once water has been driven off.
Hazardous polymerization:	Will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:	
Oral:	LD50/oral/rat > 3311 mg/Kg
Inhalation:	Product is not volatile
Irritation:	
Skin:	Mild skin irritant. May cause skin irritation with prolonged contact
Eyes:	Irritation and redness.
Chronic Toxicity:	
No chronic effects	
Threshold limit value:	2 mg/m ³ based on Al (roughly 0.25 mg/m ³ based on actual product (Ref.: ACGIH, soluble Aluminium salts)
Target organs:	There is no data to hand indicating any particular target organs.

12. ECOLOGICAL INFORMATION**Environmental fate and distribution:**

Aluminium compounds are common in most soils and are the principle components of Bauxite and Gibbsite, which are common, naturally occurring minerals. When diluted by copious quantities of water (for example, to the point that the concentration is less than about 100 grams per cubic meter), this product will hydrolyze rapidly to form aluminium hydroxide, which can be expected to become a part of the natural soil profile if not recovered. Turbiclear should be stored in a location that if a leakage occurs the product will not lead directly to a natural water way to minimise any potential risk.

Ecotoxicity:Direct Toxicity Assessment

Whole of Effluent Ecotoxicity Testing undertaken on construction site water treated with Turbiclear in 2017 indicated no effect to either the Australian freshwater flea or Eastern Rainbowfish at full concentration.

For the 48-hr acute toxicity test using the freshwater cladoceran *Ceriodaphnia dubia* the EC50 = >100% (at 100% concentration, no affect was observed).

For the 96-hr fish imbalance toxicity test using the eastern rainbowfish *Melanotaenia splendida splendida* the EC50 = >100% (at 100% concentration, no affect was observed).

Effective Concentration Method Assessment

Aquatic toxicity carried out by others on Aluminium Chlorohydrate solution indicated that:

For the 48-hr acute toxicity test using the freshwater flea *Daphnia magna* the LC50 = 397mg/L

For the 96-hr acute toxicity test using the freshwater fish *Pimelphales promelas* the LC50 = 832mg/L

Bioaccumulative Potential:

Does not bio accumulate.

13. DISPOSAL CONSIDERATIONS

Waste disposal method:

Refer to local waste disposal authority. This product can be neutralized with alkali to form a mixture of aluminium hydroxide and the chloride salt of the alkali. The resulting mixture is non-hazardous provided the resulting pH is between roughly 5 and 10.

14. TRANSPORT INFORMATION

This product does not carry a Dangerous Goods classification as corrosion tests have verified that it is not corrosive to either skin or to metals.

15. REGULATORY INFORMATION

This product is to be found in the public AICS database.

16. OTHER INFORMATION

This SDS was prepared in accordance with the Code of Practice for the Preparation of Safety Data Sheets for Hazardous Chemicals.

Acronyms:

ADG Code Australian Code for the Transport of Dangerous Goods by Road and Rail (7th edition)
 AICS Australian Inventory of Chemical Substances
 SWA Safe Work Australia, formerly ASCC and NOHSC
 CAS Number Chemical Abstracts Service Registry Number
 Hazchem code Emergency action code of numbers and letters that provide information to emergency services especially firefighters
 IARC International Agency for Research on Cancer
 NOS Not otherwise specified
 NTP National Toxicology Program (USA)
 R-Phase Risk Phrase
 SUSMP Standard for the Uniform Scheduling of Medicines & Poisons
 Un Number United Nations Number

References cited:

1. American Conference of Governmental Industrial Hygienists (ACGIH), Documentation of the Threshold Limit Values and Biological Exposure Indices, 6th Edition, ACGIH, Cincinnati, Ohio, 1991.
2. Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995)]
3. Registry of Toxic Effects of Chemical Substances (RTECS)
4. Sax's, Dangerous Properties of Industrial Materials, Edition 8, Ed. RJ Lewis Sr., van Nostrand Reinhold.

Revision 12: Issued 16/01/2019

This SDS summarizes to our best knowledge of health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this SDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products. Please contact the company if any further information is required.



TURBICLEAR™

SEDIMENT BASIN COAGULANT

Turbiclear™ is a high quality, environmentally friendly, rapid acting coagulant for application to sediment basins. Turbiclear™ is an Aluminium Chlorohydrate-based product, manufactured to drinking water specifications with no cost penalty, i.e. very low impurities and it does not add heavy metals into treated water like some coagulants which are very low quality and contain heavy metals. Some key advantages are:

- Concentrated and 2 to 3 times more effective than other coagulant agents. Lower dosing required
- Easy to apply liquid - no dust like gypsum
- Can be automatically dosed using the Turbid's range of treatment systems
- Excellent treated water clarity
- Settles quickly
- Works over a wide pH range (6-9) without needing correction
- Reduced alkalinity consumption compared to other agents, therefore, very little pH drop
- Significantly lower aluminium residuals than other agents in the treated water
- Very low levels of trace elements
- Forms inert sludge, re-useable on site
- Non Dangerous Good- not corrosive to skin
- Contains no sulfates
- Available in 200L drums or 1000 IBC tanks

Turbiclear™ is 100% Australian made from Australian products, and represents the best in the industry for producing highly effective treatment while maintaining environmentally friendly attributes. Aluminium compounds are common in most soils and are the principal components of Bauxite and Gibbsite, which are common, naturally occurring minerals. When diluted by copious quantities of water, this product will hydrolyse rapidly to form aluminium hydroxide, which can be expected to become a part of the natural soil profile if not recovered. Get in touch with Turbid today to purchase this product.



ENVIRONMENTALLY FRIENDLY STORMWATER TREATMENT

07 5471 2290 | info@turbid.com.au | turbid.com.au

APPENDIX F: WATER MONITORING LOCATIONS AND SAMPLING

Routine

- Routine monitoring is to be performed monthly, prior to a controlled release and after significant events (i.e. in the event of an uncontrolled release from one or more of the existing sediment basins).
- Duration of 12 months
- Assume 4 controlled events
- Assume 4 uncontrolled events

Location

Monthly Routine Sampling

- **Upstream Creek (West)**
 - o Upstream of the wetland stream/drain to the west, along Tweed Coast Rd (background quality).
- **Variable Creek (North-West)**
 - o Water flowing through the wetland stream/drain from the river and urban catchment.
- **Downstream Creek (East)**
 - o Upstream of the wetland stream/drain, to the east along Turnock street (background quality).
- **Dam**
 - o Catchment for on Site/off Site drains, water diverted from wetland.
- **Dam Drain**
 - o To assess water entering the dam - upstream/paddock run off.

Controlled Event Sampling (Discharge Basins)

- **Discharge Point of Sediment Basin 1**
- **Discharge Point of Sediment Basin 2**
- **Discharge Point of Sediment Basin 3**
- **Discharge Point of Sediment Basin 4**

Uncontrolled Event Based Sampling

The 9 locations listed above, as well as:

- **Cudgen Road Drain**
 - o To assess stormwater runoff entering the Site (upstream, background quality).
- **Lowest Paddock Drain**
 - o To assess runoff from the site.
- **Turnock St Drain**
 - o Assess upstream water entering the wetland.

Sampling

A summary of the proposed sampling analytes is provided below:

Field

- pH
- Turbidity
- Electrical Conductivity (EC)
- Dissolved Oxygen (DO)
- Temperature
- Oxidation Reduction Potential (ORP)
- Oil and grease

Laboratory

- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Major Cations & Hardness
- Ammonia
- Chlorophyll-a
- Filterable Reactive Phosphorus
- Nitrate
- Oxides of Nitrogen
- Total Nitrogen
- Total Phosphorus
- Aluminium (pH > 6.5) filtered
- Arsenic (filtered)
- Boron (filtered)
- Cadmium (filtered)
- Chromium (filtered)
- Copper (filtered)
- Cobalt (filtered)
- Lead (filtered)
- Manganese (filtered)
- Mercury (filtered)

- Nickel (filtered)
- Selenium (filtered)
- Silver (filtered)
- Zinc (filtered)
- Benzene
- Toluene
- Ethylbenzene
- Xylene - Total
- Naphthalene
- Total Recoverable Hydrocarbons (TRH)
- Organochlorine Pesticides (OCP)
 - 4,4'-DDE
 - 4,4'-DDT
 - Aldrin
 - g-BHC (Lindane)
 - Chlordane
 - Dieldrin
 - Endosulfan
 - Endrin
 - Heptachlor
 - Toxaphene
- Organophosphorus Pesticides (OPP)
 - Azinphos-methyl
 - Chlorpyrifos
 - Demeton-S
 - Diazinon
 - Dimethoate
 - Fenitrothion
 - Malathion

If a sample returns detectable concentrations of the analytes presented in Table 1, additional analyses may be required to enable comparison against additional trigger criteria or trace potential sources of contaminants. It is cost prohibitive to analyse these parameters unless required.

Table 1 Additional Analysis Requirements

Analyte	Additional Analysis
Total Recoverable Hydrocarbons	TRH Silica-gel Clean-up
Arsenic (filtered)	Arsenic (III) (filtered) Arsenic (V) (filtered)
Chromium (filtered)	Chromium (CrVI) (filtered)

APPENDIX G: WATER MONITORING SAMPLING PARAMETERS

		Water Quality Objectives (WQOs)	
Analyte	Units	Fresh Water	Estuary
pH		6.5-8.5	7.0-8.5
Turbidity	NTU	6.0-50	0.5-10
Electrical Conductivity (EC)	µS/cm	125-2,200	125-2,200
Dissolved Oxygen (DO)	% Saturation	85-110	80-110
Temperature	°C	N/A	N/A
Oxidation Reduction Potential (ORP)		N/A	N/A

		Water Quality Objectives (WQOs)	
Analyte	Unit	Fresh Water	Estuary
Ammonia	mg/L	0.02	0.015
Chlorophyll-a	µg/L	5	4
Filterable Reactive Phosphorus (FRP)	µg/L	0.02	0.005
Oxides of Nitrogen(NOx)	µg/L	0.04	0.015
Total Nitrogen (TN)	µg/L	0.35	0.30
Total Phosphorus (TP)	µg/L	0.025	0.030
Aluminium	µg/L	55	N/A
Cobalt	µg/L	N/A	1.0
Copper	µg/L	1.4	1.3
Lead	µg/L	3.4	4.4
Zinc	µg/L	8.0	15

APPENDIX H: VOLUME OF PRELIMINARY WORKS SEDIMENTATION BASIN

Windley, Monique

From: Colin Rope <colin.rope@robertbird.com.au>
Sent: Tuesday, 21 May 2019 11:02 AM
To: Sue Folliott
Cc: Hughes, Lee; Windley, Monique; simon waterworth; Emily Windle
Subject: [EXT]:RE: Sed basin calc
Attachments: RBG-CV-REF-RIE-0000003 SURVEY.dwg

Hi Sue,

We have used the as-built survey of the sediment basins to determine the capacity of each up to the existing overflow spillway and the full capacity to the top of the basin walls (ie. if the spillway was to be filled in). Basin A is the western basin, then B, C and D going east. The below figures have been calculated using 12 software for detailed analysis.

I have also attached the survey file in case anyone should wish to carry out their own independent check to verify these figures.

Basin	To spillway level	To top of basin wall
A	4,630 m3	6,898 m3
B	379 m3	689 m3
C	993 m3	1,490 m3
D	2,009 m3	3,050 m3

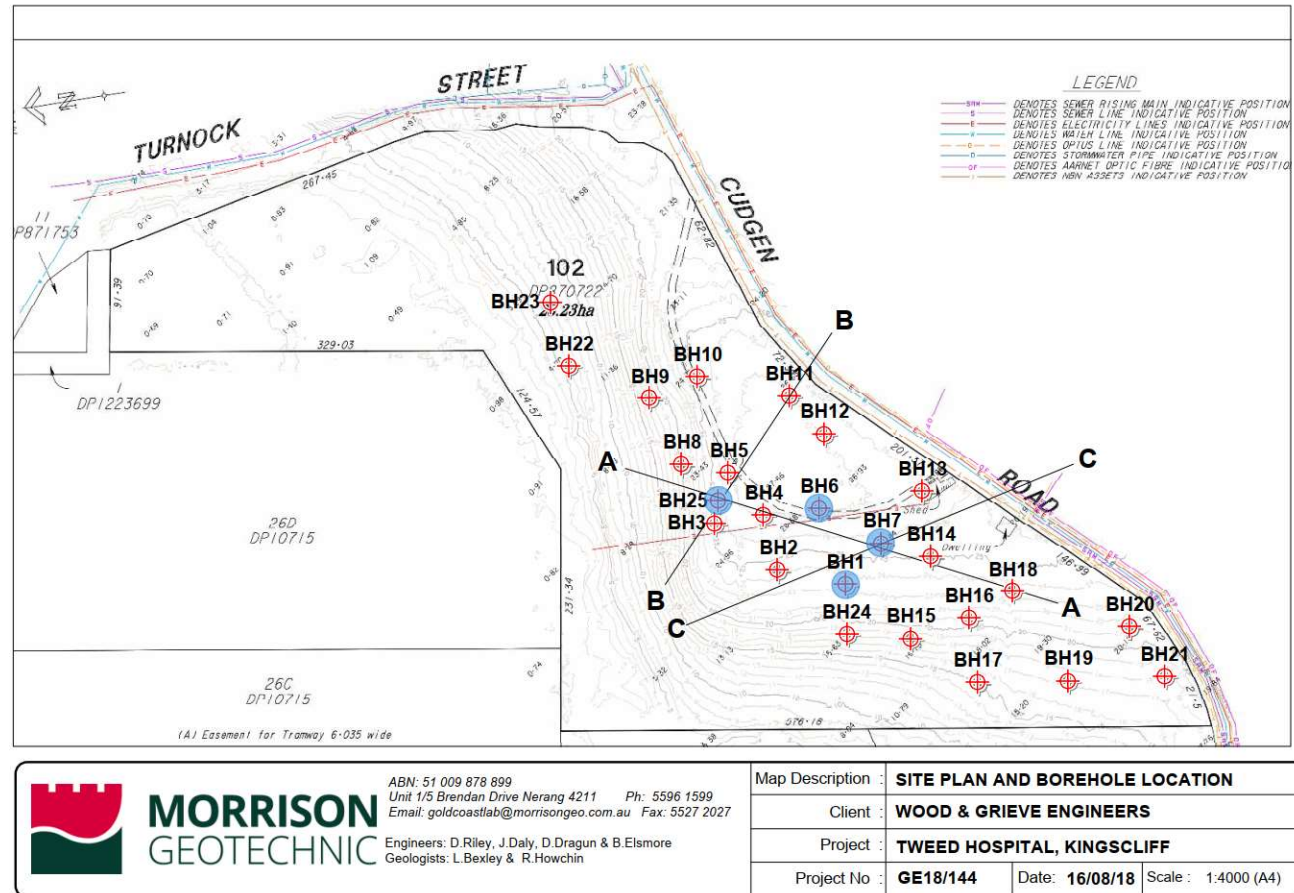
Regards,

Colin

Colin Rope
Senior Associate

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Sydney, NSW 2000, Australia
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APPENDIX I: LOCATION OF GEOTECHNICAL BOREHOLES – GROUNDWATER ENCOUNTERED

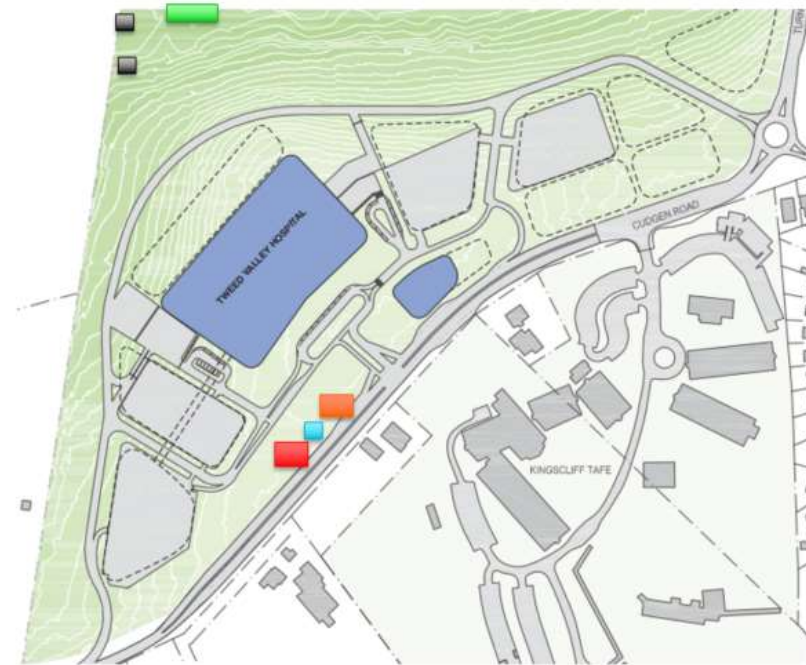


APPENDIX J: PROPOSED GROUNDWATER MONITORING WELLS

Area of Concern Proposed Groundwater Scope

<u>Cattle Dip</u>	3 No. Monitoring wells installed to ~ 15m
<u>Farm Shed</u>	1 No. Monitoring Well, installed to ~ 15m
<u>Rubbish Deposit</u>	1 No. Monitoring Well, installed to 10m.
<u>Farm Dam</u>	1 No. Monitoring Well, installed to 10m.
<u>Farm House</u>	Nil

■ Farm dam
 ■ Farm rubbish deposit
 ■ Farm shed
 ■ Cattle Dip
 ■ Farm House



APPENDIX K: WATER CONSULTANT PEER REVIEW – EVIDENCE OF CONSULTATION



Wednesday 2nd September 2020

To: Geoffrey Lobdell
Site Engineer, LendLease
Tweed Valley Hospital Project – Stage 2

Dear Geoffrey,

A division of
Ecotechnology
Australia Pty Ltd
ABN 82 106 758 123

13 Ewing Street
Lismore NSW 2480
Phone: 02 66 215 123
Fax: 02 66 218 123
info@ecoteam.com.au
www.ecoteam.com.au

- Operation and maintenance of village and resort-scale water supply & sewerage systems
- Design and construction of wastewater treatment wetlands
- contaminated land assessment and remediation
- environmental consultancy, scientific research projects, agricultural assessment
- Partnerships with Aboriginal communities

**Re: Review of Tweed Valley Hospital – Stage 2
Construction Soil and Water Management Plan (CSWMSP)
Rev 3.3 (Dated 11/8/2020)**

Thank you for the opportunity to review the Construction Soil and Water Quality Management Plan for Stage 2 of the Tweed Valley Hospital Project.

Ecoteam reviewed the Plan in detail and provided feedback to LendLease Building. It is our opinion that the plan will be effective at managing soil and water at the site.

We are happy to provide further information if required.

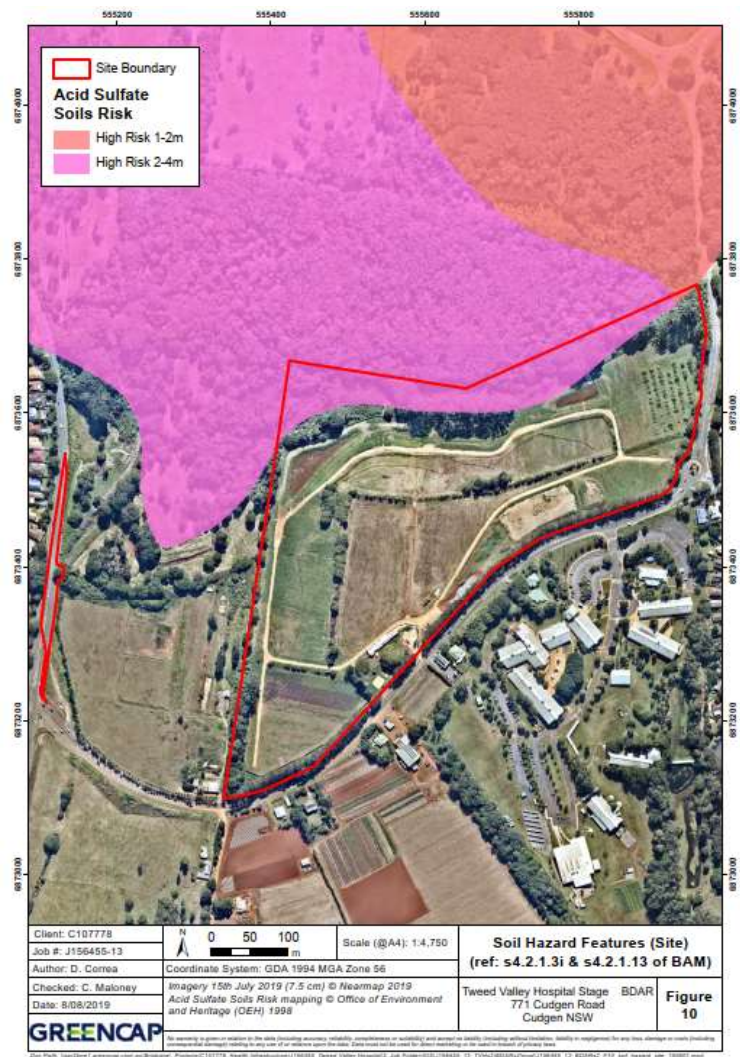
Kind regards,



Lise Bolton
Environmental Engineer and Director
lise@ecoteam.com.au

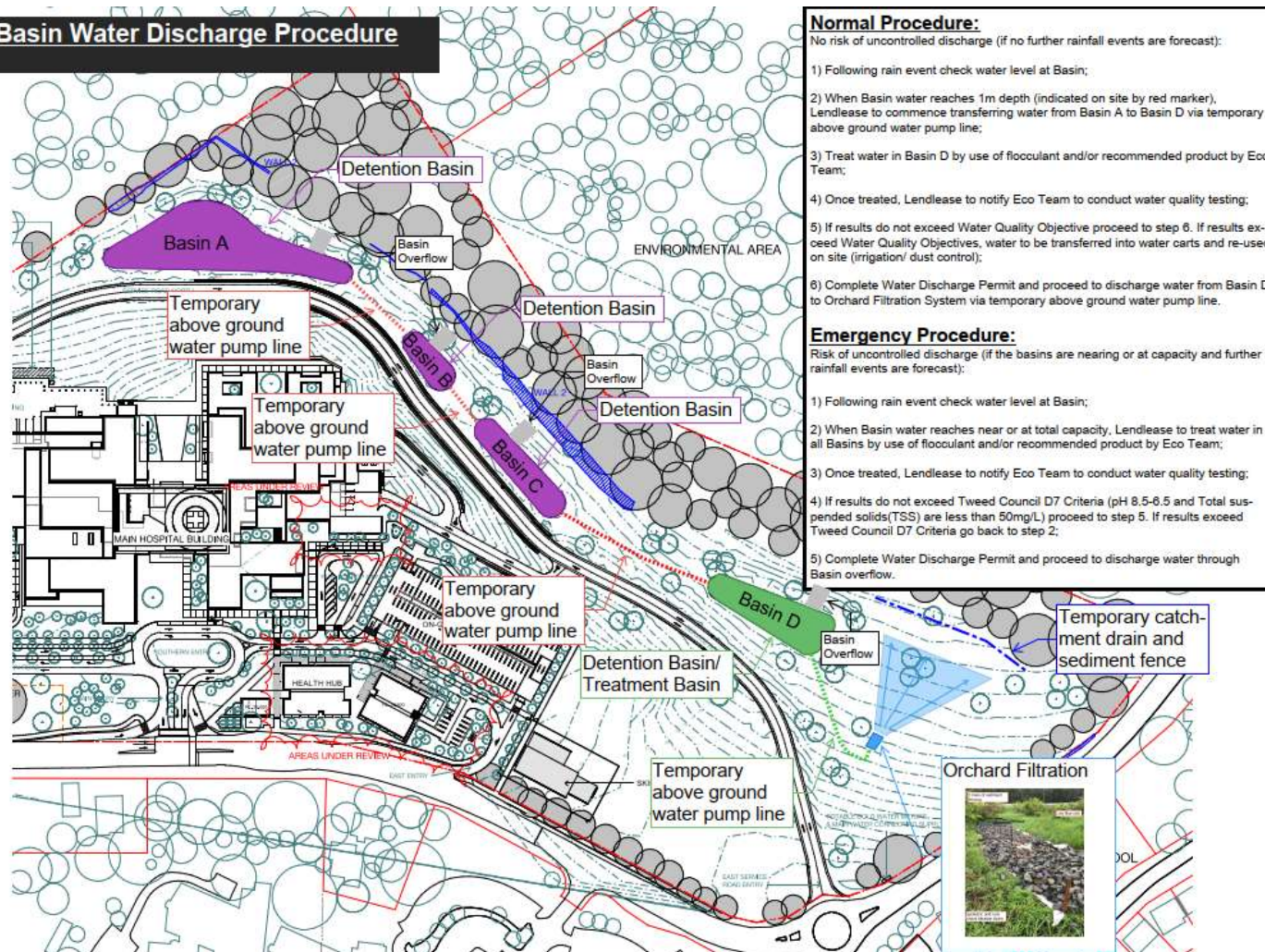
mob: 0428-215-124
office: (02) 66-215-123
fax: (02) 66-218-123
ABN: 82 106 758 123

APPENDIX L: ACID SULFATE SOIL RISK MAP



APPENDIX M: SEDIMENTATION BASIN – WATER DISCHARGE PROCEDURE

TVH Basin Water Discharge Procedure Rev 4



APPENDIX N: SEDIMENTATION BASIN – WATER DISCHARGE PERMIT

DISCHARGING OR DEWATERING PERMIT Permit to be Displayed at Work Areas (SWMS to be attached) Tweed Valley Hospital - Early Works		Section A Required Permit Number: _____			
THE DETAILS OF THIS PERMIT ARE TO BE IMPLEMENTED, CHECKED AND COMPLETED BY THE RESPONSIBLE LENDLEASE AND SUBCONTRACTOR SUPERVISOR BEFORE WORK PROCEEDS.					
1. Permit Details:					
Date of Permit Application:		Subcontractor:			
Subcontractor Supervisor:		Work Telephone Number:			
2. Dewatering Details:					
Basin Number:		Volume of water in Basin:			
Date of Testing:		Weather Conditions:			
Date of Last Rainfall:		Condition of 2 inch Mining Pump:			
3. Water Quality Results					
Parameter	Discharge Criteria	First Test		Second Test	
		First Reading	Acceptable (Y/N)	Second Reading	Acceptable (Y/N)
NORMAL DISCHARGE - NO RISK OF UNCONTROLLED DISCHARGE:					
pH	6.5 - 8.5				
Turbidity (NTU)	6.0 - 50				
Electrical Conductivity - EC (uS/cm)	125 - 2,200				
Dissolved Oxygen - DO (% Saturation)	85 - 110				
Ammonia (mg/L)	0.02				
Chlorophyll-a (mg/m ³)	5				
Filtrable Reactive Phosphorus (mg/L)	0.02				
Oxides of Nitrogen - NOx (mg/L)	0.04				
Total Nitrogen - TN (mg/L)	0.35				
Total Phosphorus - TP (mg/L)	0.025				
Aluminium (mg/L)	55				
Cobalt (mg/L)	N/A				
Copper (mg/L)	1.4				
Lead (mg/L)	0.4				
Zinc (mg/L)	5				
EMERGENCY DISCHARGE - RISK OF UNCONTROLLED DISCHARGE:					
Oil and Grease	Not visible				
pH	6.5 - 8.5				
TSS	<50mg/L				
Turbidity	TSS correlation				
4. Action (Please Tick)					
Discharge from Basin into Orchard Filtration (Must be undertaken in Fine Weather)					
Discharge from Site into Water Cart and discharge on site					
Discharge from Basin into Overflow					
Other (provide description): _____					
5. Release Details:					
Date water is released:					
Name of the person supervising the pump:					
Is maintenance to the basin required (e.g. desludging, spill, seal):					
Name of person Approving discharge:					
Signature of person Approving discharge: _____					
6. Attachments (Please Tick)					
Water Quality Initial Test Results					
Water Quality Secondary Test Results (If Applicable)					
Other (provide description): _____					

