Environmental Management Plan

Prepared for

Tweed Coast Road – Cudgen Road Intersection

Contract No: HI21712

DOCUMENT CONTROL & DISTRIBUTION

REVISION REGISTER

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Position	Name	Organisation
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Contents

1 Introduction

1.1 Purpose and Application

The Environmental Management Plan (EMP) should be read in conjunction with the Integrated Construction Management Plan which outlines the overall project requirements and contractual obligations. The EMP addresses the environmental aspects and potential impacts for the construction of the Tweed Coast Road – Cudgen Road Intersection Project. Management actions outlined in this EMP apply to all works under the Contract, including temporary works, ancillary activities, stockpile sites and activities such as sourcing water. This EMP has been guided by the following documents associated with the project:

- Review of Environmental Factors (TSC, 2021);
- Vegetation Constraints Assessment (GeoLINK, 2020);
- Fauna Constraints Assessment (TSC, 2020);
- Hazardous Material Investigation (JBS&G, 2021);
- Notice of Determination No. DWY21/0253 (TSC, 2022);
- Development Consent Conditions No. SSD-10353; and
- Managing Urban Stormwater: Soils and Construction Vol 1, 4th edition (Landcom, 2004).

The EMP incorporates Hazell Bros' policies and undertakes to ensure implementation of the requirements of the Integrated Management System (HBway/ProMapp) at a project site level. The plan also identifies the key client and project requirements and addresses the environmental risks and hazards associated with the delivery of the project. This plan is compliant with the AS/ISO 14001:2004, MRTS51 and MRTS52. The overall objective of this plan is to:

- Describe the system that will be put in place to identify and manage the Environmental aspects of the works;
- Outline incident reporting and investigation requirements;
- Outline risk management strategies; and
- Outline the project's communication and consultation requirements.

The Project Manager is responsible for the administration of the EMP and maintains overall responsibility for the project environmental control systems and processes.

1.2 Site Location

The Project is located at the junction of Tweed Coast Road and Cudgen Road in Cudgen, NSW.

Figure 1-1 Site locality.

1.3 Scope

The general scope of works includes the following:

- Clearing and grubbing;
- Earthworks;
- Stormwater drainage;
- Sewer rising main;
- Road formation works;
- Footpath construction;
- Installation of road furniture; and
- Landscaping.

2 Environmental Planning

2.1 Key Environmental Issues and Risks

The project's key environmental issues and potential impacts are detailed in **Table 2-1**.

Table 2-1 Key environmental aspects and associated potential impacts and risks

Environmental Aspect	Potential impacts and risks
Air Quality	• Excess generation of dust and reduced air quality in surrounding environment.
Noise and Vibration	• Excessive noise and vibration from construction activities.

Environmental Aspect	Potential impacts and risks
	• Potential damage to nearby properties, recreational areas or businesses.
Surface Water	• Potential for pollution of surface water (sedimentation or chemical pollutants from spills). • Harm to aquatic ecosystems.
Groundwater	• Pollution of groundwater from uncontained spills.
Cultural Heritage	• Damage to cultural heritage items
Flora and Fauna	• Damage or harm to fauna during clearing operations. • Damage or harm to retained native vegetation and riparian zone. • Clearing of vegetation outside clearing limits.
Weeds and Pathogens	• Introduction or spread of weeds from imported materials, plant and vehicles. • Spread of existing weed species.
Waste	• Litter and uncontained waste leading to pollution of surrounding environment.
Hazardous Materials	• Potential for contamination of surrounding environment from improper storage or management of hazardous materials and fuels.
Contaminated Land	• Exposure of contaminated soils leading to pollution of nearby surface water or soils.

2.2 Objectives and Targets

Hazell Bros primary objective in the delivery of this project is to provide appropriate resources, management systems and support to ensure the project is delivered in accordance with project requirements, program, environmental, risk management requirements and budgets. The targets of the EMP are shown in **Table 3-1** below.

Table 2-2 Environmental objectives and targets.

Environmental Issues	Objectives & Targets
Noise & vibration management	• Compliance with noise and vibration requirements. • Target zero non-conformances.
Dust management	• No dust to leave the work area above and beyond the natural surrounds. • Target zero non-conformances.
Surface water and stormwater runoff	• No sediment laden runoff to leave site. • No impacts to surface water quality and nearby waterways.

Environmental Issues	Objectives & Targets
	• No water quality monitoring results outside of accepted criteria.
Biosecurity	• No introduction or spread of weeds and pathogens.
Hydrocarbon/chemical spills	• Spill Kits available onsite always. • Refuelling away from waterways and wetlands. • Target zero spills.
Flora & fauna	• No fauna injuries or mortalities. • No damage to vegetation outside of limits.
Erosion and Sediment control	• No offsite impacts from sedimentation. • Minor non-conformances not repeated.
Aboriginal Cultural heritage	• Compliance with Aboriginal Cultural Heritage management actions. • No non-conformances.
Waste management	• Compliance waste management requirements. • Minor non-conformances not repeated.
Environmental hazard reporting	• Reporting in line with HB incident reporting procedure and EMP

2.3 Environment Policy

Hazell Bros Group is committed to undertaking our business in a manner that provides for the protection of the environment through the integration of environmental programs in all aspects and areas of our operations.

We will achieve this by:

- Maintaining an environmental management system that conforms with ISO 14001:2015 (certification number 20320) is appropriate to the purpose and context of our business.
- Establishing environmental objectives and targets aimed at minimising the risk of environmental harm.
- Taking all practical steps to protect the natural environment and prevent pollution.
- Developing strategies to encourage the sustainable use of resources, climate change mitigation and adaptation and the protection of biodiversity and ecosystems.
- Complying with all legal and other environmental compliance obligations.
- Continually improving the environmental management system to enhance our environmental performance.

A copy of Hazell Bros' Environmental Policy is attached at **Appendix D**.

3 Legal and Other Requirements

3.1 Environmental Legislation and Policies

The key legal and environmental requirements to be complied with during the project are:

- Environment Protection & Biodiversity Conservation Act 1999
- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- Biodiversity Conservation Act 2016
- Biosecurity Act 2015
- Heritage Act 1977
- National Parks and Wildlife Act 1974
- Protection of the Environment Operations Act 1997
- Protection of the Environment Operations (General) Regulation 2009
- National Environment Protection (Ambient Air Quality) Measure
- National Greenhouse and Energy Reporting Act 2007
- Contaminated Land Management Act 1997
- Environmentally Hazardous Chemicals Act 1985
- Fisheries Management Act 1994
- Local Government Act 1993
- State Environmental Planning Policy (SEPP) Coastal Management
- Water Management Act 2000
- Waste Avoidance and Resource Recovery Act 2001)

Access to relevant legislation, codes of practice and standards for this project shall be administered by the Project Manager and can be accessed at www.epa.nsw.gov.au and www.legislation.gov.au.

Workers shall be informed of the location and availability of environmental legislation, standards and codes of practice during induction.

Relevant environmental policies, guidelines and draft plans include:

- TSC Contaminated Land Policy V1.1.
- Tweed Coast Comprehensive Koala Plan of Management
- Tweed Community Strategic Plan 2017-2027
- Tweed Shire Council Local Strategic Planning Statement
- Tweed Urban Stormwater Quality Management Plan

3.2 Project Approvals

The project will be undertaken in accordance with the Notice of determination of an application under Section 138 of the Roads Act, 1993 for consent to upgrade Cudgen Road (Notice No. DWY21/0253) and the Development Consent Conditions (No. SSD-10353).

A copy of the Notice of Determination and SSD is included in **Appendix I**.

4 Organisational Structure and Responsibilities

The general organisational structure of authority and reporting flow paths is shown in **Figure 4-1.**

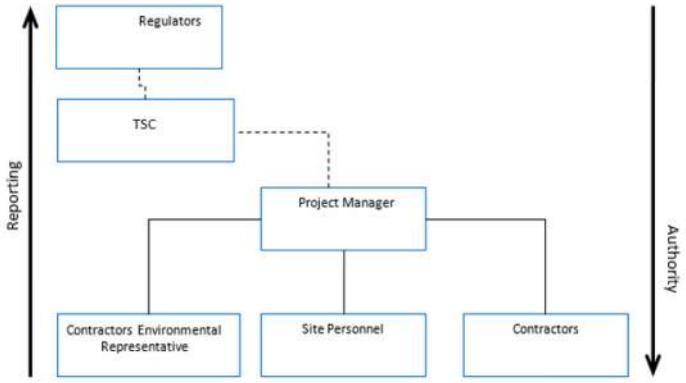


Figure 4-1 General organisational structure.

4.1 Responsibilities and authorities

Key persons responsible for environmental management of the works are listed in Table 5-1.

Table 4-1 Key personnel and responsibilities.

Position	Responsibility
Project manager	• The project meets its environmental objectives, minimises its environmental impacts and adequately manages its environmental risks • Relevant permits and approvals for the project are obtained prior to commencement of any works (including pre-works) • Control measures identified in this EMP are implemented and maintained throughout the works • Changes to the project (scope, timing, methodology, etc.) are reflected in the permits and approvals • Incorporation of mitigation measures identified in the permits and approvals into the EMP • Communication of EMP to the Construction Manager/Site Supervisor

Position	Responsibility
	• All incidents and complaints are investigated, and all subsequent corrective actions implemented in a timely manner • Copies of due diligence records (e.g. management plans, audits, inspections, incidents, etc.) are kept and accessible. • Report any cultural heritage finds or damage to Administrator.
Construction Manager/Site Supervisor	• All incidents and complaints are reported and appropriately managed (in collaboration with the project manager) • All site-based mitigation measures for the project are implemented and maintained • Potential environmental impacts of the project and required safeguards/control measures are communicated to all staff and contractors, prior to the commencement of works • Communication of environmental issues is maintained over the project e.g. with the inclusion of relevant environmental issues in tool-box talks, etc. • Identified resources are sufficient and effective at controlling risks, advising project manager of any required changes • Control measures are monitored and updated to address changing site conditions • Environmental control documentation is accurate and provides a complete record of implemented controls • All staff are aware of the environmental risks and associated controls for the work package. • Staff are resourced and competent to address EMP requirements and environmental controls • Report any unexpected Cultural Heritage finds or damage to the Project Manager.
Environmental Officer	• Review the EMP prior to approval by the project manager, and commencement of works. • Provide technical support to the project team on environmental management and performance as needed, including during incident management and any liaison with the environmental regulators

Position	Responsibility
	• Conduct inspections, reviews and/or audits to facilitate continual improvement
All Staff	• Adhere to all relevant plans, procedures and instructions, including all control measures listed within this EMP • Maintenance and use of relevant environmental control equipment and processes • Attend project briefings and site inductions (including environmental component). • Report all environmental and cultural heritage incidents • Raise all environmental concerns with the Construction Manager/Site Supervisor

4.1.1 Site Induction

All site personnel, including contractors shall be made aware of the environmental issues associated with works and the processes and procedures for dealing with potential environmental impacts.

As part of site induction and training all personnel engaged in construction shall be made aware of the provisions of the EMP in order to promote a general awareness of environmental and cultural heritage issues and management. Evidence of environmental induction of personnel in this project shall be maintained on project records.

This induction will be conducted as part of the project specific site safety and environmental induction. The induction will be based on the EMP and include:

- Relevant legislation;
- General environmental duty and duty to notify
- Conditions of environmental licences, permits and approvals;
- Environmental management strategies outlined in this EMP;
- Identified site specific areas, such as environmentally sensitive areas, limits of construction etc;
- Cultural heritage issues;
- Management of environmental incidents and response/notification procedures;
- Refuelling, waste disposal etc.

5 Monitoring and Reporting

5.1 Environmental Inspections

Weekly inspections will be undertaken by the Environmental Officer, any deficiencies in environmental controls, corrective actions or other observations will be recorded on inspection checklists.

Refer to **Appendix C** for inspection forms.

5.2 Environmental Audits

Environmental audits may be undertaken periodically to ensure EMP implementation and effectiveness. Records of audit findings will be kept onsite.

5.3 Environmental Monitoring

A summary of the environmental inspection/monitoring requirements of the project are shown in **Table 6-1**. Specific details are provided in the corresponding management actions table in each section. Monitoring shall be undertaken for the duration of construction.

Table 5-1 Environmental monitoring and inspection regime.

Environmental Provision	Type and frequency
Erosion and sediment controls	• Daily inspections by Site Supervisor or leading hand. • Weekly by Environmental Officer or delegate staff. • Inspections to include stockpiles and ancillary areas.
Water quality	• Visual monitoring during discharge from site, daily during works in or near waterways and post rainfall.
Air quality	• Daily visual inspections of work areas throughout project duration. • Inspection of disturbed areas and stockpiles. • Visual inspections to ensure no excessive exhaust emissions from plant and vehicles.
Flora and fauna	• Weekly inspections of retained vegetation and no-go zones. • Arborist supervision as required.

Environmental Provision	Type and frequency
	• Unexpected finds procedure.
Weeds	• Weekly inspections of the project area (i.e. exposed soil and revegetated areas) to identify any outbreaks of invasive weed species and fire ants.
Noise and vibration	• Daily observations by Supervisor.
Waste management	• Waste tracking register. • Inspections of waste containers and working areas to ensure the site is tidy and kept free of rubbish.
Heritage	• Find, Stop, Notify and Manage Procedure. • Monitoring as per Section 6.6.2.
Contaminated land	• Unexpected finds procedure.

5.4 Environmental Incidents

Hazell Bros *Integrated Management System Manual* governs the process of incident reporting and investigation.

All project related environmental incidents must be reported as soon as practicable to the Hazell Bros Project Manager and will be entered into Hazell Bros electronic reporting system. The Project Manager will report the incident to the Client representative in accordance with contractual requirements.

All incidents will be reported to the Principal as soon as practicable, upon becoming aware of any of the following:

- Actual or potential material or serious Environmental Harm as defined in the Environmental Protection Act 1994;
- Reportable breach of legislation;
- Breach of an Approval condition(s);
- Non-conformances from Water Quality Investigation Criteria recorded during monitoring;
- Injury or death of native fauna other than least concern species, potentially caused by Work under the Contract, including the occurrence of a fish kill on Site or in Waterways receiving Discharge from Site;
- Tampering with a native animal breeding place(s) other than in accordance with an applicable Species Management Program;

- Ground disturbance or vegetation clearing beyond the Contractual Limits of Clearing or areas otherwise deemed suitable by the Administrator;
- Damage to known or potential Cultural Heritage;
- Ground disturbance or vegetation clearing beyond the boundary of the Contract's Cultural Heritage Management Agreement or Plan otherwise deemed suitable by the Administrator;
- Movement or relocation of Cultural Heritage without approval of the Indigenous Party(s);
- Clearing of a protected plant under State or Commonwealth legislation other than authorised under an Environmental Approval;
- Discovery of a Contaminated Site or land contamination occurred on the Site during the Work under the Contract.

Following the occurrence of any accident, incident or near miss the following notification process shall be adhered to:

- Enact relevant emergency response procedure as required.
- Immediately report incident to Supervisor.
- The Site Supervisor shall report the accident/incident to the Project Engineer and/or Project Manager.
- If the HSE Team has not already been contacted, then the Project Manager shall do this.
- The Project Manager (or his/her delegates) shall inform the client via the quickest available means.
- Depending on the severity of the incident or near miss, an investigation team maybe established after consultation with the HSE Manager.
- The Project Manager shall report the accident/incident to senior management

Specific matters relating to Environmental Incidents are included in this Environmental Management Plan. For details of incident response (i.e. procedures to address emergency, instruction for notifying relevant authorities etc.) refer to ICMP Emergency Response Plan (HB, 2020).

State environmental legislation requires a person to take such steps as are practicable or reasonable to prevent or minimise environmental harm or environmental nuisance caused, or likely to be caused, by an activity conducted by that person. Environmental incidents involving potential or actual environmental nuisance or harm must be notified to the Local Government Environmental Regulator or State Pollution Hotline within 24 hrs of becoming aware an incident has occurred.

Notifications should include:

- Your full name, address and telephone contact details
- Date, time and duration of the incident
- Type of pollutant or a description of the incident, discharge or emission
- Location of the incident, being as specific as possible

- Source and cause of pollution if known
- Extent or size of the area where the pollution is visible
- Anything else that is relevant to the incident

Alternatively, if the incident is not occurring at the time you can contact the Regulator by lodging the above information by email:

All environmental incidents are entered into Hazell Bros' electronic incident reporting system for investigation. The investigation process is as follows:

- Incidents are reviewed by Hazell Bros' Environmental Manager and assigned to an incident Owner
- The Owner conducts the incident investigation and assigns corrective actions to the responsible person(s)
- Corrective actions are tracked and may only be closed once satisfactorily completed
- When all corrective actions have been completed, the incident is closed out.

5.5 Complaints

The Contractor shall establish complaints register. All complaints shall be referred to the Administrator and shall be resolved in consultation with the Administrator through implementation of appropriate management measures. In addition, if complaints are received, monitoring may be directed as a variation to the contract by the Administrator.

Any environmental related complaints shall be actioned in accordance with the HBG Process "CPM-022 Resolve client or stakeholder complaint (refer to **Appendix F**).

5.6 Review and Continuous Improvement

An Environmental Management Plan review shall be conducted by the Project Management team and is normally conducted as an integral part of the overall review of the project's management system. The initial review meeting may be convened within three months after commencement on site and thereafter at intervals not exceeding six months. Unscheduled reviews may be required where critical non-compliance is identified including where non-conformance occur, there is a change in scope, or a new environmental or cultural heritage issue arises that isn't currently addressed in this document.

6 Environmental Management

6.1 Soil and Water Management

The site occurs within the Cudgen (cu) soil landscape which comprises a gently undulating to undulating plateau. The main characteristics of this soil landscape are low undulating hills and rises on tertiary basalt. There are to soil types including predominantly Krasnozems (red self-mulching light clay and brown crumble clay) on localised steeper areas.

The site includes a drainage channel that conveys stormwater from upstream agricultural and urban areas, via a piped network, into additional channels downstream and eventually a low-lying wetland area.

6.1.1 Potential Impacts

The project has the potential to result in polluted runoff from the proposal footprint entering waterways and adjoining areas through soil disturbance and construction activities. Potential sources of soil and water pollution include:

- Soil disturbance during construction and vegetation clearing activities.
- Increased sediment transfer and erosion potential in areas of exposed soil.
- Inappropriate management of soil and material stockpiles leading to offsite impacts.
- Hydrocarbon leaks or spills from vehicles or equipment used in construction or vegetation clearance activities, as well as during operation of the project.
- Disturbance of texture contract dispersive soils leading to erosion and sedimentation impacts.
- Increased sediment transfer and erosion potential in areas of exposed soil.
- Inappropriate management of soil and material stockpiles leading to offsite impacts.
- Contamination to groundwater

6.1.2 Management Actions

The management actions outlined in **Table 6-1** will be implemented to minimise potential impacts on water quality and hydrology as a result of construction activities.

Table 6-1 Soil and water management actions.

Ref	Management Action	Timing
1.1	Works will be undertaken in accordance with the Erosion and Sediment Control Plan (ESCP) in Appendix A. This ESCP has been developed in accordance wit the Blue Book – Managing Urban Stormwater: soil and construction (Landcom, 2004).	Construction
1.2	Erosion and sediment control (ESC) measures will be installed progressively to ensure all disturbed area are adequately protected.	Construction
1.3	Where practicable staging of the works will be undertaken to reduce the extent and duration of disturbance at any one time.	Construction
1.4	Trenching would be staged so that the minimum amount of ground disturbance occurs at any one time.	Construction
1.5	Works would be stopped if unsuitable weather conditions are predicted, such as during and after heavy rain.	Construction

Ref	Management Action	Timing
1.6	The condition of sediment control structures would be monitored and maintained in proper working order throughout the time they are in place. They would be kept clear of debris at all times and cleared of sediment if filled >50% capacity.	Construction
1.7	Stockpile sites would be located in existing cleared areas away from drains and surface water flows and protected with an upslope diversion bund and down slope sediment fencing (if required).	Construction
1.8	External flows will be diverted around disturbances as much as practicable.	Construction
1.9	Stabilised access points will be installed at main entry and exit points to prevent sediment being tracked onto the roadway. A 'shake down' (i.e. rumble grid or rock pad) may be required.	Construction
1.10	Sediment or mud being tracked onto roadways will be cleaned as soon as practicable.	Construction
1.11	Instream sediment control measures such as floating turbidity curtains or instream rock filter dams will be utilised as required.	Construction
1.12	All practicable and reasonable measures will be implemented to prevent the release of dirty water into drainage lines or waterways.	Construction
1.13	Visual water quality monitoring will be undertaken on a regular basis (i.e. daily during instream works, post rainfall sufficient to cause runoff and during weekly inspections). Periodic reviews of the water quality monitoring program will be undertaken quarterly i.e. every four months from commencement.	Construction
1.14	All materials that may cause pollution are to be appropriately contained when working near waterways.	Construction
1.15	Maintenance of ESC measures will be undertaken as required to ensure efficiency.	Construction
1.16	Machinery will not enter or work from the waterway without prior written approval.	Construction
1.17	If machinery is to enter the waterway after approval has been obtained, the machinery is to be degreased and cleaned prior to commencement.	Construction
1.18	Only clean rock is to be used for construction works within the waterway.	Construction

Ref	Management Action	Timing
1.19	In the event ground water is encountered and requires construction dewatering, a Dewatering Management Plan should be prepared and implemented including the obtaining of any necessary licences, to the satisfaction of Council's Environmental Scientist.	Construction
1.20	All chemical and fuel stores will be bunded to contain any spills and prevent contamination of groundwater and soil.	
1.21	It is not expected to encounter groundwater at the proposed depth of excavation. If groundwater is extracted, it will be discharged via infiltration at a location near the extraction point.	
1.22	Acid sulfate soils are not expected to be encountered. In the event that ASS/PASS is encountered, they are to be excavated and disposed at a licenced facility the same day. If they cannot be disposed of the same day as excavation an Acid Sulfate Soil Treatment Area is to be established. This will comprise of an impermeable and bunded area to contain any potential acidic leachate. If runoff from this area is to be discharged, it shall meet discharge criteria i.e. pH 6.5 – 8.5, solution net acidity <10mg/L as CaCO3, total iron <1000 ug/L, total aluminium <150 ug/L, no odour or floating matter.	
1.23	Due to the RL of the site, the likelihood of the site flooding is extremely low. In the event of extreme wet weather events, the following procedure will be followed: 1. All stockpiles will be stabilised (i.e. covered with fabric or application of soil binder). 2. Inspection and maintenance of all erosion and sediment control measures will be undertaken as required. 3. Protection of materials and storage of chemicals. 4. All plant and equipment shall be moved to high ground and away from concentrated or overland flow paths.	

6.2 Acid Sulfate Soils

6.2.1 Potential Impacts

The works have the potential to intercept acid sulfate soils. Potential impacts include:

- Exposure of potential acid sulfate soils (PASS) or actual acid sulfate soils (ASS).
- Oxidation of PASS and exposure of ASS leading to acid leachate generation.

- Contamination to surrounding environment from acid leachate.

6.2.2 Management Actions

The management actions outlined in **Table 6-1** will be implemented to minimise potential impacts from acid sulfate soils.

Table 6-2 Acid sulfate soil management actions.

Ref	Management Action	Timing
2.1	In the event that acid sulfate soils are expected to have been excavated stockpiles should be immediately bunded and the soil material returned to excavation points and backfilled within 12 hours.	Construction
2.2	Should acid sulfate soils require disposal off-site, treatment and management would be required and the site supervisor should organise the implementation of a project acid sulfate soil management plan in consultation with a Council Environmental Scientist.	Construction
2.3	Acid sulfate soils indicators include the following: Jarosite soil horizons including pale yellow mineral deposits within the soil; Iron oxide mottling of soils within excavations; Clear or milky blue-green surface water; iron stains on water surfaces. If identified, field peroxide testing will be undertaken.	Construction
2.4	Field peroxide testing will be undertaken with guidance from the National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual 2018.	Construction

6.3 Air Quality

The site is located on the outskirts of Cudgen village and more broadly intensive agricultural and rural land holdings. Air quality within the locality is expected to be reasonable with no known offensive or foul industries located nearby. Tweed coast Road would be the primary source of fugitive emissions associated with vehicles within the subject site.

Prevailing winds for the area are south (BOM site number 040717, 13.1km north of site). Wind rose for 9am is shown in Figure 6-1 below.

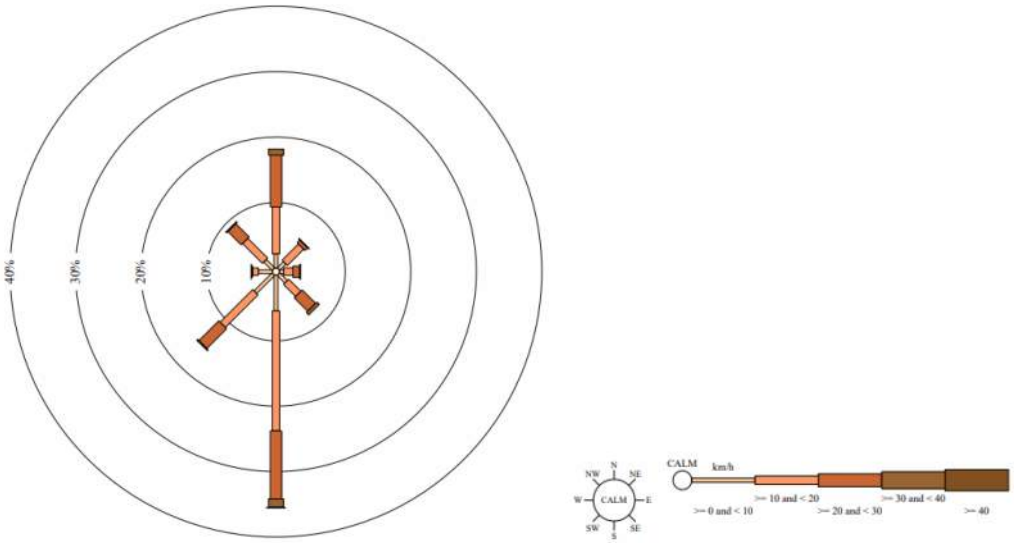


Figure 6-1 Wind speed and direction rose (Source: BOM, 2021).

Routine air quality monitoring is not required for the Contract. The Contractor shall visually monitor for dust on a daily basis and implement pre-emptive control measures to limit dust creation. This information is to be recorded in the Works Supervisor's Diary and the environmental inspection checklist.

6.3.1 Potential Impacts

Construction activities have the potential to generate excessive dust, creating an environmental nuisance to nearby sensitive receivers and the surrounding environment, including:

- Damage or harm to nearby retained vegetation.
- Fine particles entering waterways and affecting water quality.
- Damage or nuisance to nearby sensitive receivers.
- Dust disturbance impacting vehicle visibility.

6.3.2 Management Actions

The management measures outlined in **Table 6-3** will be implemented to reduce potential impacts from dust generated by construction activities.

Table 6-3 Air quality management actions.

Ref	Management Action	Timing
3.1	No burning of material is permitted onsite.	Construction
3.2	Plant & equipment operating on the project must not emit visible smoke for >10 consecutive seconds.	Construction

3.3	Water cart(s) are available to suppress nuisance dust when required.	Construction
3.4	Where dust suppression does not reduce the risk of nuisance, the Project Manager must be informed, and consideration given to stopping dust generating works until conditions improve.	Construction
3.5	The constructor would observe local meteorological conditions and predicted forecasts on a daily basis and prepare site for extreme weather events (i.e. high winds, rainfall).	Construction
3.6	Works would be staged, where practicable, to minimise the area of disturbance at any one time.	Construction
3.7	All necessary precautions shall be taken to minimise impacts from dust during construction works and from construction vehicles.	Construction
3.8	Dust to be managed by the use of wetting down areas and implementation of groundcover (i.e. lining, mulch or soil binders).	Construction
3.9	All stockpiles, exposed areas, unsealed trafficable areas and compound areas will be covered where practicable (using plastic, mulch, hydromulch, etc.) or wet down as required to minimise wind-blown and traffic generated dust. Wetting down of these areas should not be done to the extent that run-off occurs.	Construction
3.10	All works to be in accordance with the Air Quality Management Sub Plan in Appendix H.	Construction

6.4 Flora and Fauna

No threatened flora species listed under the BC Act or EPBC Act were recorded at the site. Given the small size of the site, the potential for threated flora to occur undetected at the site is considered low.

The site is mostly highly modified and simplified regarding structure and biodiversity. Vegetation provides poor quality habitat for most native animals.

6.4.1 Potential Impacts

Construction activities can cause damage or harm to native flora and fauna, including:

- Harm or mortality to fauna during clearing operations
- Damage to retained vegetation outside of project limits
- Destruction of native fauna habitat
- Damage or disturbance to riparian vegetation and waterways
- Introduction or spread of weeds and pathogens

6.4.2 Management Actions

In addition to the above-mentioned requirements, the management actions outlined in **Table 6-4** will be implemented to prevent potential impacts to flora and fauna during construction at all sites including ancillary areas such as borrow pits, take water locations etc.

Table 6-4 Flora and fauna management actions.

Ref	Management Action	Timing
4.1	Retained vegetation is to be clearly identified and delineated from the construction footprint.	Construction
4.2	High visibility temporary fencing (i.e. flagging and bunting or parawebbing) identifying no-go zones is to be installed prior to the commencement of works.	Construction
4.3	Where construction activities are likely to damage trees (trunks, branches or roots), precautionary measures including trunk and branch protection shall be implemented in accordance with Section 4 of AS4970-2009.	Construction
4.4	If threatened fauna species are identified within the disturbance footprint, construction will avoid disturbance of the individuals and if necessary, the individuals will be relocated by experienced wildlife handlers.	Construction
4.5	If nest and/or eggs of threatened species are identified within the distur4.8bance footprint, the construction works are to be postponed until the eggs are hatched and the hatchling have dispersed on their own accord or an experienced wildlife handler can safely relocate them.	Construction
4.6	All machinery on site is be visibly free of soil and plant material to prevent the introduction or spread of weeds.	Construction
4.7	Limit vegetation clearing to the absolute minimum area required.	Construction
4.8	No materials, stockpiles, equipment or heavy vehicles are to be located or parked within the drip line of trees adjacent to the project.	Construction
4.9	All works in regards to the management of vegetation (pruning of roots or branches or removal of identified trees) would be supervised by a suitably qualified arborist.	Construction
4.10	The width of trenching during works in proximity to trees is to be reduced where possible to minimise potential impacts.	Construction
4.11	Roots for trees to be retained which are encountered during excavations would be clean cut using a saw or hydro-jet (water knife) and not ripped or torn with an excavator or bucket etc.	Construction

	Trimming or pruning of above ground branches or limbs would be undertaken with a saw.	
4.12	Branches or trees to be removed should be performed by a licenced arborist and felled towards cleared areas and away from vegetation to be retained.	Construction
4.13	Cleared vegetation should not to be pushed into areas of retained vegetation.	Construction
4.14	Care would be taken to replace dead wood and retain dead trees in areas of retained vegetation for wildlife habitat values. Replacement locations would be determined in consultation with Project Environmental Scientist or an ecologist.	Construction
4.15	Remove all waste containing noxious weeds and seeds from the site and dispose of so that the spread of weeds is minimised.	Construction
4.16	When controlling weeds, refer to measures stipulated by the New South Wales Weed Control Handbook – A guide to weed control in non-crop, aquatic and bushland situations.	Construction
4.17	Where trenching works are proposed adjacent to the 'Native Landscape Plantings', advice should be sought from a suitably qualified arborist to ensure that these works do not adversely impact mature trees within this area.	Construction
4.18	If fauna is located within a structure during demolition of that structure or construction adjacent to that structure (e.g. dry stone wall or culvert outlet), stop work around the structure and consult the TSC ecologist assigned to the project.	Construction
4.19	The section of pipe adjacent to the Moreton Bay Fig within the unit development adjoining Tweed Coast Road is to be protected by the installation of a root barrier along the root zone of the tree and a 200mm - 20mm gravel barrier at the rear of the root barrier.	Construction
4.20	Areas which are disturbed during construction and not permanently transformed are to be revegetated.	Construction

6.5 Noise and Vibration

Predominant noise sources in the locality are associated with traffic using Tweed Coast Road and Cudgen Road. Vibration levels are expected to be negligible within the locality.

6.5.1 Potential Impacts

Construction activities have the potential to result in excessive noise and vibration generation, which could lead to:

- Increased noise levels can become an environmental nuisance and impact sensitive receivers.

- Vibration generated from construction activities could damage sensitive receivers.

6.5.2 Management Actions

The management actions outlined in **Table 6-5** will be undertaken to reduce potential impacts of construction related noise and vibration.

Table 6-5 Noise and vibration management actions.

Ref	Management Action	Timing
5.1	Operation of plant and equipment to be restricted to standard working hours 7am-6pm Monday to Saturday. No works to be undertaken on Sunday or Public Holidays.	Construction
5.2	Any proposed works outside of standard working hours shall be subject to an out of hours noise assessment to the satisfaction of Council's representative.	Construction
5.3	Closely affected residents would be notified accordingly of the works being performed in close proximity and informed of the process for making a complaint.	Construction
5.4	All personnel will be made aware of the process for receiving complaints and direct complainants to the Site Supervisor.	Construction
5.5	Trucks and equipment would not arrive or queue outside the site before 7 am Monday to Saturday.	Construction
5.6	Operating periods for particularly noisy activities (i.e. rock breaking/drilling, if required) would be reduced where possible to provide respite periods.	Construction
5.7	Machines/equipment would be turned off when not in use or throttled down to a minimum.	Construction
5.8	Reversing of vehicles would be minimised where possible to alleviate the annoyance of beeping reverse alarms (or less tonal 'broadband' or 'quacker' type alarms would be utilised).	Construction
5.9	A noise complaint register would be maintained throughout construction. The register would record all complaints including: • Complainant contact details • Source/type of noise causing disturbance • Time and duration of noise causing disturbance • Times when the noise would cause least disruption	Construction

	• Measures taken to address the complaint Complaints handling is to occur in a prompt and responsive manner.	
5.10	Where there are complaints about noise from an identified work activity, it would be reviewed and, where feasible and reasonable, actions additional to those in place implemented to minimise noise output and disruption to sensitive receptors (e.g. reschedule activity causing disturbance to a time which causes least disruption to the complainant and other receptors).	Construction
5.11	Complaint based noise monitoring would be performed throughout construction as required to confirm the effectiveness of noise management controls.	Construction
5.12	All reasonable steps shall be taken to muffle and acoustically baffle all plant and equipment. In the event of complaints from the neighbours, which Council deem to be reasonable, the noise from the construction site is not to exceed the following: • Short Term Period – 4 weeks. o LAeq, 15 min noise level measured over a period of not less than 15 minutes when the construction site is in operation, must not exceed the background level by more than 20dB(A) at the boundary of the nearest likely affected residence. • Long term period – the duration. o LAeq, 15 min noise level measured over a period of not less than 15 minutes when the construction site is in operation, must not exceed the background level by more than 15dB(A) at the boundary of the nearest affected residence.	Construction
5.13	All plant would be maintained in good condition, with all reasonable and feasible acoustic treatments (i.e. residential mufflers and plant enclosures) installed and maintained (refer to AS 2436 – 1981 'Guide to noise control on construction, maintenance and demolition sites').	Construction
5.14	Any stationary equipment (e.g. generators) would be located as far as possible from residential receptors.	Construction
5.15	Plant operators shall avoid generating excessive noise or vibration as much as possible, including excessive revving, avoid dragging objects or dropping objects from heights, minimise impact with solid objects, utilise excavator buckets, claws or ripper picks instead of rock drillers or splitters where possible.	Construction

5.16	All works to be in accordance with the Noise and Vibration Management Sub Plan in Appendix G.	Construction

6.6 Cultural Heritage

The site is mapped as a predictive place of Aboriginal cultural heritage significance associated with the potential for middens to occur.

The site is also mapped as a local heritage item (archaeological site) associated with the former Cudgen Sugar Mill.

The site also holds value to the local South Sea Islander communit based on their ancestror's links with the land associated with their occupation of the land as workers during the locality's sugar cane growing and harvesting.

A Statement of Hertiage Impact (SOHI) was performed to consider the potential for non-aboriginal heritage items. The SOHI findings indicate low to moderate potential of encountering relics associated with the former cudgen sugar mill. Although there is a high likelihood of encountering relics to the north of the subject site (associated with the sugar mill).

Dry stone walls occur on the south-eastern and south-western corners of the intersection.

Figure 6-2 Dry stonewall on the south-eastern corner of the intersection. This wall will be impacted by the works, however, was determined not to be locally significant and will be rebuilt.

6.6.1 Potential Impacts

- Discovery of heritage items including Aboriginal cultural heritage items;
- Damage to known or unknown cultural heritage items.

6.6.2 Management Actions

Management actions for cultural heritage are shown in **Table 6-6**.

Table 6-6 Cultural Heritage Management Actions

Ref	Management Action	Timing
6.1	Key construction personnel would receive an Aboriginal cultural heritage induction specific to the project prior to commencing works.	Construction
6.2	A Tweed Byron Local Aboriginal Land Council representative would be engaged as a site monitor during all trenching activities required for the project.	Construction
6.3	If an Aboriginal object or objects, or any cultural heritage material is identified during the works, all works would stop immediately and the Manager Infrastructure Deliver, Tweed Shire Council (TSC) notified. The TSC contact is to advise the Tweed Byron Local	Construction

Ref	Management Action	Timing
	Aboriginal Land Council (TBLALC) Aboriginal Sites Officer (on 07 553601926) and OEH. No works or development may be undertaken until the required investigations have been completed and any permits or approvals obtained, where required, in accordance with the National Parks and Wildlife Act 1974. It is possible that in such a case there may be a necessity to apply for an AHIP and further investigations may be required. The National Parks and Wildlife Act requires that, if any person finds an Aboriginal object on land and the object is not already recorded on AHIMS, they are legally bound under Section 89A of the Act to notify OEH as soon as possible of the object's location.	
6.4	If objects suspected of being of Aboriginal Cultural Heritage significance are uncovered, the unexpected finds procedure must be followed: • Stop work at in a 10m area around the unexpected find, and secure this area • Notify a qualified archaeologist, and engage them to assess the suspected material to determine historical significance of the find • If assessed to be not culturally significant, proceed with works with caution • If assessed to be of cultural value, works must cease in this portion of the site (within 100m of the find) and the NSW heritage council and TSC's Heritage office must be contacted. Any directions or responses from these organisations should be considered, Works of this type could include salvage excavation, testing, further monitoring, archival recording.	Construction
6.5	If human remains are found during the works, then all works shall cease immediately. The area must be secured within an exclusion zone to prevent unauthorised access and the NSW Police and OEH must be informed as soon as possible.	Construction
6.6	A qualified archaeologist is to be on site at all times for all trenching/earthworks undertaken north of the Cudgen Road intersection. Trenching works south of Cudgen Road intersection to proceed with caution. Should any suspected archaeological relics be encountered during trenching activities, all works are to cease immediately, and the Unexpected Finds Protocol should be implemented.	Construction
6.7	A representative of the local South Sea Islander community group/s would be present during all trenching/earthworks undertaken north of the Cudgen Road intersection.	Construction

Ref	Management Action	Timing
6.8	Road tie in works contained to road base levels can proceed with caution in the area identified as High archaeological potential in the north of the Subject Area. A qualified archaeologist is to be in attendance during all works. Works are not to be undertaken below road base depth. If any archaeological relics are encountered in the area of moderate to high archaeological potential all works are to cease immediately, and the archaeologist would advise the recommended course of action.	Construction
6.9	The drystone wall is to be carefully dismantled prior to the start of the proposed works and the material be retained. A qualified stone mason is to be engaged to re-build the wall after the completion of works.	Construction
6.10	The following management approach would apply to any works within the area of High archaeological potential to the north of the subject site (excluding road tie in works): Prior to the commencement of the Proposed Works, TSC apply for a Section 139 permit required for the works to be conducted, in conjunction with a program of archaeological testing. A separate archaeological research design will be required as a component of the archaeological testing program recommended. • Implement an archaeological testing program, including an Archaeological Research Design, in the historic location of the Cudgen Sugar Mill in the northern extent of the Subject Area (associated with the site of the former Cudgen Mill) to address the issues of integrity and scope of the archaeological profile. • Following the results of the testing program the route of the proposed works may need to be reconsidered to avoid the archaeological profile, or an archaeological salvage program may need to be undertaken prior to earthworks/trenching, in conjunction with any advice or direction from the Heritage Council of NSW. A Section 140 permit will be required to undertake the salvage excavation.	Construction

6.7 Contaminated Land

The Principal has not identified any contaminated Sites.

In accordance with the Contract, if any works encounter or disturb hazardous materials, Hazell Bros shall:

- Ensure Hazmat registers (including reigsters covering asbestos) are in place in relation ot such works. When registers are obtained, they shall be provided to the Principal. No works shall commence until such register are in place.

6.7.1 Potential Impacts

Construction activities have the potential to cause the following:

- Exposure and transport (via sediment transport, runoff etc) of contaminated soils.
- Contamination of waterways and groundwater.
- Introduction or spread of contaminated material.
- Exposure or disturbance of unexpected contaminated soil.

6.7.2 Management Actions

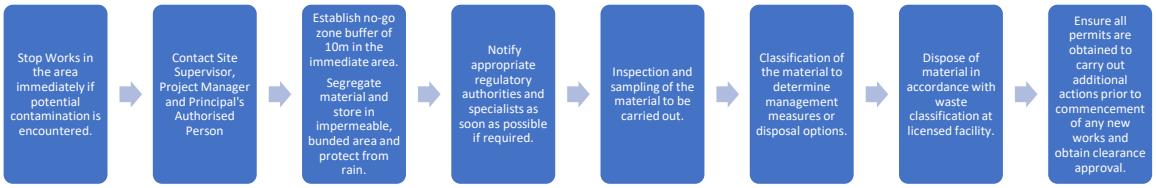
The management actions outlined in **Table 6-7** will be undertaken to prevent potential impacts from contaminated land.

Table 6-7 Contaminated land management actions.

Ref	Management Action	Timing
7.1	Works are to cease immediately if any potential source of contamination is uncovered during works (e.g. chemical drums). In such an instance remediation in accordance with a Council approved Remediation and Validation Action Plan would be required.	Construction
7.2	All imported fill material shall be from an approved source. Prior to commencement of construction, details of the source of the fill, description of the material, and evidence that the material is free of contaminants, must be produced.	Construction
7.3	Potentially contaminated soil and suspected asbestos containing materials (ACM) shall be reported immediately to the Project Supervisor and Project Manager.	Construction
7.4	Suspected contamination will be quarantined from other works and investigated to characterise the nature and extent of the contaminated material.	Construction
7.5	Where contamination is confirmed, containment and disposal strategies will be determined in consultation with appropriate specialists and in accordance with regulatory requirements.	Construction
7.6	Only use clean materials and ensure that works do not cause contamination.	Construction

Ref	Management Action	Timing
7.7	The Contractor shall immediately contact the Administrator in the event suspected contaminated material is discovered.	Construction
7.8	If unexpected contamination is encountered onsite, the following procedure shall be followed: 1. Stop works in the area immediately. 2. Contact Project Manager and Principal's Authorised Person to report the find. 3. Establish no-go zone around the find to isolate the area. 4. Notify the appropriate regulatory authority as soon as possible (if required). 5. Engage a suitably qualified environmental scientist. 6. Arrange sampling of the material by the environmental scientist. 7. Classify the material to determine management measures or disposal options. 8. In consultation with the environmental scientist, determine if further remedial action is necessary based on results to enable reuse, treatment or disposal. 9. Obtain permits to carry out remedial works or disposal and implement appropriate environmental and health controls. 10. Obtain written clearance certificate prior to recommencing works in the area.	Construction

6.7.3 Unexpected Contamination Finds Procedure Diagram



6.8 Waste

6.8.1 Potential Impacts

Construction activities related to waste management have the potential to cause adverse effects to the environment including:

- Pollution of surface water (i.e. litter/rubbish in waterways).
- Damage to aquatic ecosystems (i.e. sediment causing harm to aquatic fauna and flora).
- Tannins produced from mulched vegetation entering waterways.
- Contamination of soil and groundwater.

6.8.2 Management Actions

The management actions outlined in **Table 6-8** will be undertaken to prevent potential impacts from waste generated onsite.

Table 6-8 Waste management actions

Ref	Management Action	Timing
9.1	All waste materials shall be managed in accordance with the Waste Management Plan in Appendix B.	Construction

All waste must be disposed of in an approved waste facility that accepts and is licensed to accept such waste. The waste is to be disposed of and managed according to Environmental Protection Act (1994) and Local Government Authority requirements.

The following waste types are to be managed by the Contractor on site.

Table 6-1 Waste type, estimated volume and management.

Type	Management
Food products, litter, and other waste	Store in covered bins for collection and offsite disposal in landfill. Collected on a regular basis and disposed of at a local waste facility. Contained within bins. Estimated under 1t.
Sediment and silt collected through drainage controls	Reuse sediment/silt on site for landscaping and rehabilitation purposes. Contained within controls and then reinstated or stockpiled for later reuse. Estimated under 1t.
Waste concrete	Minimise the generation of waste concrete through accurate estimation of required volumes.

	Reuse concrete where possible or return to supplier. Avoid concrete washouts on site. If equipment/vehicles must be cleaned on site, then perform the wash out in areas to be concreted next. If this is not possible, design and construct a temporary wash down area that ensures all concrete wastes are contained and collected via a geofabric liner. Stockpiled in concrete washouts and designated lay down areas. Estimated under 10000t. Concrete will be transported to concrete recycling facilities or disposed at licenced landfills.
Green Waste (cleared vegetation)	Reuse mulch where possible. Dispose of weeds at a licenced facility that accepts the waste type. Ensure a waste disposal receipt is retained and logged in the waste register. Mulch stockpiled in windrows (i.e. mulch filter berms) or in designated laydown area. Estimated under 1000t.
Regulated Wastewater (Sewage)	Portable toilets will be required if facilities are not available and are to be regularly serviced by a licenced contractor and the waste material disposed of or treated offsite at a licenced waste management facility. Regulated waste (sewage sludge and residues, including night soil and septic tank sludge) must be collected by a licenced waste contractor for disposal at an appropriate licenced facility in accordance with local government requirements. Contained within sceptic tanks. Estimated at 2000L a month.
Regulated Waste (hazardous wastes not identified above)	All hazardous liquid wastes are to be stored in a bunded facility (compound, temporary or pallet) and flammable or combustible liquids are to be stored in a bund constructed in accordance with AS 1940:2004.
Recyclables	Timber pallets and skids – the Contractor will be responsible for returning timber skids and pallets to the supplier for recycling or re-use.

	Metals, steel and aluminium scrap – to be segregated and collected by or delivered to a licenced scrap metal recycler. Waste drums with no hazardous residue - return to supplier for reuse. Paper and cardboard - stored in recycling bins for collection and recycling offsite. Glass and plastics - maximise recycling opportunities if feasible at work sites.

Waste containment locations will be determined based on the type of waste, i.e. concrete in concrete washout bays, litter in skip bins, mulch in windrows or stockpiled in lay down area etc.

6.9 Hazardous Materials Management

- Hazardous materials will be stored at the site compound.
- Fuels and chemicals are to be stored off-site, however, if required to be stored on-site, they are to be located in a bunded area away from drainage lines.
- If, however, refuelling is required at the subject site, areas designated for the storage, refuelling and maintenance of plant are to be established where native vegetation has previously been cleared and at least 30 m from a waterway.
- Chemicals and fuels will be kept in storage containers in accordance with storage requirements and MSDS.
- Any large volumes (i.e. >250L) of chemicals will be stored within bunded areas and >50m from waterways.
- Storage of large volumes (>250L) of fuel will be avoided onsite by the use of mini-tankers.
- Appropriate spill kits, advocated for use in association with fuels and chemicals are to be maintained on-site. These are to include spill booms and other methods aimed at the containment of fuels and chemicals spilled within the aquatic environment.
- Fuels such as diesel and petrol will be stored in 20L containers in bunded areas.
- The use and storage of hazardous materials will be minimised on site to the extent reasonably practicable.
- Hazardous materials will be stored in a bunded area consistent with regulatory requirements and contract specifications.
- Well stocked spill kits (i.e. absorbent material, containment bags etc) will be maintained on the project site close to hazardous material storage areas.
- Spills will be contained, cleaned up and reported immediately.
- Workers will be provided with instructions on spill response procedures during site specific project inductions
- Refuelling is not permitted within 30m of any watercourse or drainage line.

- Contaminated soils and hydrocarbon waste will be segregated from other waste streams and disposed of in accordance with regulatory requirements.
- In the event that heavy rain is predicted, arrangements are to be made immediately to remove any plant and equipment from within the banks of the waterway prior to the rain event. All plant and equipment would be removed to higher ground above the 1 in 100-year flood level.
- Any debris and spoil accumulated within the works site as a result of flooding would be removed to the designated stockpile area.

6.10 Fire

- Fires are not permitted on the project site.
- Unplanned fires will be controlled and extinguished immediately where safe to do so.
- Fires that cannot be controlled will be reported immediately to Fire Emergency Services using the 000-emergency phone number.

Appendix A – Erosion and Sediment Control Plan

Erosion and Sediment Control Plan

Prepared for

Tweed Coast Road – Cudgen Road Intersection

Contract No: HI21712

CN 116225

DOCUMENT CONTROL & DISTRIBUTION

REVISION REGISTER

Rev	Date	Prepared by	Reviewed by	Approved by
0	27/05/22	[redacted]	[redacted]	[redacted]

REVISION STATUS

Rev	Section Changes
0	Issue for Approval (Construction)

DISTRIBUTION LIST

Position	Name	Organisation
Principal's Authorised Person	[redacted]	TSA Mgt
Operations Manager	[redacted]	HBQ
Project Manager	[redacted]	HBQ
Senior Project Engineer	[redacted]	HBQ
Project Supervisor	[redacted]	HBQ
Project Environmental Officer	[redacted]	HBQ
Senior Safety Advisor	[redacted]	HBQ
Project Safety Advisor	[redacted]	HBQ

Contents

1 Introduction

This erosion and sediment control plan (ESCP) has been prepared to provide erosion and sediment control guidance for the works associated with the Tweed Coast Road and Cudgen Road Intersection project.

1.1 Guidelines

This ESCP has been prepared in accordance with the following documents and legislation:

- Tweed Shire Council Development Design Specification D7 – Stormwater Quality and Annexure A "Code of Practice for Soil and Water Management on Construction Works".
- Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2D (Landcom, 2004).
- Best Practice Erosion and Sediment Control Guidelines (IECA, 2008).

ESCPs should be considered live documents and will in some instances require review and updating to reflect changing site conditions or work methodologies, or if the adopted measures fail to achieve the required treatment standard.

When a site inspection detects a notable failure in the adopted ESC measures, the source of its failure must be reported, investigated and appropriate amendments made to the ESCP.

1.2 Plan Preparation

This ESCP has been prepared by an Appropriately Qualified Person ([redacted], BSci Env).

2 Project Description

2.1 Location

The Project is located at the junction of Tweed Coast Road and Cudgen Road in Cudgen, NSW.

Figure 2-1 Site locality.

2.2 Scope of Works

The general scope of works includes the following:

- Clearing and grubbing;
- Earthworks;
- Stormwater drainage;
- Sewer rising main;
- Road formation works;
- Footpath construction;
- Installation of road furniture; and
- Landscaping.

2.3 Staging

The works will be staged to reduce the extent and duration of soil exposure. The extent of exposed soil will be minimised as much as practicable and reasonable to do so during construction.

3 Site Description

3.1 Climate

Historic rainfall for the region is presented in **Figure 3-1**. Construction is anticipated to commence in June 2022 and be completed around December. Historic rainfall data shows that construction will commence during the drier part of the year, with the highest risk works (i.e. earthworks) being completed during this period.

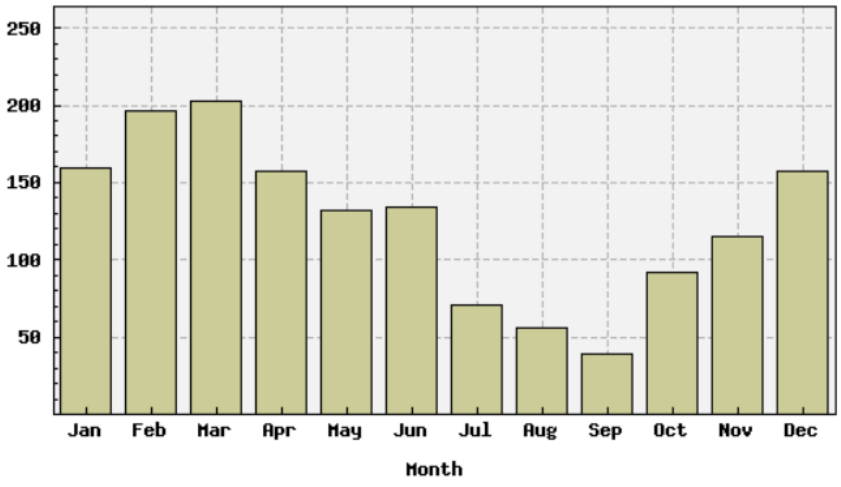


Figure 3-1 Historic Rainfall for station 040717 which is 13.1km north of site (Source: BOM, 2022).

3.2 Topography and Drainage

Topography of the site is relatively flat, with the site grade ranging between 1-5% on average. Drainage comprises of existing kerb and channel and table drains. There is culvert which intersects Tweed Coast Road on the northern end of site.

3.3 Soils

A geotechnical investigation undertaken by Pacific Geotech (2021), indicates the general subsoils encountered across site are sandy clays underlain by silty clays.

4 Erosion Risk Assessment

A soil loss assessment has been conducted using the Revised Universal Soil Loss Equation (RUSLE), as detailed in the following sections.

$$A = K * R * LS * P * C$$

A = predicted soil loss (t/ha/yr)

K = soil erodibility factor

R = rainfall erosivity factor

LS = slope length/gradient factor

P = erosion control practice factor

C = ground cover and management factor

4.1 K Factor – Soils

The soil erodibility factor (K factor) is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. Soil texture is the principal component affecting the K factor, but soil structure, organic matter and profile permeability also contribute. No emerson testing was included in the geotechnical investigation.

The K-factor applied is 0.025 for silty clays which are the expected subsoil.

4.2 R Factor – Rainfall

An annual rainfall erosivity factor of 3909 for Southport has been determined from IECA (2008). This is an overestimate as the program is anticipated to be completed within 6 months.

4.3 LS Factor – Slope Length

A slope analysis was performed for each catchment, resulting in a gradient ranging between 2-3%. A maximum slope length of 80m across site gives an LS factor ranging between 0.36 - 0.41.

4.4 C & P Factors – Cover and Practice

Within RUSLE, the C and P factors are used to describe management of the site with respect to reducing erosion. The C Factor measures the combined effect of all the interrelated cover and management variables. It also represents non-structural methods for controlling erosion (i.e. groundcover erosion

control products, or revegetation). The P factor measures the combined effect of all support practices and management variables. Management measures that reduce runoff velocity and reduce the tendency of runoff to flow directly downhill reduce the P factor value.

Industry accepted default values of 1 and 1.3 have been adopted as C and P factors respectively in soil loss estimations to represent bare soil. Based on the proposed staging a higher level of cover will be maintained for the majority of the project and hence a lower C factor could be considered more representative.

4.5 Estimated Soil Loss

The above factors result in an estimated soil loss ranging between 36.6-41.7 t/ha/yr. This should be considered a worst-case scenario, as the construction period is expected to be under a year and the majority of ground disturbance will be undertaken during the historically dry season. Based on these soil loss rates the site presents a very low erosion risk rating (as per Table 4.4.3 of IECA, 2008).

Table 4-1 Soil loss estimation.

Catchment ID	Area (m2)	Area (ha)	R	K	Slope Length	Slope (%)	LS	P	C	A (t/ha/yr)
A	12212	1.22	3909	0.02	80	2.0	0.41	1.3	1	41.7
B	1921	0.19	3909	0.02	60	3.0	0.36	1.3	1	36.6
C	3960	0.40	3909	0.02	80	2.0	0.41	1.3	1	41.7

4.6 Erosion Risk Assessment

Best practice erosion control requires appropriate measures to be employed as soon as reasonable and practicable to limit soil erosion and to protect any and all exposed areas of soil from raindrop impact erosion.

Best practice land clearing, erosion control and site rehabilitation timeframes are outlined **Table 5-1**.

Table 4-2 Erosion risk rating based on estimated soil loss rate and required management (Source: IECA, 2008).

Erosion Risk Rating	Soil Loss (t/ha/yr)	Advance land clearing allowed (weeks)	Maximum days to stabilisation
Very Low	0 – 150	8	30 (60%)
Low	150 – 225	8	30 (70%)
Moderate	225 – 500	6	20 (70%)
High	500 – 1500	4	10 (75%)
Extreme	>1500	2	5 (80%)

The proposed Type 2 and Type 3 controls are commensurate with the erosion risk level.

5 Key Controls

5.1 Erosion Control During Work Stages

The separate stages of construction have been outlined to identify relevant controls for each stage.

5.1.1 Clear and Grub

- Established stabilised site access points
- Establish exclusion zones to ensure extent of disturbance is restricted to approved areas only.
- Stabilise diversion bunds and temporary drainage features with nominated measures.
- Stage topsoil stripping to coincide with areas of active earthworks only.
- Topsoil push-back bund to be installed progressively. Maximum height of 1.5m from the base to ensure biological health.

5.1.2 Cut and Fill Earthworks

- Minimise occurrence and duration of stockpiling.
- Do not stockpile material within flow paths.
- Install sediment fencing or mulch berms around stockpiles between 1.5-2m from the base of the stockpile.
- Maintain stabilised site access points, haul routes and facilities areas.
- Undertake dust suppression and monitor air quality during high winds.
- Roughen earthwork areas, including batters to reduce erosion risk.
- Progressively stabilise steep batters if practical using temporary erosion controls (i.e. binders or similar).

5.1.3 Main Civil

- Ensure all stormwater inlets are adequately protected from sedimentation.
- Staging of pavement works will reduce extent and duration of exposed materials.
- Erosion risk will be greatly reduced once areas are sealed.

5.1.4 Instream Works

- During culvert works on the northern end of site, instream controls such as instream rock filter dams or floating turbidity curtains will be used to capture bulk sediment.
- In the event of forecast wet weather likely to cause high flows through the culvert, all exposed areas will be stabilised with geotextile fabric, soil binder or similar.

5.1.5 Landscaping

- Progressively complete landscaping throughout the alignment wherever possible, ensuring landscaping is completed as soon after earthworks as possible.
- Combine temporary erosion controls with long term revegetation measures, such as binders, mulch or hydromulch to provide immediate stabilisation, while landscape is establishing.
- Post construction, all exposed/bare earth areas shall be revegetated as per design.

6 Drainage Control

Drainage control considers three main principles: diverting external flow prior to it entering site, directing site runoff to an appropriate sediment control and ensuring runoff is conveyed in a non-erosive manner.

6.1 Drainage Control During Construction

Flow diversion bunds will be installed where required to divert external flows away from the exposed soils during early works.

Check structures (i.e. sandbags, rock check dams, filter socks) will be installed within any drainage lines at appropriate intervals across the disturbed areas to break up slopes and reduce velocity of runoff to prevent excessive erosion.

7 Sediment Control

Sediment control standard is typically based on catchment area and soil loss rate. Type 2 and Type 3 sediment controls will be utilised across site. The proposed Type 2 controls (i.e. rock filter dam, filter socks and mulch filter berms) are suited to the existing and designed landform.

Mulch filter berms or sediment fencing will be utilised in areas where sheet flow may leave the site limits. Mulch filter berms are likely to perform better than sediment fencing with dispersive soils and are a good way to reuse mulch generated onsite.

Any areas of concentrated flow identified once on site, will be controlled through the use of rock filter dams or coir log sediment traps.

Sediment controls will be installed progressively at all areas with exposed catchments.

8 Water Quality Monitoring

In accordance with Clause 2 of MRTS51.1 water quality monitoring shall be undertaken through visual observations of runoff discharging from site. All water quality monitoring shall be undertaken in accordance with the Water Quality Monitoring Plan (WQMP) presented in Appendix B of the EMP.

9 Roles and Responsibilities

Responsibilities of project personnel in respect to the ESCP are outlined below:

Table 9-1 Roles and responsibilities of personnel.

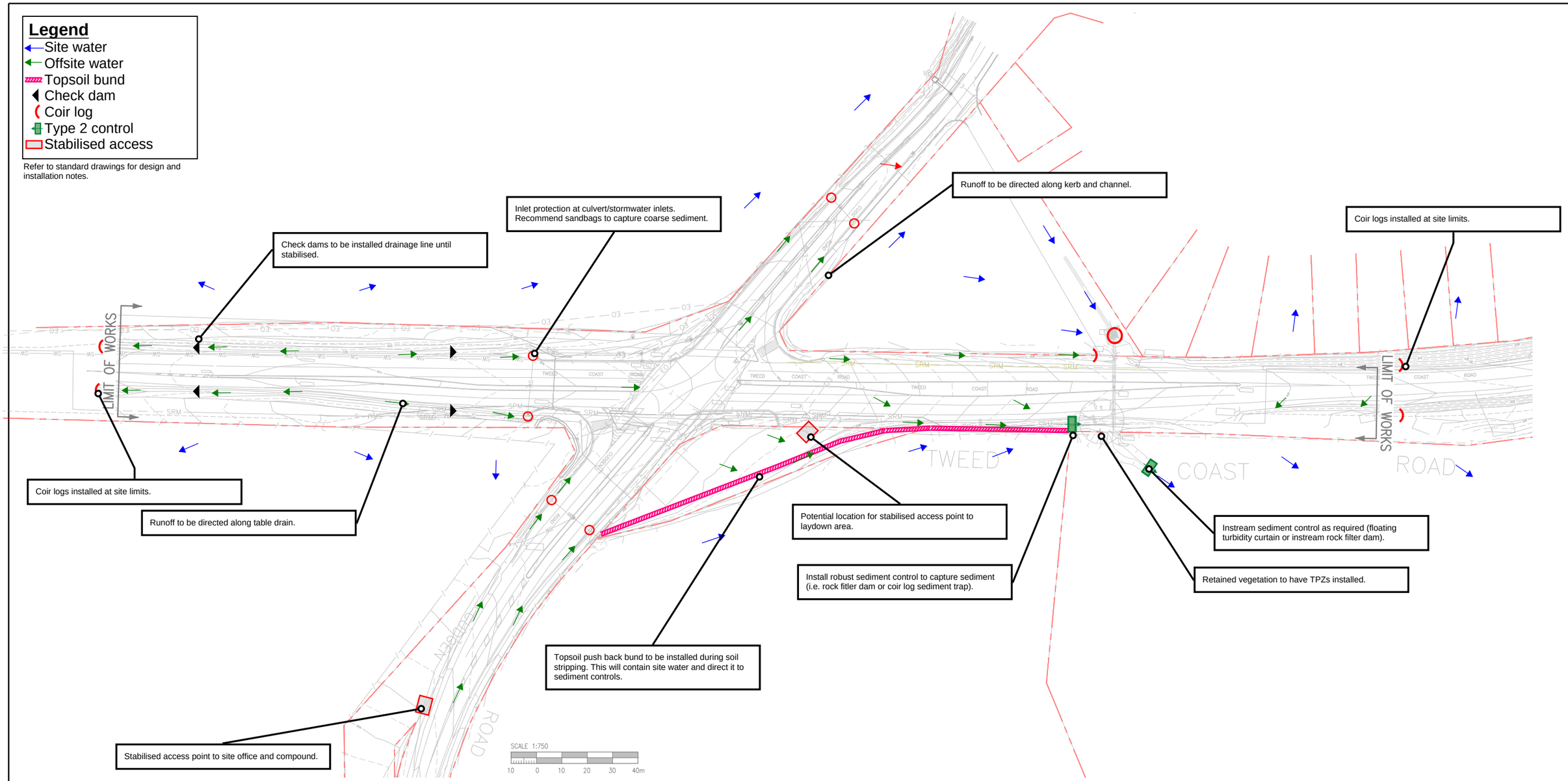
Position	Responsibility
Project manager	• Overall implementation of ESCP • Control measures identified in this ESCP are implemented and maintained throughout the works • All incidents and complaints are investigated, and all subsequent corrective actions implemented in a timely manner

Position	Responsibility
Site Supervisor /Foreman	• Undertake inspections of all control measures, discharge points and perimeter of works per inspection requirements • Copies of due diligence records (e.g. management plans, audits, inspections, incidents, etc.) are kept and accessible
Environmental Representative	• Weekly inspections of all ESC measures • Inspection of offsite impacts and management • Collect and submit any samples (as required)
All Personnel	• Report any damage to ESC measures and any potential or actual environmental harm in line with Duty to Notify under the requirements of the Environmental Protection Act 1994

Appendix A – Erosion and Sediment Control Drawings

Legend
- Site water
- Offsite water
- Topsoil bund
- Check dam
- Coir log
- Type 2 control
- Stabilised access

Refer to standard drawings for design and installation notes.



Construction and Installation Sequence

1. Commence clearing and grubbing during period of forecast dry weather.
2. Install controls progressively ensuring sediment controls are downslope of any exposed areas. Ensure all existing stormwater inlets have protection measures installed.
3. Undertake soil stripping and construct lightly compacted topsoil bund along the perimeter of the work area to divert external flows and direct site water towards sediment controls.
4. Undertake required earthworks. Install check structures where required to reduce velocity of runoff and prevent erosion at the invert of table drains. Sandbag check dams are recommended in areas of exposed soil.
5. Maintain controls until areas are stabilised. Once stabilised remove all controls.

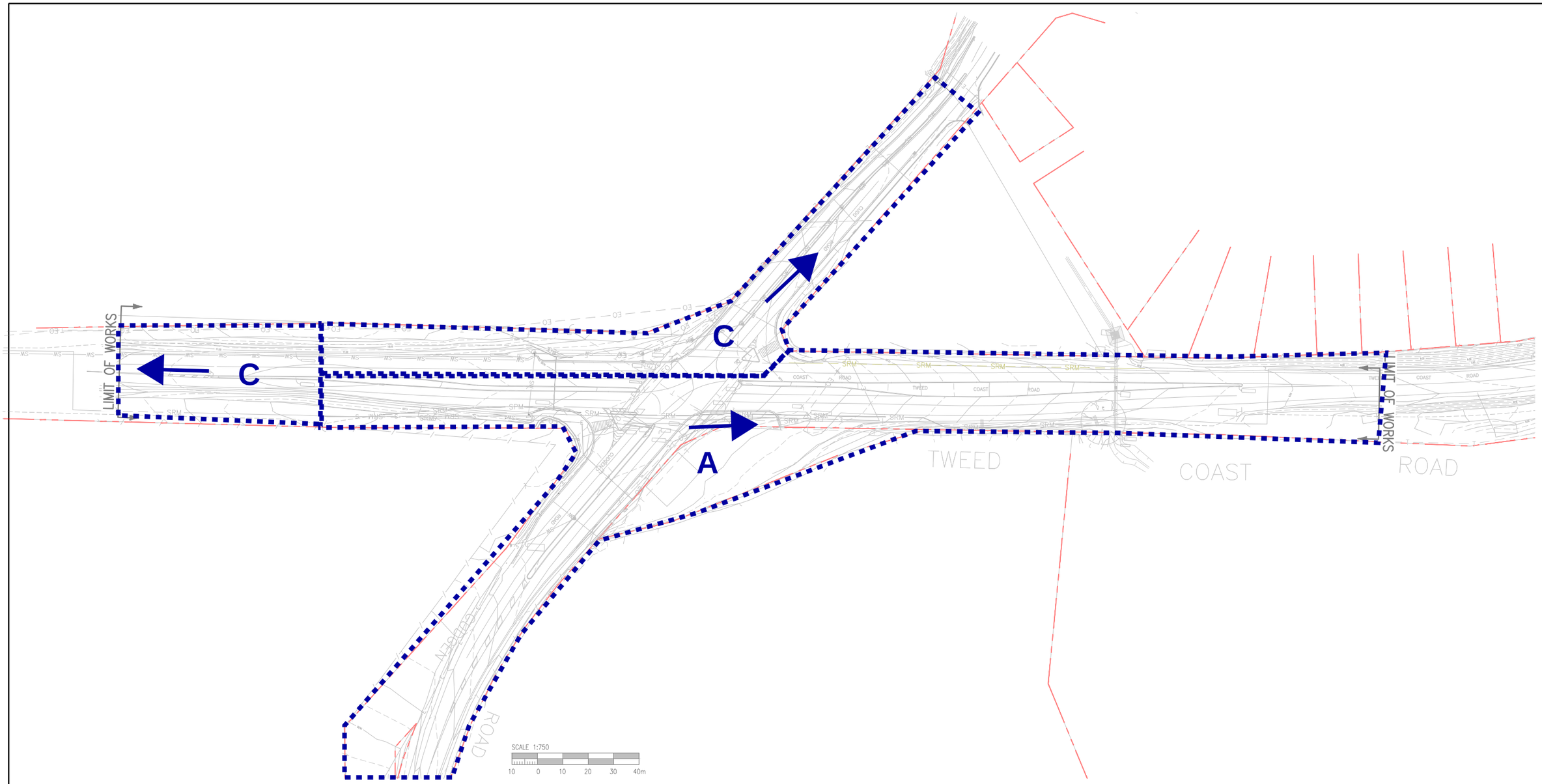
Culvert Works

1. Undertake works during periods of forecast dry weather.
2. In the event of wet weather, ensure that all exposed areas within flow paths are stabilised (i.e. implement groundcover such as geofabric lining or soil binder).
3. Prioritise stabilisation of banks as soon as design levels are reached.
4. If flows are present install floating turbidity curtain or instream rock filter dam.
5. Due to site constraints, diverting flows away from the active work area is unfeasible.

Note: Size, location and extent of controls is indicative only and they are to be installed in accordance with site conditions.

REVISION	DESCRIPTION	APPROVED	DATE
0	ORIGINAL ISSUE	SB	03/06/22

CLIENT	TSC		
DRAWN	MG	DESIGNED MG	DATE 03/06/22
CPESC CERTIFICATION			
PROJECT	TWEED COAST-CUDGEN RD INTERSECTION		
DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN		
PROJECT No	DRAWING No D001	REV 0	



RUSLE Calculations

Catchment ID	Area (m2)	Area (ha)	R	K	Slope Length	Slope (%)	LS	P	C	A (t/ha/yr)
A	12212	1.22	3909	0.02	80	2.0	0.41	1.3	1	41.7
B	1921	0.19	3909	0.02	60	3.0	0.36	1.3	1	36.6
C	3960	0.40	3909	0.02	80	2.0	0.41	1.3	1	41.7

REVISION	DESCRIPTION	APPROVED	DATE
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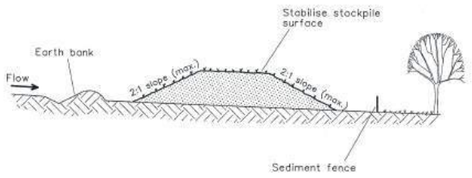
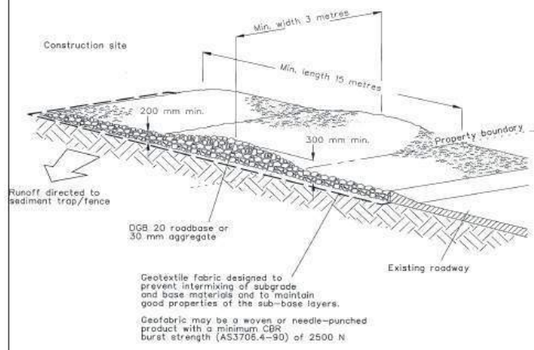
DRAWING TITLE: CATCHMENT PLAN
PROJECT No:
DRAWING No: D001
REV: 0



Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

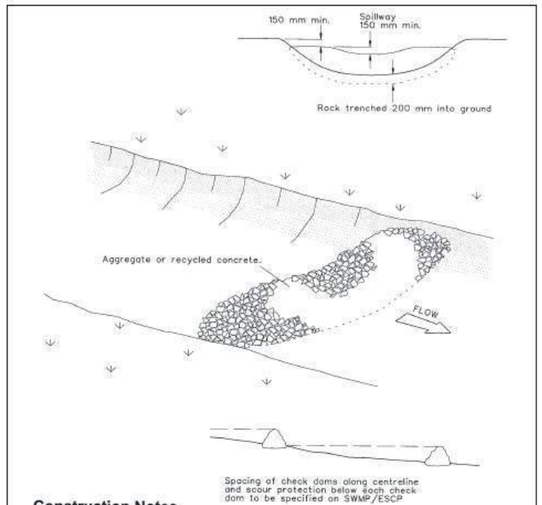
STOCKPILES **SD 4-1**



Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200-mm thick pad over the geotextile using road base or 30-mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

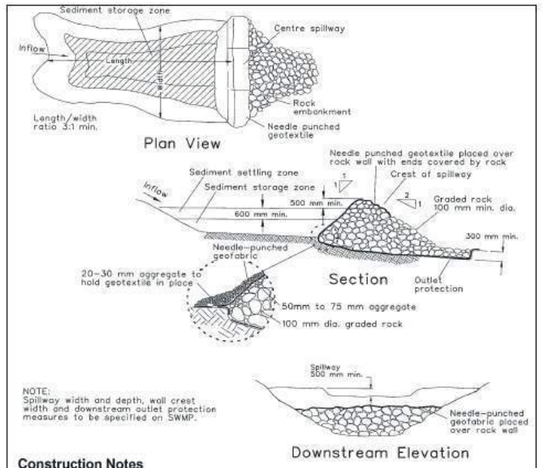
STABILISED SITE ACCESS **SD 6-14**



Construction Notes

1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

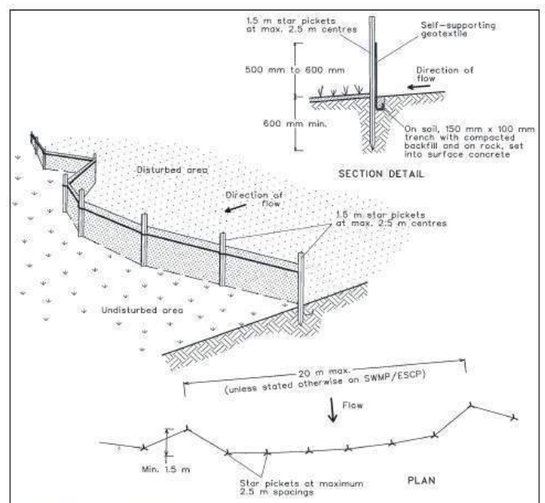
ROCK CHECK DAM **SD 5-4**



Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Excavate to 300 mm depth for base of the dam wall.
3. Line the excavation with a needle-punched geotextile allowing sufficient to line below the wall, and over the upstream rock and the spillway to 500 mm below the spillway exit on the downstream face.
4. Make up the wall profile and outlet protection with100 mm (min.) diameter graded rock. Spread a layer of 50 mm to 75 mm diameter aggregate over the upstream batter for a more even surface, and add 100 mm to 150 mm of 20 mm to 30 mm gravel over the 50 mm to 75 mm diameter aggregate.
5. Lay geotextile over the upstream batter and through the spillway, fixing in place with 100 mm rock.
6. Place a "Full of Sediment" marker to show when less than design capacity occurs and sediment removal is required.
7. Replace the upstream geotextile layer each time sediment is removed

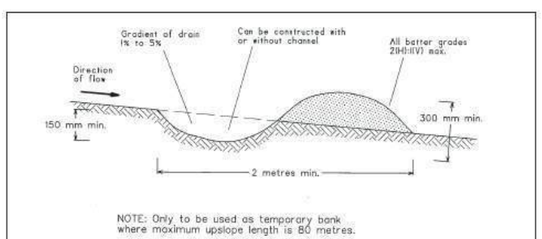
ROCK SEDIMENT BASIN **SD 6-1**
(APPLIES TO 'TYPE C' SOILS ONLY)



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE **SD 6-8**



NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) **SD 5-5**

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DRAWING TITLE: STANDARD DRAWINGS
PROJECT No | DRAWING No: D001 | REV: 0

Appendix B – Waste Management Plan

Appendix G

Air Quality and Dust Management Sub Plan

Prepared for

Tweed Coast Road – Cudgen Road Intersection

Hazell Bros Qld Pty Ltd ABN: 46 145 228 986

DOCUMENT CONTROL & DISTRIBUTION

REVISION REGISTER

Rev.	Date	Prepared by	Reviewed by	Approved by
0	13/07/22	[redacted]	[redacted]	[redacted]
1	31/08/22	[redacted]	[redacted]	[redacted]

REVISION STATUS

Rev.	Section Changes
0	Issue for Construction
1	Updated waste streams in Section 4.3

DISTRIBUTION LIST

Position	Name	Organisation
Principal's Authorised Person	[redacted]	TSA Mgt
Operations Manager	[redacted]	HBQ
Project Manager	[redacted]	HBQ
Senior Project Engineer	[redacted]	HBQ
Project Supervisor	[redacted]	HBQ
Project Environmental Officer	[redacted]	HBQ
Senior Safety Advisor	[redacted]	HBQ
Project Safety Advisor	[redacted]	HBQ

Contents

1 Introduction

The purpose of this Waste Management Plan (WMP) is to identify project waste streams and implement measures to minimise and manage waste during construction. This plan will be updated accordingly as specific details change.

2 Objectives

The key objectives of this WMP is to ensure waste is minimised and to increase the amount of recycling and reuse opportunities whilst reducing the amount of waste ending up in landfills. The following will be implemented:

- Identify and implement measures to reduce the amount of waste generated through the construction phase.
- Ensure the waste management hierarchy of avoidance, minimisation, reuse, recycling and disposal is followed.
- Reduce management and disposal costs.
- Implement appropriate measures to manage waste generated onsite.
- Implement appropriate measures to comply with all relevant legislation and other requirements.

3 Legislation and Guidelines

Relevant legislation and regulation to waste management include:

- *Protection of Environment Operations Act 1997*
- *Waste Avoidance and Recovery Act 2001*
- *Environmental Planning and Assessment Act 1979*
- *Environmentally Hazardous Chemicals Act 1985*
- *Protection of the Environment Operations (Waste) Regulation 2014*

Guidelines, specifications and policy documents relevant to this plan include:

- *Guidelines on Resource Recovery Exemptions (EPA, 2014)*
- *Waste Avoidance and Resource Recovery Strategy (EPA, 2014)*
- *Waste Classification Guidelines (EPA, 2014)*
- *Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014)*

4 Waste Classification

Wastes are classified into groups that pose similar risks to the environment and human health. The Waste Classification Guidelines (EPA, 2014) cover the details and processes to classify waste. The following sections describe the process to determine waste classification and outline the expected project waste streams and their classification.

4.1 Waste Classification Process

The classification of waste is undertaken in accordance with the Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014). This document identifies six classes of waste: Special, Liquid, Hazardous, Restricted Solid, General Solid (putrescible) and General Solid (Non-putrescible) and describes a six-step process to classify waste. The six-step process is outlined below.

1. **Is it Special Waste**
   Determine if the waste should be classified as special waste. Special wastes include clinical and related, asbestos, waste tyres. Special Waste includes:
   a. Clinical and related waste (i.e. sharps)
   b. Asbestos waste
   c. Waste tyres
   Transport and management of asbestos must be managed in accordance with Part 7 of the *2014 Waste Regulation* and special requirements pertaining to clinical and related waste are stipulated in Section 113 of the *2014 Waste Regulation*.

2. **Is it Liquid Waste**
   Liquid waste means any waste that has an angle of repose of less than 5^{O} above horizontal, becomes free flowing at or below 60^{O}C or when it is transported it is generally not capable of being picked up by a spade or shovel. Liquid wastes are sub-classified into:
   a. Sewer and stormwater effluent.
   b. Trackable liquid waste according to the 2014 Waste Regulation, Schedule 1, waste to which waste tracking requirements apply.
   c. Non-trackable liquid waste.

3. **Is it pre-classified by the EPA**
   The EPA has pre-classified several commonly generated wastes in the categories of hazardous, general solid waste (putrescibles) and general solid waste (non-putrescibles). If a waste is listed as pre-classified, no further assessment is required. Pre-classified wastes include:

   Hazardous Waste

   - Coal tar or coal tar pitch waste
   - Lead acid or nickel cadmium batteries
   - Lead paint waste
   - Any mixture of above waste
   - General Solid Waste (putrescible)
   - Waste from litter bins
   - Manure or night soil

- Food waste

General Solid Waste (putrescible)

- Household waste with putrescible organics
- Waste from litter bins
- Manure or night soil
- Food and animal waste
- Any mixture of the above wastes

General Solid Waste (non-putrescible)

- Glass, plastic, rubber, plasterboard, ceramics, bricks or metal
- Paper or cardboard
- Grit, sediment, litter and gross pollutants collected in and removed from stormwater treatment devices and/or stormwater management systems
- Wood or garden waste
- Virgin excavated natural material
- Building and demolition waste
- Asphalt waste

4. **Does the waste possess hazardous characteristics**
   If a waste has not been classified in the previous 3 steps, it must be classified as hazardous waste if it is dangerous under any of the following classes or divisions under the *Transport of Dangerous Goods Code*:
   - Class 1: Explosives
   - Class 2: Gases
   - Division 4.1: Flammable solids
   - Division 4.2: Substances liable to spontaneous combustion
   - Division 4.3: Substances which when in contact with water emit flammable gases
   - Class 5: Oxidising agents and organic peroxides
   - Division 6.1: Toxic substances
   - Class 8: Corrosive substances

5. **Determine waste classification with chemical assessment**
   If waste has not been classified in accordance with Steps 1-4, then chemical assessment of the waste will be undertaken. The chemical assessment process is based around the waste's potential to release chemical contaminants into the environment through contact with liquids, which leads to the production of leachates.

4.2 Waste Exemptions

The Protection of the Environment Operations (Waste) Regulation 2014 enables the EPA to grant exemptions to the licencing and payment of levies for the land application or use of waste in accordance with clauses 91 and 92 of the Regulation. The general Resource Recovery Exemptions that may be applicable to the project are outlined below:

- Excavated Natural Material Exemption (ENM) 2014
- Recovered Aggregate Exemption 2014
- Mulch Exemption 2016
- Recovered Railway Ballast Exemption 2014

4.3 Project Waste Streams

Waste types which are expected to be generated during construction, are outlined with classifications below.

Waste Type	Classification	Proposed Reuse/Recycling/Disposal
Vegetation	General Solid Waste ((putrescible) or green waste	Mulch will be reused onsite where suitable, offsite reuse in accordance with mulch exemption. Cleared weeds will be disposed offsite in accordance with Noxious Weeds Act 1993 at a licenced facility.
Asphalt	GSW (non-putrescible)	Reused or recycled offsite (i.e. Reclaimed Asphalt Pavement).
Steel	GSW (non-putrescible)	Recycled offsite.
Excavated public road material	GSW (non-putrescible)	Reused onsite or within road corridor under the Excavated Public Road Material exemption and order.
Timber	GSW (putrescible)	Reused or recycled offsite.
Concrete	GSW (non-putrescible)	Reuse onsite in accordance with Recovered Aggregate Exemption. Recycled at concrete recycling facility.
Soil, sediment and rock	Excavated Natural Material (ENM) or Virgin Excavated Natural Material (VENM)	Onsite reuse for earthworks, landscaping or rehabilitation works. Offsite reuse or disposal at approved facility.
Acid Sulfate Soils	Hazardous waste	Treatment and onsite reuse. Offsite disposal at licenced facility.
Litter and general waste	GSW (non-putrescible)	Disposed at a licenced facility.
Sewage	Liquid waste	Disposed at licenced facility

Paper, cardboard, plastic	GSW (non-putrescible)	Recycled at licenced facility.
Batteries	Hazardous waste	Disposed at commercial facility (i.e. battery world collects used batteries for recycling).
Chemicals, paints, oil and fuel	Hazardous waste	Disposed at licenced facility.

5 Waste Management

5.1 Waste Management Hierarchy

The waste hierarchy is a set of priorities for the efficient use of resources and is the underlying principle of the Waste Avoidance and Resource Recovery Act 2001.

The hierarchy is:

1. Avoidance including action to reduce the amount of waste generated by households, industry and all levels of government. This can be implemented by:
2. Resource recovery including reuse, recycling and reprocessing and energy recovery, consistent with the most efficient use of the recovered resources.
3. Disposal including management of all disposal options in the most environmentally responsible manner.

The waste hierarchy pyramid is shown below. Details of management measures that will be undertaken to implement the waste hierarchy are detailed in the following sections.

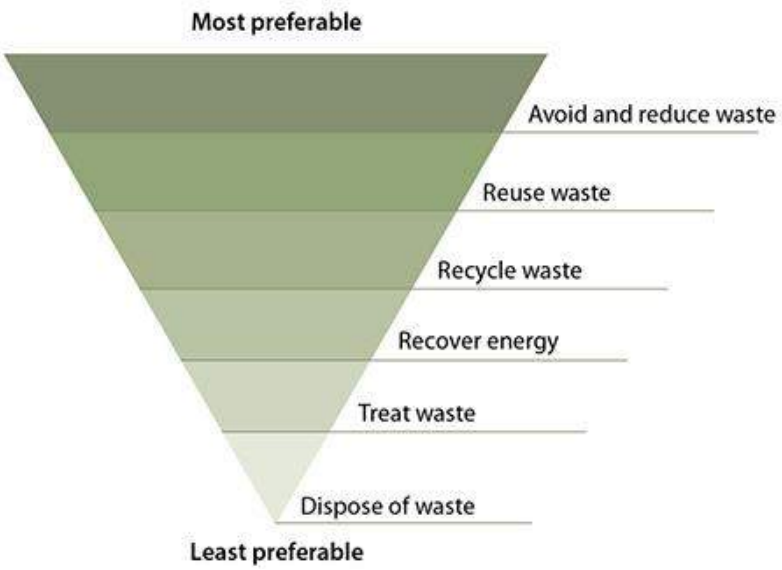


Figure 1 Waste hierarchy (EPA, 2001).

5.2 Waste Avoidance and Reduction

Waste avoidance is the most preferable practice nominated by the waste hierarchy. During the construction phase, the following measures will be implemented to avoid the generation of waste:

- Ensuring correct types and quantities of materials are procured to avoid excess waste material.
- Planning to efficiently manage the delivery and storage of materials to avoid spoilage.
- Establish, where possible, agreements with suppliers for 'take back' arrangements for packaging and pallets etc.
- Engaging experienced operators to avoid excess rework and reduce wastage during construction.

5.3 Reuse and Recycling

Waste recycling and reuse will be promoted throughout the construction phase as follows:

- Waste streams will be segregated and recycling will be promoted onsite to facilitate reuse and recycling as a priority of the waste management program in accordance with the *Government Resource Efficiency Policy* (DECCW, 2014).
- Materials generated within the rail corridor through excavations and bridge works will be reused or recycled. All excavated material will be reused onsite, where this is not possible, resource recovery exemptions will be explored for offsite reuse.
- Where materials cannot be reused and recycled, all waste will be handled and disposed of in accordane with the *Protection of the Environment Operations Act 1997*.

5.4 Waste Handling and Storage

Waste that is required to be handled and stored prior to onsite reuse or offsite reuse/recycling/disposal is to be managed in accordance with the following:

- Stockpiling of spoil and topsoil in allocated areas and appropriate controls to be implemented to prevent generation of dust, erosion and sedimentation.
- Bulk materials shall be stockpiled in designated areas, litter and smaller waste shall be contained within bins or skips, non-dispersive materials (i.e. steel, timber sleepers, pipes etc.) shall be stockpiled in lay down areas.
- Liquid wastes are to be stored in appropriate containers and within bunded areas until transported offsite.
- Hazardous waste is to be managed by appropriately qualified and licenced contractors in accordance with the requirements of the *Environmentally Hazardous Chemicals Act 1985* and the EPA waste disposal guidelines.
- Recyclables and non-recyclable wastes are to be stored in appropriate containers onsite until removal to an approved disposal or recycling facility.
- All waste storage shall be undertaken away from sensitive environments, watercourses and drainage lines.
- Waste may be covered to prevent excessive dust generation as required.
- Bins and receptables should be located so that there is adequate access and manoeuvring area for collection vehicles.
- Only licenced asbestos removalists working under a permit issued by WorkCover shall be engaged for work involving the removal of asbestos. Ensure asbestos waste has been wetted and sealed in heavy duty plastic prior to transportation to licenced landfill.
- Storage of dangerous goods shall be in accordance with the WorkCover Code of Practice for Storage and Handling of Dangerous Goods.
- Labels and signage should conform to any legal requirements (i.e. labelling requirements for dangerous or hazardous substances).
- All incompatible and dangerous goods and materials must be segregated.

5.5 Waste Disposal

Waste disposal is to be undertaken in accordance with the Protection of the Environment Operations Act 1997 and the Waste Avoidance and Resource Recovery Act 2001. The following measures will be implemented throughout construction:

- Wastes unable to be reused or recycled will be disposed offsite at a licenced waste management facility, where possible. Contact lists and location of waste management and disposal facilities will be recorded onsite.

Details of disposal will be recorded in the Waste Management Register (Appendix A), details will include:

- Amount and type of waste generated, stored , treated or disposed of;
- Amount and the type of waste transported;
- Name and licence number (if applicable) of transporter;
- Date of transportation; and
- Name and location of the waste facility that receives the waste.

These records must be kept for a period of four (4) years from the date of transportation. Records are required for all trackable wastes, but it is recommended that the records are kept for all solid and liquid wastes.

Section 143 Notices should be kept at the project site office and a copy lodged to TSC project manager.

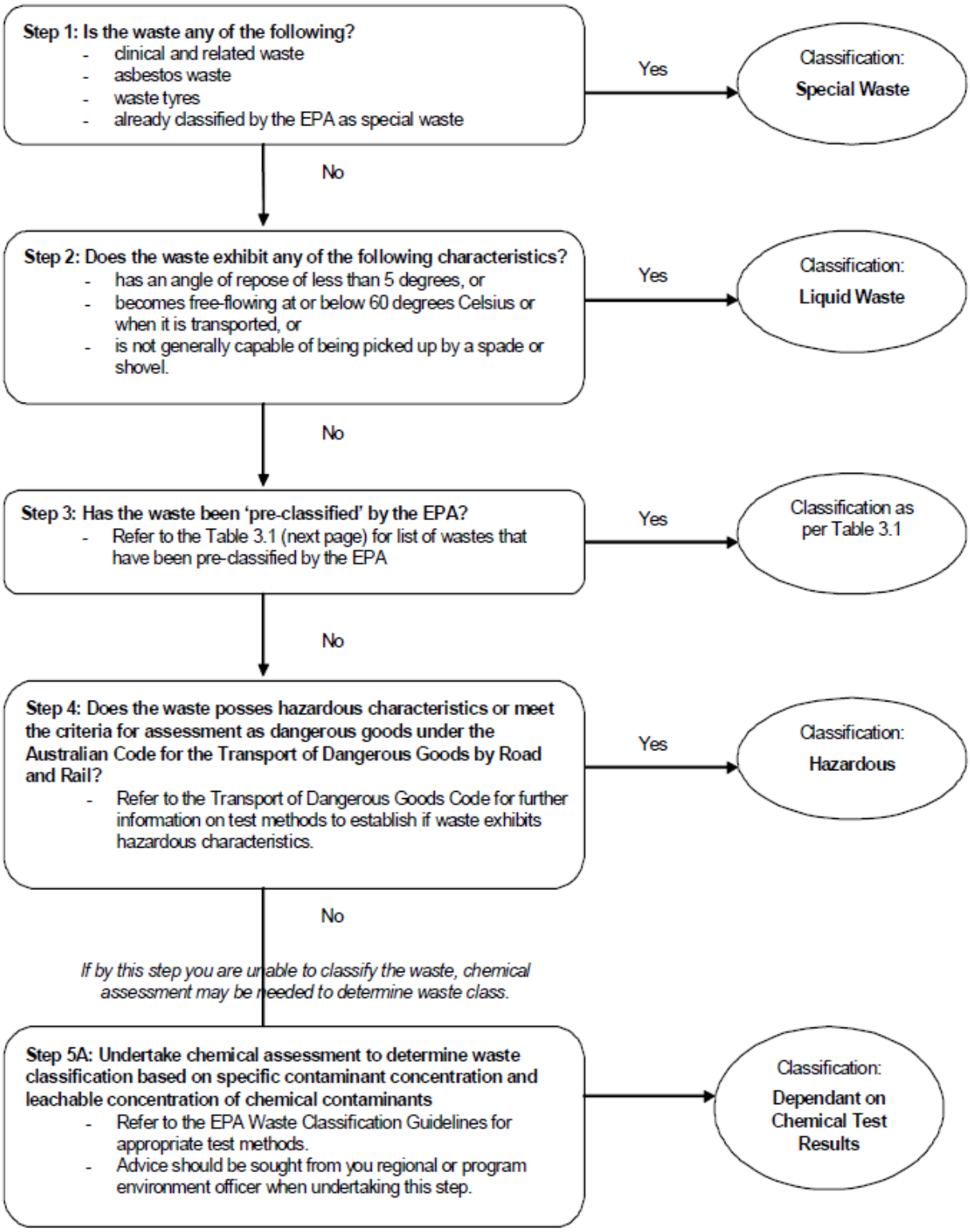
5.6 Monitoring and Inspections

Routine monitoring and inspections will be undertaken during construction to ensure the above mentioned management measures are being implemented. All required waste sampling and testing are to be conducted in accordance the relevant guidelines and resource recovery exemptions.

Appendix A – Waste Tracking Register

Waste Type	Classification	Amount	Transporter	Date	Destination	Licence

Appendix B – Classifying Waste Flow Chart


Step 1: Is the waste any of the following?
- clinical and related waste
- asbestos waste
- waste tyres
- already classified by the EPA as special waste
Yes
Classification: Special Waste
No
Step 2: Does the waste exhibit any of the following characteristics?
- has an angle of repose of less than 5 degrees, or
- becomes free-flowing at or below 60 degrees Celsius or when it is transported, or
- is not generally capable of being picked up by a spade or shovel.
Yes
Classification: Liquid Waste
No
Step 3: Has the waste been 'pre-classified' by the EPA?
- Refer to the Table 3.1 (next page) for list of wastes that have been pre-classified by the EPA
Yes
Classification as per Table 3.1
No
Step 4: Does the waste posses hazardous characteristics or meet the criteria for assessment as dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail?
- Refer to the Transport of Dangerous Goods Code for further information on test methods to establish if waste exhibits hazardous characteristics.
Yes
Classification: Hazardous
No
If by this step you are unable to classify the waste, chemical assessment may be needed to determine waste class.
Step 5A: Undertake chemical assessment to determine waste classification based on specific contaminant concentration and leachable concentration of chemical contaminants
- Refer to the EPA Waste Classification Guidelines for appropriate test methods.
- Advice should be sought from you regional or program environment officer when undertaking this step.
Classification: Dependant on Chemical Test Results

Appendix C – Inspection Forms

1) Inspection Procedure
2) Daily Inspection Form
3) Weekly Inspection Form
4) Monthly Environmental Report
5) Cultural Heritage Monitoring Forms

Inspection Procedure

Introduction
This procedure outlines the requirements for the conduct of regular worksite inspections on Hazell Bros projects. Regular workplace inspections are performed to ensure a safe working environment is maintained. These inspections aim to identify hazards in the workplace and to minimise risks to health, safety or environmental harm.

Scope
This procedure applies to all worksites owned or operated by Hazell Bros.

Definitions
Hazard is a situation that has the potential to harm a person, the environment or damage property.
Worksite inspection is a regularly scheduled inspection of worksites using a checklist to assist with the monitoring and identification of hazards.

Roles & Responsibilities
Managers/Supervisors are responsible for:
- preparing a schedule of regular worksite inspections as per the suggested frequency
- the conduct of worksite inspections
- the implementation of appropriate hazard/risk control measures identified during worksite inspections
- consulting with employees in relation to outcomes of worksite inspections and the rectification of issues

Workers are responsible for:
- participating in worksite inspections
- using control measures as required and any other action taken, which is designed to protect the health, safety and environment.

Procedure
Function of Inspections
- Identify hazards in the work environment;
- Monitoring expected organizational standards;
- Improve health and safety practices and procedures;
- Measure WHS legislative compliance;
- Maintain worker involvement and participation in Health and Safety activities.

Frequency
Worksite inspections should be carried out as detailed in the Integrated Construction Management Plan.

Participation in Workplace Inspections
For best results the Project Manager and at least one other worker should be involved in the worksite inspections.
1. Review the checklist to be used
2. Conduct an inspection by walking around the work environment
3. Identify any physical hazards and areas of non-compliance against the checklist
4. Record all findings, providing specific comments, ensuring form is signed and dated and includes personnel conducting the inspections
5. Ensure responsibilities, priorities and time frames are listed when determining corrective action.

Corrective Action

If a hazard or a non-conformance is identified corrective action must be identified. All corrective actions must have a person or persons allocated responsibility with time frames and priority. Priority should be determined by the level of risk posed by the hazard. The following gives an indication of time frames required for each priority:

Priority	Time Frame	Responsibility
High	Immediate action required	Manager should be aware
Medium	Needs to be actioned within 2 months	Supervisor/Manager
Low	Needs to be monitored, action can be planned	Supervisor/Manager

Review

The information obtained from regular inspections shall be reviewed and monitored by Manager in an attempt to identify the following

- trends;
- the need for training;
- reoccurring issues;
- establishment of priorities for corrective action;
- assist in establishing or improving safe work practices;
- need for further risk assessment;

Environmental Monitoring Checklist

PROJECT: **JOB NO:** **WEEK ENDED:**

Environmental Monitoring	Date and day of inspection and verification of the monitoring																	
	Monday			Tuesday			Wednesday			Thursday			Friday			Saturday		
	a	p	Notes	a	p	Notes	a	p	Notes	a	p	Notes	a	p	Notes	a	p	Notes
There are no sediment or chemical plumes present in any waterways																		
Erosion and sediment control devices are installed and working effectively																		
Visual monitoring of discharge points shows no sediment accumulation																		
Dust adequately controlled																		
Exclusion zones are being maintained and working effectively																		
No visual sign of invasive weed outbreaks or potential fire ant infestations																		
Noise and vibration controlled effectively																		
Waste is being effectively controlled																		
Chemical and fuels being effectively managed																		
Monitoring conducted by (initial)																		
Comments/observations																		

Responsible Employee Name: **Signature:**

DELEGATED EMPLOYEE TO INITIAL & DATE EACH DAY TO VERIFY THE MONITORING HAS BEEN UNDERTAKEN

WEEKLY ENVIRONMENTAL CHECKLIST
Q22020

NOTE: Report observations for contracted works (including sub-contractors at the time of inspection and where possible for activities since last inspection. Assess requirements for future works and interactions with other contractors where applicable. Provide recommendations / comments with cross-references to relevant checklist items.

Project: Cudgen Road	**Job No:** Q22020	**Areas inspected**:
Inspector:	**Date:**	**Weather:**
Current activities:		

	CHECKLIST	Action required		
	FLORA / FAUNA / PEST PLANTS & ANIMALS			
1.	Are clearing limits clearly defined / communicated to relevant persons?	☐Y	☐N	☐n/a
2.	Are limits of clearing being minimised and staged in accordance with the EMP?	☐Y	☐N	☐n/a
3.	Is pre-clearing removal of habitat structures (logs, hollows) being completed in accordance with the CEMP?	☐Y	☐N	☐n/a
4.	Has a Fauna Spotter inspected / attended all clearing of native vegetation?	☐Y	☐N	☐n/a
5.	Has fauna injury and relocation log been completed?	☐Y	☐N	☐n/a
6.	Are access restrictions to sensitive areas (protected plants, habitat, and property) adequate and well maintained?	☐Y	☐N	☐n/a
7.	Fauna have suitable means of escaping trenches, culverts and other structures where they could become trapped?	☐Y	☐N	☐n/a
8.	Vegetation to be retained and adjacent to the works is in good health? (Report poor health to Principal).	☐Y	☐N	☐n/a
9.	Are measures to prevent spread of weeds being implemented (access restrictions, eradication, plant wash down, separation of weed infested soil/material)?	☐Y	☐N	☐n/a
10.	Increase in extent/cover (new outbreaks) of weed infestations identified and reported?	☐Y	☐N	☐n/a
11.	New or increased populations of pest animals identified and reported?	☐Y	☐N	☐n/a
	PLANT HYGEINE			
12.	Plant and equipment that have been off-road or operated in a RIFA restricted area have been certified free of weed material and RIFA prior to mobilisation/relocation, as applicable?	☐Y	☐N	☐n/a
13.	Are wash down facilities designed and maintained to contain contaminants (weeds, waste water)?	☐Y	☐N	☐n/a
14.	Random inspection of light vehicles and plant for weed material / compliance with wash-down procedure.	☐Y	☐N	☐n/a
	SOIL & WATER			
15.	Are clean water diversions installed around major disturbances, where possible?	☐Y	☐N	☐n/a
16.	Are cut-off drains or alternative measures installed to break-down steep slopes and larger catchments?	☐Y	☐N	☐n/a
17.	Is drainage well defined and flow dissipation / check dams installed where necessary?	☐Y	☐N	☐n/a
18.	Are sed. traps (basins, sed. fence, bunds) installed in effective locations (down slope boundaries, discharge pts)?	☐Y	☐N	☐n/a
19.	Are sediment controls installed properly, of adequate scale, and structurally sound with minimum 2/3 capacity?	☐Y	☐N	☐n/a
20.	Are access points stable and haul roads well maintained / roads free of mud?	☐Y	☐N	☐n/a
21.	Are stockpiles generally within height limits, well profiled, with ESC controls?	☐Y	☐N	☐n/a
22.	Is revegetation (temporary or permanent) and/or maintenance being actioned in a timely manner?	☐Y	☐N	☐n/a
23.	Visual signs of degradation of watercourses (e.g. sedimentation)?	☐Y	☐N	☐n/a
24.	Has WQ monitoring been completed in accordance with EMP (prior to basin discharge and daily during discharge)?	☐Y	☐N	☐n/a
25.	Are activities in watercourses (bed or banks) in accordance with permit conditions / exemption guidelines?	☐Y	☐N	☐n/a

	CHECKLIST	Action required		
	HAZMAT			
26.	Are minor qualities of fuels, oils, chemicals and other hazardous materials secure from spillage?	☐Y	☐N	☐n/a
27.	Are bulk fuels, oils, chemicals and other hazardous materials appropriately bunded (impervious, 110% capacity)?	☐Y	☐N	☐n/a
28.	Is refuelling and other oil/chemical transfer in accordance with CEMP (50m from drainage where practicable, containment devices, spill prevention fitted equipment, etc.)?	☐Y	☐N	☐n/a
29.	Is spill (and fire) response equipment of adequate type (hydrocarbon, chemical, floating), number and capacity for the works and readily visible / accessible? Are SDS readily identified / accessible?	☐Y	☐N	☐n/a
30.	Have all spills been remediated appropriately?	☐Y	☐N	☐n/a
31.	Hot works and smoking is restricted to designated areas?	☐Y	☐N	☐n/a
32.	Fire fighting equipment (extinguishers, water, pumps) of adequate capacity is located in all vehicles / storage / hot work areas?	☐Y	☐N	☐n/a
33.	Fire prevention measures are in place to protect other potential ignition sources / fuels?	☐Y	☐N	☐n/a
34.	Bushfire response and evacuation procedures are clearly communicated to all personnel?	☐Y	☐N	☐n/a
	DUST / NOISE / VIBRATION / NUISANCE			
35.	Dust control measures (e.g. wetting, speed limits) are maintaining dust within acceptable levels?	☐Y	☐N	☐n/a
36.	Noise control measures (e.g. conditioning, restricted hours) are being implemented in sensitive (habitat) areas?	☐Y	☐N	☐n/a
37.	Plant & equipment emissions (i.e. noise, exhaust smoke) present doubt of compliance with relevant criteria?	☐Y	☐N	☐n/a
38.	Vibration (indicators) at sensitive receptors present doubt of compliance with vibration criteria?	☐Y	☐N	☐n/a
	WASTE / RECYCLING			
39.	Waste / recyclables are segregated to maximise recovery of recyclable materials and minimise waste?	☐Y	☐N	☐n/a
40.	Type and size of receptacles sufficient to properly segregated waste / recyclable materials?	☐Y	☐N	☐n/a
41.	Receptacles / storage areas are secure from wildlife, spills & weather proof as required for various materials?	☐Y	☐N	☐n/a
42.	Waste / recyclables are being collected / disposed by licensed operators? Waste tracking records complete?	☐Y	☐N	☐n/a
	ENERGY & WATER USE			
43.	Site is free of water leaks and uncontrolled running water, wastage?	☐Y	☐N	☐n/a
44.	Hoses, taps etc. are fitted with water efficient devices (stop valves, flow restrictors?	☐Y	☐N	☐n/a
45.	Water usage (taking) records are being maintained?	☐Y	☐N	☐n/a
46.	Plant and equipment (including administrative) are being shut-down when idle, where practicable?	☐Y	☐N	☐n/a
	CULTURAL HERITAGE			
47.	Have any cultural heritage related items been found or suspected?	☐Y	☐N	☐n/a
48.	Are works progressing into a previously undisturbed area that could have items of cultural significance buried?	☐Y	☐N	☐n/a
	INCIDENTS & CORRECTIVE ACTION			
49.	Have all incidents / complaints been reported appropriately (e.g. spills, sedimentation, harm to wildlife)?	☐Y	☐N	☐n/a
50.	Are preventive and corrective actions being actioned in a timely manner?	☐Y	☐N	☐n/a

ACTIONS / COMMENTS / ISSUES	

Attachments:

- ☐ Site photos
- ☐ Technical information
- ☐ Monitoring data
- ☐ Correspondence

Mobile Plant and Vehicle
Weed and Seed Hygiene Inspection Checklist

FRM-GRP-098

All heavy mobile plant must be inspected to confirm that it is free from fuel and oil leaks, soil matter and weed seed before entry to site or travel between environmental exclusion zones.

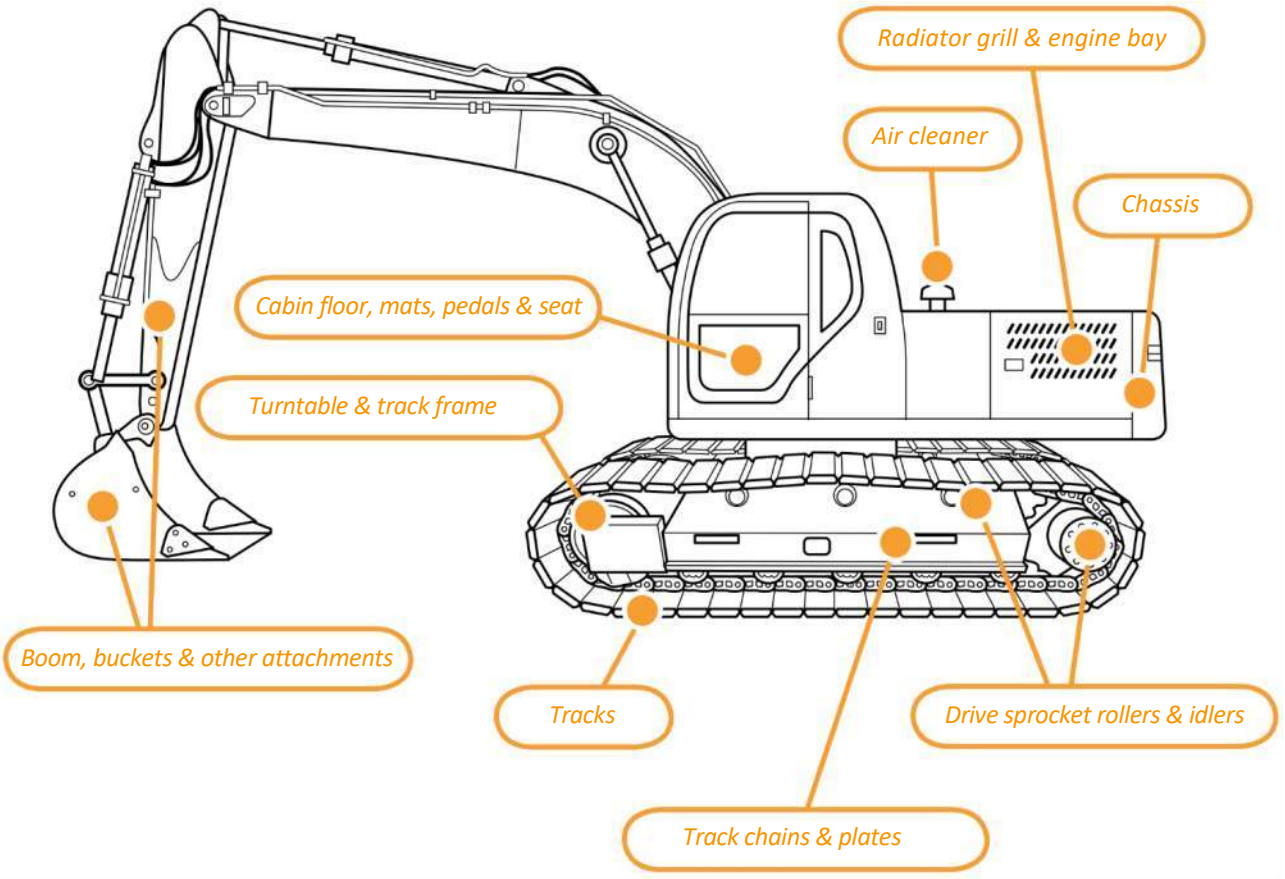
Plant Type		**Make**	
Model		**Unit/Rego No.**	
Plant Owner		**Project Site**	

SYSTEMATICALLY INSPECT THE FOLLOWING AREAS:		Yes	N/A
Cabin	Floor, mats and under seats		
	Below transmission cover plates		
Engine	Grill, radiator, oil cleaner		
	Engine bay		
	Sound deadening panels		
	Air filters (check for seeds)		
Body	Hollow channels		
	Axle housing		
	Around fuel tank		
	Cab steps		
	Inside bumper bars		
	Crevices, ledges and underside		
	Fuel cell		
	Battery box		
	Lubrication points		
Wheels	Inside and outside wheels and rims, including spare		
	Between dual wheels		
Tray	Hollow channels		
	Chassis		
Tracks	Tracks and track frame		
	Removable track adjuster guards		
	Idler wheels		
Blade	Check all hollow sections		
	Pivot points and adaptors at rear of blade		
	Ripper points and frame support		
Body Plates	Check belly and rear plates for loose material		
Buckets & Attachments	Between teeth and adaptors		
Booms	Crevices		

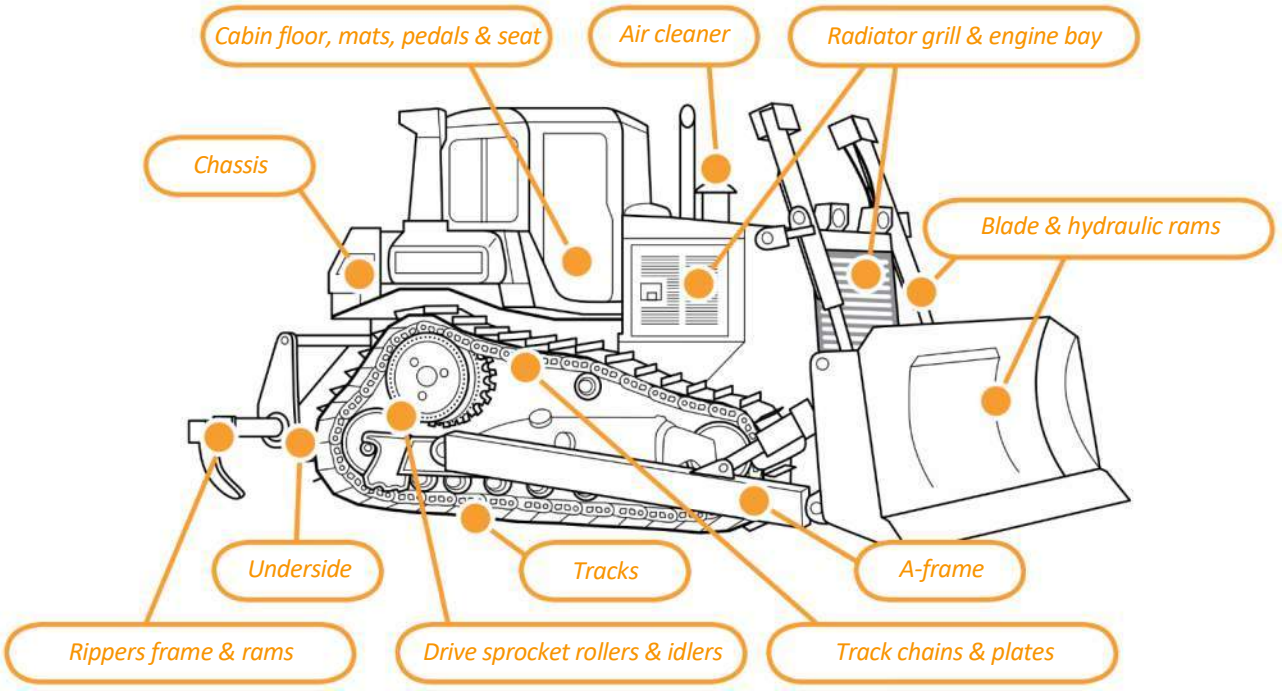
I confirm I have inspected the plant identified above in accordance with this checklist, and that the plant is clean of mud and dirt that could carry weeds, seeds or disease and there are no fuel or oil leaks.

Inspected By			
	PRINT NAME	SIGNATURE	DATE

EXCAVATOR WITH KEY SPOTS TO CHECK AND CLEAN



BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



Rainfall Register - January 2021

PROJECT SITES	MONTH	Jan-20																													Rainfall Total (mm)
	DAYS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	
Gympie																																0
Signed TMR																																
																												Accumulative Total for Month of Feb (mm)				**0**

Rainfall Register - February 2021

PROJECT SITES	MONTH	Feb-20																													Rainfall Total (mm)
	DAYS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
Gympie																																0
Signed TMR																																
																												Accumulative Total for Month of Feb (mm)				**0**

Rainfall Register - March 2021

PROJECT SITES	MONTH	Mar-20																														Rainfall Total (mm)
	DAYS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Gympie																																0
Signed TMR																																
																												Accumulative Total for Month of Feb (mm)				**0**

Rainfall Register - April 2021

PROJECT SITES	MONTH	Apr-20																													Rainfall Total (mm)
	DAYS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Gympie																																0
Signed TMR																																
																												Accumulative Total for Month of Feb (mm)				**0**

Appendix D – Environmental Policy

1) Environmental Policy
2) ISO Accreditation

Environment Policy

Hazell Bros Group is committed to undertaking our business in a manner that provides for the protection of the environment through the integration of environmental programs in all aspects and areas of our operations

We will achieve this by:

- Establishing, maintaining, and promoting an effective Environmental Management System that is appropriate to our business, focuses on continual improvement, complies with applicable laws and regulations and meets the requirement of ISO 14001.
- Promoting a culture of responsible environmental management with all workers and stakeholders.
- Taking all practical steps to protect the natural environment, preserve biodiversity and prevent pollution.
- Identifying, reporting, investigating and resolving all environmental incidents and non-conformances.
- Monitoring, managing and developing strategies to minimise our waste output, energy usage and greenhouse gas emissions.
- Considering environmental aspects of our products and services.
- Establishing and reviewing measurable and defined objectives and targets aimed and minimising environmental harm.
- Ensuring our workers are aware of the impacts we can have on the natural environment and what our responsibilities are in protecting and regenerating areas in which we work.

[redacted]
Managing Director
January 2019

Certificate of Conformity

Hazell Bros Group Pty Ltd

ABN: 27 088 345 804

Hazell Bros (QLD) Pty Ltd
ABN: 46 145 228 986

H.B.M.I. Pty Ltd
ABN: 84 009 509 148

Hazell Bros Concrete Pty Ltd
ABN: 56 118 390 800

Clarke's Sands Pty Ltd
ABN: 82 059 363 478

Hazell Bros Plant Hire (QLD) Pty Ltd
ABN: 22 148 075 101

Hazell Bros Resources Pty Ltd
ABN: 16 150 374 280

Hazell Bros Raeburn Quarry Pty Ltd
ABN: 95 630 027 075

To certify that their

Environmental Management System

has been assessed and registered as complying with the requirements of
ISO 14001:2015 – *Environmental management systems – Requirements with guidance for use*.

Scope of works covered by certification and locations
Refer to the Certification Schedule for further details.

Certification Number 20320
Issue Date 04/04/2019
Issue Number 09

Period of Registration
04/04/2019 to 25/03/2022

[redacted], Operations Director
dlcs international

Certification is subject to ongoing surveillance assessments
The validity of this certificate can be verified at www.jas-anz.org/register

Accredited by the Joint Accreditation System of Australia and New Zealand.
Acc. No. M5250513AM

Certification Schedule

Hazell Bros Group Pty Ltd

Hazell Bros (QLD) Pty Ltd
H.B.M.I. Pty Ltd
Hazell Bros Concrete Pty Ltd
Clarke's Sands Pty Ltd
Hazell Bros Plant Hire (QLD) Pty Ltd
Hazell Bros Resources Pty Ltd
Hazell Bros Raeburn Quarry Pty Ltd
Certification Number 20320

Scope of works covered by certification

Hazell Bros Group operates in civil construction, transport, workshop, quarries, concrete and material handling services. Particulars of the business units include but are not limited to bridge works, road works, traffic management services, pipeline construction and commercial building, material handling, transport and earthmoving, maintenance and services of fixed and mobile plant, management of asbestos removal.

At the following locations

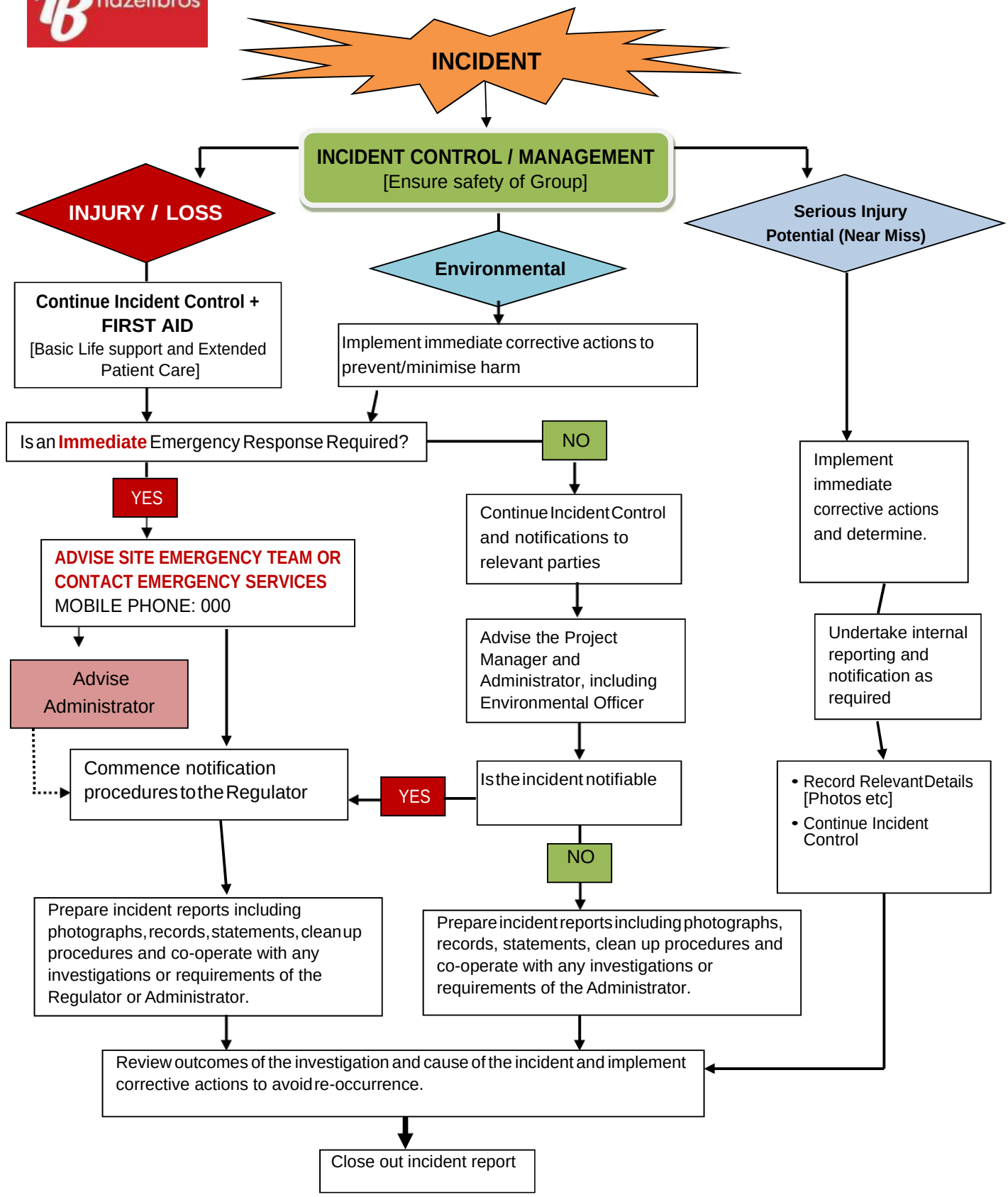
14 Farley Street, DERWENT PARK, TAS 7009
10 Burgess Drive, SHEARWATER, TAS 7307
174 Stoney Rise Road, DEVONPORT, TAS 7310
18-34 Massey Greene Drive, BURNIE, TAS 7320
22 River Road, BURNIE, TAS 7320
60 St Leonards Road, ST LEONARDS, TAS 7250
73-79 Lilydale Road, ROCHERLEA, TAS 7248
835 Hobart Road, BREADALBANE, TAS 7258
8b Lampton Avenue, DERWENT PARK, TAS 7009
9 Bee Court, BURLEIGH HEADS, QLD 4220
Bass Highway, LONGHILL, TAS 7307
Hobart Blue Metal Industries Leslie Road, LESLIE VALE, TAS 7054
Loop Road, CAMBRIDGE, TAS 7170
Marshalls Road, FLOWERDALE, TAS 7325
NYRSTAR - Ellen Street, PORT PIRIE, SA 5540
NYRSTAR - Risdon Road, LUTANA, TAS 7009

Issue Date	04/04/2019
Issue Number	09
Page	01/01

Appendix E – Incident Reporting

1) Incident Response Procedure
2) Environment and Heritage Incident Form
3) Guideline to Notify of Environmental Harm (EP Act 1994)

Incident / Emergency Response Flow Chart



CONSEQUENCE AND SEVERITY MATRIX (ENVIRONMENTAL)

HARM TYPE	IMPACT CATEGORY			CONSEQUENCE SEVERITY LEVEL 1	2	3	4	5
Harm to Persons	A	Injury		No treatment required	First aid only	Medical treatment Restricted work case Lost time injury	Single fatality	Multiple fatalities
Harm to the Environment	B	Environmental Harm		Environmental nuisance Aesthetic impacts only	Minor reversible impact. Clean up as per procedures.	Reversible impact. Clean up outside procedures.	Serious reversible impact. External assistance to clean up.	Irreversible impact. Long term clean up or rehabilitation required.
		Emission / Spill Guide	Substance	Noise, Light, Odour, Dust	Chemicals, Combustible Liquids, Regulated Wastes	Dangerous Goods, Hazardous Chemicals, Hazardous Wastes.	N/A	N/A
			Quantity	<20L	20-100L	100-1000L	1000-10000L	>10000L
			Receiving Environment	Air Only	Air and/or Ground Only	Ground and/or Water	Identified Sensitive Environment	N/A
			Duration	Temporary -single event	Intermittent >24 hrs Ongoing <24 hrs	Ongoing 24-72 hrs	Ongoing >72 hrs	N/A
Damage	C	Cost of Damage to Plant or Property		Less than $5000	$5001-$10000	$10000-$30000	$30001-$60000	Over $60000
Other Impact to Business	D	Cost of other Loss, including NCRs		Less than $5000	$5001-$10000	$10000-$30000	$30001-$60000	Over $60000
	E	Client Relationship		N/A	N/A	Client complaint	Multiple client complaints	Loss / termination of contract or service
	F	Community Complaints		Individual verbal complaint	More than 1 verbal complaint	Formal / written complaint	Local media coverage	Widespread media coverage
	G	Statutory or Legal Breaches		N/A	N/A	Notice from statutory authority or legal entity	Statutory fine or other legal costs incurred	N/A

LIKELIHOOD		CONSEQUENCE SEVERITY LEVEL (from table above) 1	2	3	4	5
A	Almost Certain. It is expected to occur at least once in the life of the project.	High (11)	High (16)	Extreme (20)	Extreme (23)	Extreme (25)
B	Likely. Will probably occur. May occur every second similar type project.	Medium (7)	High (12)	High (17)	Extreme (21)	Extreme (24)
C	Moderate. Should occur at some time. Once in 5 similar type projects.	Low (4)	Medium (8)	High (13)	Extreme (18)	Extreme (22)
D	Unlikely. Could occur at some time. Once in 10 similar type projects	Low (2)	Low (5)	Medium (9)	High (14)	Extreme (19)
E	Rare. May occur only in exceptional circumstances.	Low (1)	Low (3)	Medium (6)	High (10)	High (15)

Complaint Form

FRM-QLT-815

Customer	☐Internal		☐External		
Complainant				Date	
Project or Address				Report No.	
Reported By		Phone No.		Received By	

Customer Complaint

Non-Conformance

Corrective Action

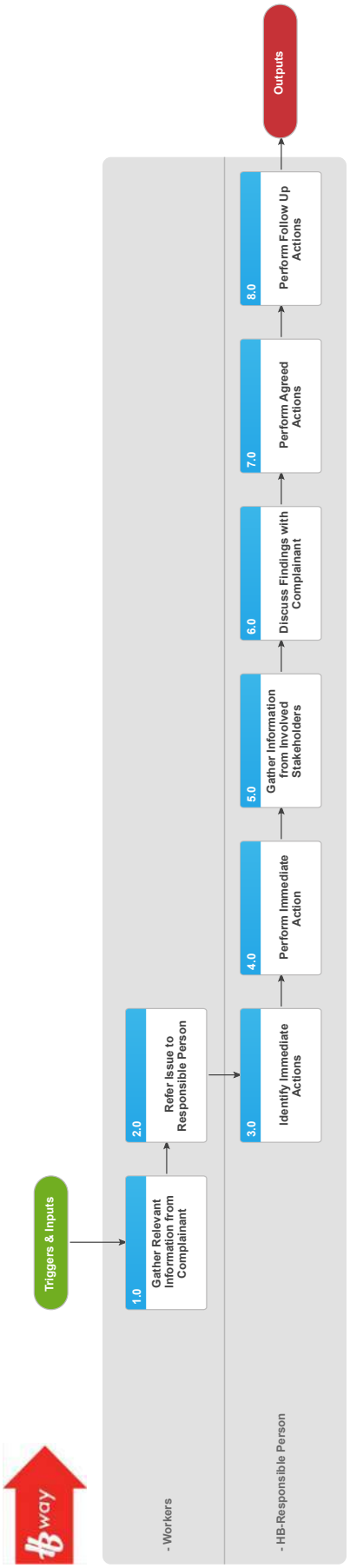
Target Resolution Date		Customer Informed	
Actual Resolution date		Outcome	

Preventative Action

Appendix F – Complaint Procedure

1) Complaint Procedure
2) Complaint Form
3) Project Complaint Register

CPM-022 - Resolve Client or Stakeholder Complaint v8.0



Complaint Form

FRM-QLT-815

Customer	☐Internal		☐External		
Complainant				Date	
Project or Address				Report No.	
Reported By		Phone No.		Received By	

Customer Complaint

Non-Conformance

Corrective Action

Target Resolution Date		Customer Informed	
Actual Resolution date		Outcome	

Preventative Action

Appendix G – Noise and Vibration Management Plan

Appendix G

Noise and Vibration Management Sub-Plan

Prepared for

Tweed Coast Road – Cudgen Road Intersection

Revision 0

DOCUMENT CONTROL & DISTRIBUTION

REVISION REGISTER

Rev.	Date	Prepared by	Reviewed by	Approved by
0	13/07/22	[redacted]	[redacted]	[redacted]

REVISION STATUS

Rev.	Section Changes
0	Issue for Construction

DISTRIBUTION LIST

Position	Name	Organisation
Principal's Authorised Person	[redacted]	TSA Mgt
Operations Manager	[redacted]	HBQ
Project Manager	[redacted]	HBQ
Senior Project Engineer	[redacted]	HBQ
Project Supervisor	[redacted]	HBQ
Project Environmental Officer	[redacted]	HBQ
Senior Safety Advisor	[redacted]	HBQ
Project Safety Advisor	[redacted]	HBQ

Contents

1 Introduction

1.1 Purpose and Application

This Noise and Vibration Management Plan (NVMSP) has been prepared to satisfy the State Significant Development (SSD-10353) conditions. The NVMSP has been developed in accordance with:

- *Interim Construction Noise Guideline* (DECC, 2009); and
- Australian Standard 2436 – 2010 *Guide to Noise Control on Construction and Maintenance and Sites*.

The objectives of the Plan include but are not limited to:

- Achieve compliance with regulatory requirements and standards for noise and vibration management;
- Avoid excessive noise and vibration generation through site planning and the adoption of appropriate work methods and management measures.
- Prevent or minimise the impact of construction generated noise and vibration on sensitive receivers and the community.
- Establish and maintain positive relationships with project stakeholders.
- Adopt measures recommended in the Noise and Vibration Impact Assessment (Appendix O of the EIS).

All reasonable and practicable mitigation measures will be implemented to achieve the noise and vibration criteria nominated in the Code. This NVMSP will be reviewed and additional reasonable and practicable measures implemented where:

- Directed by the Principal; or
- In response to a justifiable complaint or in the event of structural/building damage caused by the project's activities; or
- When changes in the equipment/work method, intensity, location, duration or timing of impacts that are expected to increase noise and vibration impacts are foreseen.

The NVMSP has been developed by Hazell Bros' Environmental Officer [redacted] based on the Construction Vibration Assessment prepared by [redacted] Acoustical Engineer from ATP Consulting Engineers.

The Contractor commits to take all reasonable precautionary measures to minimise nuisance caused by excessive noise and vibration during construction. This Noise and Vibration Management Plan (NVMP) presents the noise and vibration objectives and the chain of responsibility for implementation of the noise and vibration control measures.

1.2 Objectives

- To ensure all noise and vibration related impacts are prevented and/or minimised and managed appropriately.
- To comply with all relevant legislation and project approvals.

2 Project Approval Conditions

2.1 SSD Conditions

The SSD Conditions outline requirements relevant to the NVMP are outlined in Table 1 below.

Table 1 SSD condition requirements and reference to plan.

Condition Reference	Requirement	Section of Plan
B16.a	Be prepared by a suitably qualified and experienced noise expert.	Section 1.1
B16.b	provide details of construction noise management procedures within the Site, Cudgen Road signalised intersection and the Tweed Coast Road / Cudgen Road intersection upgrade site.	Section 5. This Plan only covers activities related to the Cudgen Road signalised intersection.
B16.c	provide details of all the residential and non-residential receivers in Catchments A, B and C, the Kingscliff TAFE and Kingscliff High School as identified in the Noise and Vibration Impact Assessment for SSDA Tweed Valley Hospital Stage 2' by JHA dated 19 September 2019.	Section 4.3
B16.d	describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009) and the relevant provisions of Australian Standard 2436 - 2010 Guide to Noise Control on Construction and Maintenance and Sites, at all identified receivers	Section 5
B16.e	Incorporate all reasonable and feasible noise mitigation measures and construction methods (where feasible) during the proposed construction works so that the project specific construction noise management levels (NMLs) at all the identified receivers (B16(c)), for standard construction hours (airborne) as identified in Section 6.5.2 of the Noise and Vibration Impact Assessment for SSDA Tweed Valley Hospital Stage 2' by JHA dated 19 September 2019, be maintained	Section 5
B16.f	identify the construction activities (including works within the Tweed Coast Road /Cudgen Road intersection upgrade site) with the associated predicted construction noise levels, that would exceed the NMLs and reach or exceed the Highly Affected Noise Level of 75dB(A) LAeq(15min), at the identified the residential and non-residential receivers in Catchments A / B / C, Kingscliff TAFE and Kingscliff High School;	Section 4.2.
B16.g	describe the management and mitigation measures to be implemented when the predicted construction noise levels for the above construction activities (exceed 75dB(A) LAeq(15min) at the residential and non-	Section 5.

	residential receivers in Catchments A / B / C, Kingscliff TAFE and Kingscliff High School, including (but not limited to): (i) proposing suitable location of the noise generating equipment so that the predicted construction noise levels at the residential and non-residential receivers in Catchments A / B / C can be lowered; (ii) intra-day respite periods (such as one hour of respite every three hours or exclusion of such works on the Saturdays); (iii) scheduling of the noisy activities outside the sensitive times of the day and specific periods of the year; (iv) equipment-specific temporary screening for noisy equipment or use of noise control measures in AS-2436; and (v) use of noise shields where feasible.	
B16.h	include details of noise monitoring procedures and the location of the loggers on the eastern and southern boundaries of the Site, and at the Tweed Coast / Cudgen Road intersection, facing the sensitive receiving catchments, to record the noise levels generated by the construction activities, and to ensure that appropriate notification occurs in the event that the construction noise level exceeds 75dB(A) LAeq(15min) at a receiver, so that mitigation measures can be incorporated on the Site at that time;	Section 5.4. This Plan only covers activities related to the Tweed Coast/Cudgen Road intersection.
B16.i	provide details of the surveys of each of the key vibration generating activity / equipment and the predicted vibration levels of the equipment.	Section 4.5.
B16.j	include details of vibration monitoring techniques to be implemented when vibration levels exceed the prescribed criteria identified in the Noise and Vibration Impact Assessment for SSDA Tweed Valley Hospital Stage 2' by JHA dated 19 September 2019	Section 5.5.
B16.k	include strategies that have been developed with the community (specifically residents in Catchments A and B), Kingscliff TAFE and Kingscliff High School for managing high noise and vibration generating works, especially during the Tweed Coast Road / Cudgen Road intersection upgrade works;	Section 5.
B16.l	describe the community consultation undertaken to develop the strategies in condition B16(g).	Section 5.1.8.
B16.m	include details of a complaints management system that would be implemented for the duration of the construction.	Section 5.8.

3 Project Overview

3.1 Site Location

The project is located along the Tweed Coast Road and Cudgen Road intersection in Cudgen, NSW. The site extends approximately 400m along the Tweed Coast Road with returns along Cudgen Road to the east and west. Approximate location of works shown in Figure 1 below.

Figure 1 Site location.

3.2 Construction Activities

The project will include:

- Reconstruction, widening and improvements to the existing Tweed Coast Road and Cudgen Road.
- Upgrade of existing road surface and pavement of footpath and median islands along with new road foundations; and
- Realignment and signalisation of the intersection of Tweed Coast and Cudgen Road.

The construction program for the Project includes the following:

- Clearing and grubbing of trees along project alignment;
- Demolition of existing road;
- Earthworks required for road widening; and
- Road pavement resurfacing.

Based on the above activities, the highest impacts are envisaged to be caused by the following plant and equipment:

- Earthworks to prepare the site for road widening and upgraded drainage;
- Pavement demolition;
- Concrete median/ traffic islands to be removed; and
- Road pavement resurfacing.

The time periods for high impact construction activities shall be during standard daytime time hours of Monday to Saturday 7:00am to 6:00pm. The duration for individual activities is outlined in the proposed construction schedule presented in Appendix A.

3.3 Legislation

The project will be undertaken in accordance with the following legislation:

- ANZECC Guidelines Technical Basis for Guidelines to minimise Annoyance due to Blasting Over pressure and Ground Vibration
- Australian Standard AS2436 (1981) Guide to Noise Control on Construction, Maintenance and Demolition Sites Australian Standard AS2601 (1991) Demolition of Structures.
- AS 1055.1-1997 Acoustics – Description and measurement of environmental noise – General Procedures AS 1055.2-1997 Acoustics – Description and measurement of environmental noise – Application to specific situations
- NSW Environmental Protection Authority (EPA)
- Noise Policy for Industry (NSW NPI) 2017
- NSW EPA Interim Construction Noise Guideline 2009
- NSW EPA Assessing Vibration: A Technical Guideline 2006
- Local Government Act 1993

4 Aspects and Impacts

4.1 Site Access and Facilities

The proposed site access route and location of the proposed site facilities are presented in Appendix B.

All construction traffic will travel via the local road network.

4.2 Predicted Noise Levels

Estimated construction noise levels for various plant types are presented below as identified for use on the project.

Table 2 Estimated noise levels from various types of plant.

Activity	Equipment	Sound pressure level @ 10m LpA dB(A)	Sound power level LwA dB(A)
Clearing & Grubbing	Chipper (tree mulcher)	89	117
	Chainsaw	77	105
	Excavator (14t)	77	105
Earthworks	Excavator (14t)	77	105
	Body trucks	79	107
Pavement Demolition	Road profiler	82	110
	Excavator (14t)	77	105
	Body trucks	79	107
Pavement Resurfacing	Asphalt paver	84	112
	Vibratory rollers (10-15t)	74	102
	Body trucks	79	107
Concrete Works	Concrete mixer truck	79	107

4.3 Nearest Noise and Vibration Sensitive Receivers

The list of the nearest vibration sensitive receivers to the project site are listed in the table and presented in the figure below.

Table 2 Nearest sensitive receivers.

Property Description	Street Address	Current Use
1DP593182	740 Cudgen Road	Residential
6DP727425	741 Cudgen Road	Commercial
11DP1269398	771 Cudgen Road	Hospital
SP40765	1/6 John Rob Way	Residential
SP40765	2/6 John Rob Way	Residential
SP40765	3/6 John Rob Way	Residential
SP40765	4/6 John Rob Way	Residential
SP40765	5/6 John Rob Way	Residential
SP40765	6/6 John Rob Way	Residential
SP40765	7/6 John Rob Way	Residential
SP40765	8/6 John Rob Way	Residential
SP40765	9/6 John Rob Way	Residential
SP40765	10/6 John Rob Way	Residential
SP37874	8 John Robb Way	Residential
SP54424	10 John Robb Way	Residential
SP40722	12 John Robb Way	Residential
SP41601	14 John Robb Way	Residential
SP45889	16 John Robb Way	Residential
95DP792161	18 John Robb Way	Residential
94DP792161	20 John Robb Way	Residential
93DP792161	22 John Robb Way	Residential
92DP792161	24 John Robb Way	Residential
91DP792161	26 John Robb Way	Residential
90DP792161	28 John Robb Way	Residential
89DP792161	30 John Robb Way	Residential
88DP792161	32 John Robb Way	Residential
87DP792161	34 John Robb Way	Residential

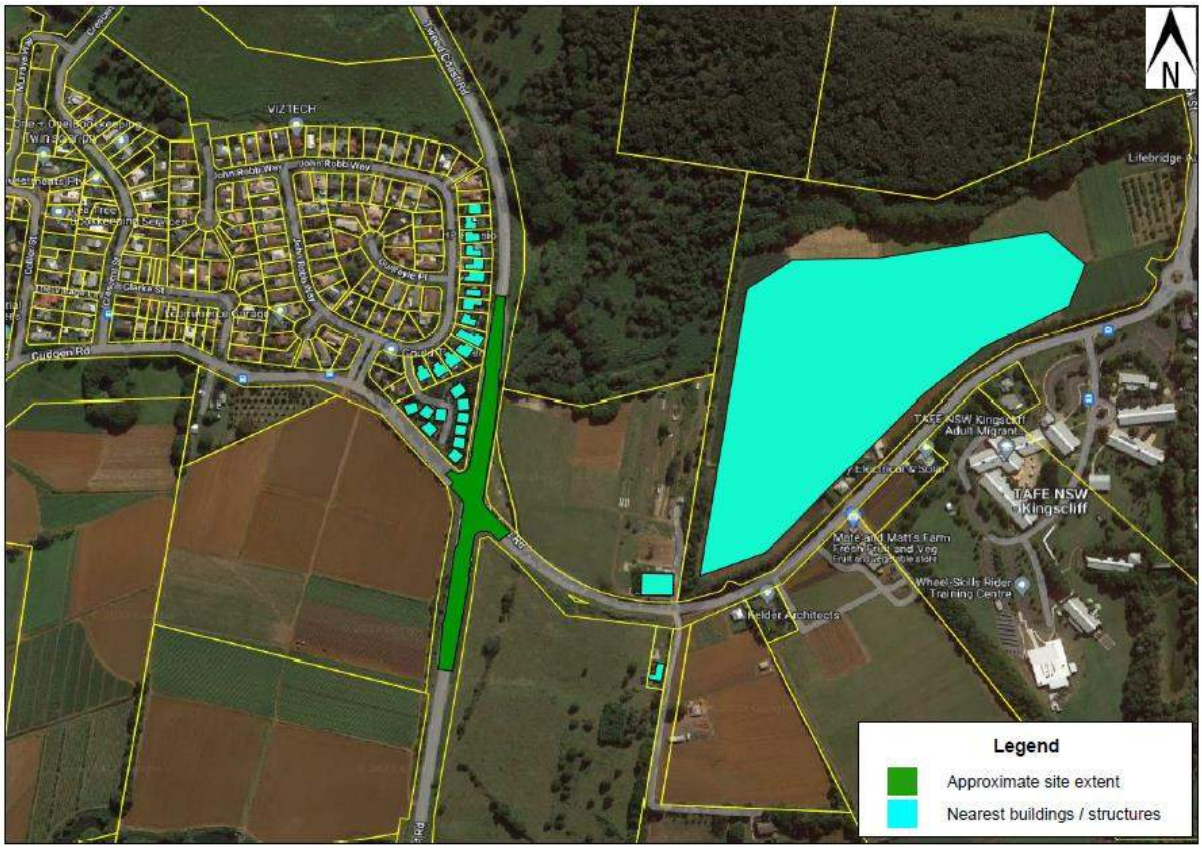


Figure 2 Nearest sensitive receivers.

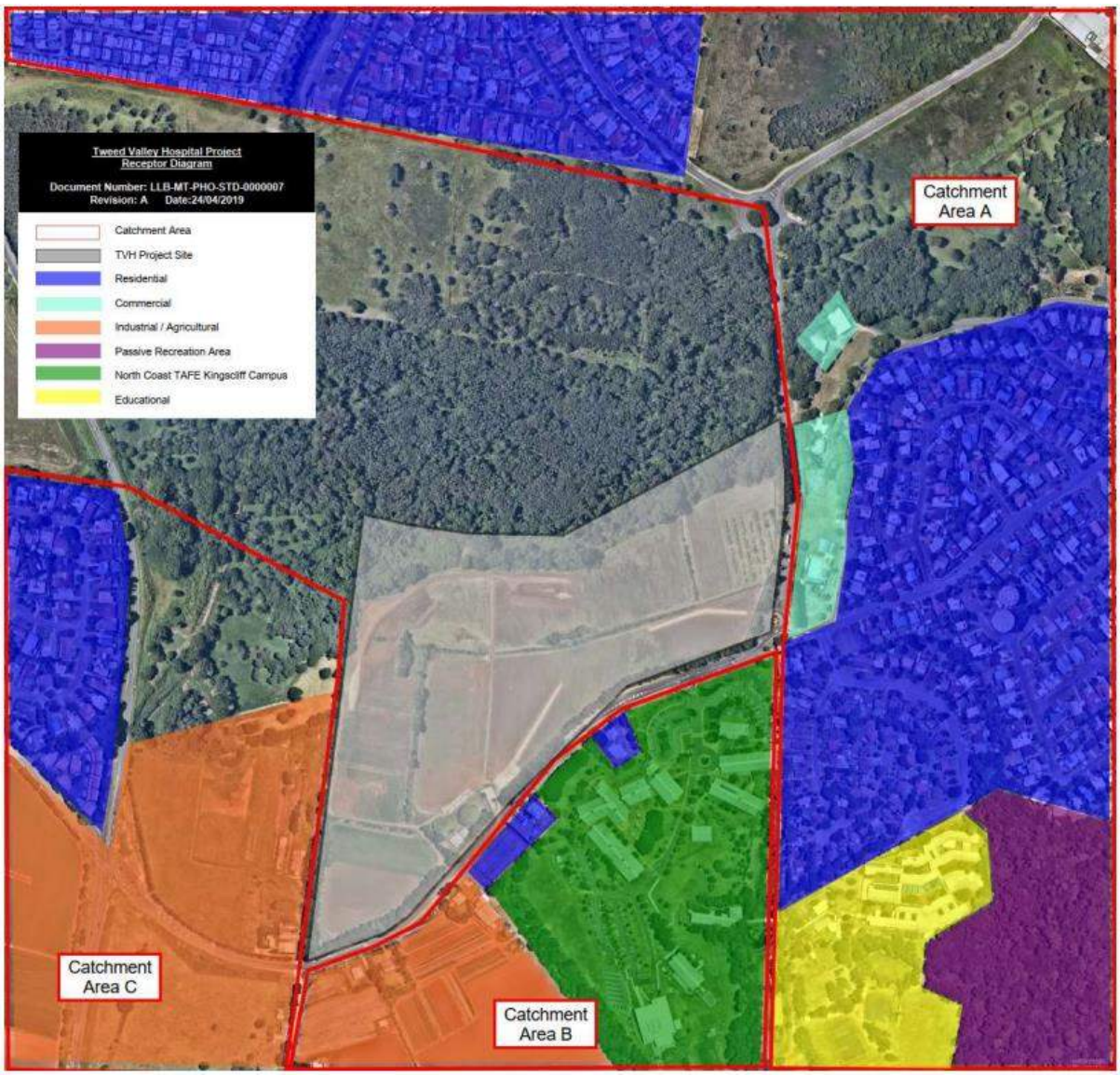


Figure 3 Noise catchments near site. Works for the project will only impact Catchment Area C.

Works will be limited to Catchment Area C and it is not anticipated that construction generated noise or vibration will affect receivers in Catchments A or B.

4.4 Noise Criteria

The table below sets out management levels for noise at residences and how they are to be applied. The rating background level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period.

Table 3 Noise at residences using quantitative assessment.

Location	Work Period		Construction noise limit at external facades* $L_{Aeq,adj,15min}$ dB(A)
All noise sensitive receptors	Standard hours	Mon-Sat: 7am-6pm	RBL + 10 dB(A)
	Non-standard hours	Sunday or public holidays	RBL + 5 dB(A)

4.5 Vibration Criteria

4.5.1 Human Comfort Criteria

The human comfort vibration criteria applicable to this project are presented in the table below.

Table 4 Human comfort vibration criteria (continuous and impulsive).

Building	Assessment Period	Vibration acceleration (m/s^2) 1-80Hz			
		Preferred values		Maximum values	
		z-axis	x- and y-axes	z-axis	x- and y-axes
Continuous vibration					
Critical working areas (e.g. hospital operating theatres, precision laboratories)	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Day-time	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
Workshops	Day or night-time	0.04	0.029	0.080	0.058
Impulsive vibration					
Critical working areas (e.g. hospital operating theatres, precision laboratories)	Day or night-time	0.0050	0.0036	0.010	0.0072
Residences	Day-time	0.30	0.21	0.60	0.42
Offices, schools, educational institutions and places of worship	Night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

Table 5 Human comfort vibration criteria (intermittent).

Building	Assessment Period	Vibration does values ($m/s^{1.75}$) 1-80Hz	
		Preferred values	Maximum values
Intermittent vibration			
Critical working areas (e.g. hospital operating theatres, precision laboratories)	Day or night-time	0.1	0.2
Residences	Day-time	0.2	0.4
	Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	Day or night-time	0.4	0.8
Workshops	Day or night-time	0.8	1.6

4.5.2 Building Damage Criteria

The building damage criteria applicable to this project are presented in the table below.

Table 6 Building damage criteria.

Standard	Measurement Location	Vibration descriptor	Objective	Vibration Limit	
				Light framed / Residential buildings	Reinforced buildings / Commercial or industrial buildings
BS7385-2	Building foundation	Peak Particle Velocity in x, y and z components (mm/s)	No cosmetic or structural damage to buildings.	*Line 2:* 15 to 50 mm/s (depends on frequency)	*Line 1:* 50 mm/s
DIN4150-3	Building foundation	Peak Particle Velocity in x, y and z components (mm/s)	No cosmetic or structural damage to buildings.	*Line 2:* 5 to 20 mm/s (depends on frequency)	*Line 1:* 20 to 50 mm/s (depends on frequency)

4.5.3 Underground Services

DIN4150.3 presents guideline values for evaluating the effects of short-term vibration on buried pipework and is summarized in the table below.

Table 7 Underground services criteria.

Duration of vibration	Maximum PPV
Intermittent or transient	30 mm/s
Continuous	15 mm/s

The underground infrastructure that is located within or adjacent to the construction site boundaries are as follows:

- AARNet buried cabling;
- Essential Energy Services buried services;
- NBN Co. NSW buried cabling;
- Optus and/or Uecomm NSW buried cabling;
- Telstra NSW North buried cabling;
- Transport for NSW buried services; and
- Tweed Shire Council (sewer, water, and stormwater assets).

4.6 Predicted Vibration Levels

The construction activities which may cause vibration impacts include, but are not limited to:

- Demolition of existing road surfaces, paths and channels using hydraulic breaker;
- Pavement construction with vibratory roller for compaction; and
- Use of excavators and other mobile plant.

The vibratory roller and hydraulic breaker are expected to generate the highest vibration levels of any construction activity on this project and will be the focus of this assessment.

Use of the other non-vibratory mobile plant typically does not generate ground vibration levels high enough to damage structures.

The potential vibration impacts are dependent on the following factors:

- Impact or vibratory energy of the construction plant and equipment;
- Efficiency of the coupling between the ground and the receptor structures;
- The number of plant and equipment engaged;
- The time and day on which works are carried out (i.e. standard or non-standard works);
- Distance between the vibration source and nearest sensitive receptors;
- Geological conditions;
- Topography;
- Susceptibility of the structure to resonant response under the vibration input (i.e. amplification or attenuation response of the structure); and
- The vibration control measures implemented on the site (i.e. the implementation of vibration management measures).

The predicted vibration levels at the nearest sensitive structures/receptors from the proposed hydraulic breakings are shown below.

Nearest Structure	Property Description	Type of Receptor	Closest Horizontal Distance from Plant, m	Peak Particle Velocity, mm/s Hydraulic Breaker		
				CAT H95S	CAT H115 S	CAT H130 S
DIN4150-3 Vibration criteria for no cosmetic or structural damage to buildings: Line 2 – 5 mm/s for dwellings and buildings of similar design and use						
740 Cudgen Road	1DP593182	Residential	249.6	0.1	0.1	0.1
741 Cudgen Road	6DP727425	Commercial	193.9	0.1	0.1	0.2
771 Cudgen Road	11DP1269398	Hospital	258.5	0.1	0.1	0.1
1/6 John Rob Way	SP40765	Residential	70.5	0.3	0.4	0.5
2/6 John Rob Way	SP40765	Residential	52.9	0.4	0.6	0.7
3/6 John Rob Way	SP40765	Residential	37.9	0.6	0.8	1.0
4/6 John Rob Way	SP40765	Residential	23.5	1.0	1.4	1.7
5/6 John Rob Way	SP40765	Residential	46.9	0.5	0.6	0.8
6/6 John Rob Way	SP40765	Residential	19.1	1.2	1.7	2.1
7/6 John Rob Way	SP40765	Residential	23.1	1.0	1.4	1.7
8/6 John Rob Way	SP40765	Residential	61.9	0.3	0.5	0.6
9/6 John Rob Way	SP40765	Residential	81.4	0.2	0.3	0.4
10/6 John Rob Way	SP40765	Residential	67.5	0.3	0.4	0.5
8 John Robb Way	SP37874	Residential	60.3	0.3	0.5	0.6
10 John Robb Way	SP54424	Residential	39.6	0.5	0.8	0.9
12 John Robb Way	SP40722	Residential	27.2	0.8	1.2	1.4
14 John Robb Way	SP41601	Residential	23.9	0.9	1.3	1.6
16 John Robb Way	SP45889	Residential	31.9	0.7	1.0	1.2
18 John Robb Way	95DP792161	Residential	59.9	0.3	0.5	0.6
20 John Robb Way	94DP792161	Residential	81.4	0.2	0.3	0.4
22 John Robb Way	93DP792161	Residential	97.2	0.2	0.3	0.4
24 John Robb Way	92DP792161	Residential	116.0	0.2	0.2	0.3
26 John Robb Way	91DP792161	Residential	132.2	0.1	0.2	0.3
28 John Robb Way	90DP792161	Residential	150.3	0.1	0.2	0.2
30 John Robb Way	89DP792161	Residential	170.5	0.1	0.2	0.2
32 John Robb Way	88DP792161	Residential	187.4	0.1	0.1	0.2
34 John Robb Way	87DP792161	Residential	205.8	0.1	0.1	0.2
BS5228-2 Vibration criteria for evaluating the effects of continuous vibration on underground services: 15 mm/s						
Underground Services	—	Underground Services	<1.0	31.1	44.0	53.9

The prediction of vibration levels associated with vibratory roller compaction was based on the empirical formulae presented below.

Street address	Property description	Type of Receptor	Closest Horizontal Distance from Plant, m	Peak Particle Velocity, mm/s				
				Vibratory Roller				
				CAT CS56B		DYNAPAC CC10	BOMAG BW 213 D-40	
				Low	High	High	Low	High
DIN4150-3 Vibration criteria for no cosmetic or structural damage to buildings: Line 2 – 5 mm/s for dwellings and buildings of similar design and use								
740 Cudgen Road	1DP593182	Residential	235.5	0.14	0.44	0.10	0.14	0.38
741 Cudgen Road	6DP727425	Commercial	168.8	0.21	0.67	0.15	0.21	0.58
771 Cudgen Road	11DP1269398	Hospital	235.2	0.14	0.44	0.10	0.14	0.38
1/6 John Rob Way	SP40765	Residential	9.0	7.48	23.48	5.78	7.26	20.21
2/6 John Rob Way	SP40765	Residential	9.7	6.91	21.69	5.30	6.71	18.67
3/6 John Rob Way	SP40765	Residential	10.6	6.29	19.72	4.77	6.10	16.98
4/6 John Rob Way	SP40765	Residential	9.7	6.91	21.69	5.30	6.71	18.67
5/6 John Rob Way	SP40765	Residential	37.3	1.45	4.54	1.02	1.40	3.90
6/6 John Rob Way	SP40765	Residential	10.8	6.16	19.32	4.67	5.97	16.64
7/6 John Rob Way	SP40765	Residential	17.8	3.51	11.01	2.55	3.40	9.48
8/6 John Rob Way	SP40765	Residential	52.8	0.94	2.95	0.65	0.91	2.54
9/6 John Rob Way	SP40765	Residential	72.2	0.63	1.99	0.44	0.61	1.71
10/6 John Rob Way	SP40765	Residential	45.3	1.14	3.57	0.79	1.10	3.07
8 John Robb Way	SP37874	Residential	63.2	0.75	2.35	0.52	0.73	2.03
10 John Robb Way	SP54424	Residential	43.3	1.20	3.77	0.84	1.17	3.25
12 John Robb Way	SP40722	Residential	27.3	2.11	6.63	1.50	2.05	5.71

Street address	Property description	Type of Receptor	Closest Horizontal Distance from Plant, m	Peak Particle Velocity, mm/s				
				Vibratory Roller				
				CAT CS56B		DYNAPAC CC10	BOMAG BW 213 D-40	
				Low	High	High	Low	High
DIN4150-3 Vibration criteria for no cosmetic or structural damage to buildings: Line 2 – 5 mm/s for dwellings and buildings of similar design and use								
14 John Robb Way	SP41601	Residential	15.4	4.15	13.01	3.05	4.02	11.20
16 John Robb Way	SP45889	Residential	4.8	14.66	46.00	12.77	14.23	39.62
18 John Robb Way	95DP792161	Residential	17.6	3.56	11.16	2.59	3.45	9.60
20 John Robb Way	94DP792161	Residential	14.7	4.37	13.72	3.23	4.24	11.81
22 John Robb Way	93DP792161	Residential	17.7	3.53	11.08	2.57	3.43	9.54
24 John Robb Way	92DP792161	Residential	22.1	2.72	8.54	1.96	2.64	7.35
26 John Robb Way	91DP792161	Residential	36.5	1.49	4.66	1.04	1.44	4.01
28 John Robb Way	90DP792161	Residential	54.1	0.91	2.86	0.63	0.88	2.46
30 John Robb Way	89DP792161	Residential	73.9	0.62	1.93	0.42	0.60	1.66
32 John Robb Way	88DP792161	Residential	91.1	0.47	1.48	0.32	0.46	1.28
34 John Robb Way	87DP792161	Residential	108.2	0.38	1.19	0.26	0.37	1.02
Underground services: BS5228-2 Vibration criteria for evaluating the effects of continuous vibration on underground services: 15 mm/s								
Underground services	—	Underground services	<2.0**	48.3	151.4	61.0	46.9	130.5

5 Noise and Vibration Management Measures

5.1 General Management Measures

The following management measures will be implemented to mitigate noise and vibration impacts related to construction activities:

- Noise and vibration monitoring in accordance with project approvals.
- Restricting works to approved construction hours (as per Section 5.2).
- Selecting appropriately sized plant, equipment and tools.
- Ensuring all plant and equipment are fitted with noise silencing devices.
- Substituting noisy processes or plant with less noisy options.

- Restricting the times and/or duration of works.
- Communicating with the community on a regular basis and providing advanced notification of noisy works.
- Reduce vibration where possible by employing alternative methods.
- Consultation with potentially affected residents.
- Ensuring that safe working distances are maintained at all times.
- Stage noise and vibration generating works as much as practicable to minimise potential effects.
- Limit high noise and vibration generating activities such as hammering to the least sensitive times of the day (i.e. avoid early morning/evening where practical).
- Include respite periods where activities are found to exceed the 75 dB(A) Highly Affected Noise Level at receivers.
- Consideration of localised screening or barriers for high noise generating activities and isolated works.
- Where possible consider options that generate less noise i.e. the use of concrete sawing as opposed to jackhammering

5.1.1 Administrative Procedures

- Provide an induction to site personnel (including subcontractors) addressing the requirements of the Noise and Vibration Management Plan (NVMP) and their responsibilities with regard to noise and vibration management ensuring: work occurs within approved hours; appropriate mitigation and management measures are being utilised.
- Provide ongoing education of supervisors, operators and sub-contractors on the need to minimise noise and vibration through toolbox meetings and on-site training.
- Includes clauses that require minimisation of noise and vibration in subcontractor agreements.
- Provide a protocol for handling noise and vibration complaints.
- Organise work to be undertaken during Standard hours where reasonable and practicable to do so.
- Avoid the use of radios or stereos outdoors where neighbours may be affected.
- Avoid the overuse of external public address systems or link these systems to the telephone system where neighbours may be affected.
- Avoid shouting and minimise talking loudly and slamming vehicle doors.
- Avoid the use of horns within the construction area, except in the case of emergency or a requirement for safety.
- Minimise mobile equipment reversing/movement or use alternative beepers, such as 'broadband noise beepers' or warning systems. All warning signals should meet the relevant occupational safety requirements. This should be implemented for plant operating during night-time hours where reasonable and practicable.
- Where significant impacts are unavoidable, particularly at night, ensure that respite measures are implemented.
- Where respite measures are implemented and significant noise and vibration impacts still occur, consider alternative measures as a last resort.

5.1.2 Construction Traffic and Deliveries

- Setting the site entry and egress points as far from sensitive and critical receptors as practical. If sensitive sites surround the construction area, the entry and egress points should be designed to distribute the movements rather than direction all movements through a single entry/exit point.
- Providing on-site parking for staff and on-site truck waiting areas away from residences and other sensitive land uses.
- Avoiding unnecessary revving of engines and switching off equipment when not required.
- Positioning loading and unloading points away from sensitive and critical receptors.
- Avoiding traffic calming devices which may cause loads to shift or securing loads to limit shifting.
- Ensuring traffic movement is kept to a minimum (for example, ensuring trucks are fully loaded so that the volume of each delivery is maximised) and night-time construction traffic is redirected away from sensitive and critical receptors where possible.
- Regularly grading unsealed areas or fill potholes in sealed access roads and hardstand areas to reduce noise and vibration from vehicles.
- Refilling aggregate bins prior to the bins being completely empty.
- The use of broadband reversing alarms rather than beeping reverse alarms.

5.1.3 Plant and Equipment

- Any construction work that generates vibration (i.e. vibratory rollers) must be carried out at the safe working distances from sensitive structures presented in this report.
- Care should be taken when working in the vicinity of underground services to locate the exact alignment of the underground services prior to construction.
- Selecting plant and equipment based on noise and vibration emission levels.
- Turning off plant and equipment or throttling them down to a minimum when not in use.
- Selecting appropriately sized equipment for the task, such as vibratory compactors and rock excavation equipment.
- Selecting plant and equipment with low sound power levels (hydraulic or electric-controlled units shall be used instead of noisier diesel units).
- Avoid use of plant and equipment simultaneously adjacent to sensitive receptors where possible.
- Using alternative construction methods to minimise noise and vibration levels (for example, during clearing, excavators with grabs and rake attachments may be used instead of chainsaws).
- Using mufflers and engine covers/screens where appropriate.
- Ensuring equipment is operated in the correct manner and correctly maintained including replacement of engine covers, repair of defective silencing equipment, tightening of ratting components, repair of leakages in compressed air lines and shutting down of equipment not in use.

- Avoiding where possible the night-time use of equipment which generates impulsive noise (for example, dropping materials from a height; metal-to-metal contact on equipment).
- Lining aggregate bins and chutes with a rubber material, to dampen the vibration of the structure.
- Minimising drop height of materials when transferring (for example, loading and unloading vehicles and storage areas).
- Using damped tips on rock-breakers where appropriate.
- Replacing noisy fatigued sealed bearings on conveyor rollers.
- Silencing dust extraction fan exhausts and orienting them away from sensitive receptors.
- Enclosing standby generators or fitting them with an effective muffler.
- Isolating stationary plant located near sensitive receptors with resilient mounts.

5.1.4 Compaction

- Minimise the number of compaction passes as far as practical within the project constraints.
- Avoid turning the vibration mode on/off when stationary or moving too slowly, or when close to buildings.
- Avoid dynamic compaction using large tamping weights near sensitive and critical receptors.
- Where vibration limits may be exceeded in proximity to structures, the site supervisor should be notified immediately, and then determine and apply all appropriate remedial actions.
- Appropriate remedial actions include ensuring the vibration settings on the vibratory roller are set to the “low amplitude + high frequency” settings rather than the “high amplitude + low frequency” setting.

5.1.5 Transmission path

- Locating construction equipment in a position that provides the most acoustic shielding from buildings and topography.
- Consideration to constructing temporary enclosures/screens around especially noise activities, or clusters of noisy equipment (for example, loaded vinyl or plywood temporary acoustic barriers). Further guidance may be obtained in Australian Standard AS2436-2010.

5.1.6 Facility Layout

- Maximising acoustic shielding from topography and buildings and from structures and buildings associated with the facility (for example, storage units and temporary offices may be grouped together to form an effective acoustic barrier), for the nearest adjacent sensitive sites.
- Minimising reversing movements (and use of audible reversing alarms). For example, sites should be designed so that delivery vehicles can drive through the site and not be required to reverse. With asphalt plants and batch-plants, use drive-through loading bays rather than backup loading.

- Considering the layout and orientation of individual items of plant and equipment to ensure that, where at all practicable, intake and exhaust vents from fans, blowers and other items of powered mechanical plant are orientated away from noise sensitive sites (that is, maximise use of 'directivity' effects).
- Avoiding on-site fabrication work where possible. The use of enclosures (for example, well-sealed shed) may be an alternative, but ventilation should be adequate and not degrade the acoustic performance of the enclosure.

5.1.7 Respite

- Where all reasonable and practicable measures are implemented and noise and vibration impacts are unavoidable and significant, respite measures may be used. The provision of respite periods involves scheduling work during periods when people are least affected to minimise exposure. Provision of respite periods should follow consultation with the affected community and may include: scheduling work when premises are not in operation (for example, commercial and educational facilities may not operate outside typical business hours); restricting the number of nights per week that the works are undertaken near residences.
- Respite periods should be used during the construction, specifically during the use of the following equipment: - chipper (tree mulcher), excavator with hydraulic breaker attachment, vibratory roller, road profiler and asphalt paver.
- The respite periods shall involve work being carried out in continuous blocks that do not exceed 3 hours each, and with a minimum 1 hour respite period between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.

5.1.8 Community Consultation

- Good community consultation practices are a key component for the management of disruption from construction activities. Prior to construction commencing, clear communication channels must be established between the project team and those persons and organisations in the community potentially most affected by project related activities. This is particularly important for activities with potential for high levels of disruption, such as when night work will be required. It is important that information is provided in a transparent and consistent manner in relation to exposure, duration, mitigation and management measures.
- Proactive consultation with residents/sensitive receivers subsequent to any potential noise or vibration nuisances to check for any unknown issues.

5.2 Construction Hours and Work Scheduling

Works shall be carried out during standard (daytime) construction hours of Monday to Friday 07:00am to 6:00pm to minimise disruption to residents and achieve higher productivities.

Any works outside of standard working hours shall be subject to an Out of Hours Works approval.

5.3 Safe Working Distances

The minimum safe working distances must be maintained at all times throughout the project. If work is expected to occur near any vibration sensitive structure or underground asset that is within these safe working distances, then smaller equipment should be selected in order to comply with the safe working distances provided below.

Table 8 Safe working distances for hydraulic braeker.

Mechanical Plant / Equipment	Input Energy (J)	Minimum Working Distance							
		Human Comfort			Buildings			Underground Services	
		Non-standard hours, lower limit (0.3 mm/s)	Standard hours lower limit, Non-standard hours upper limit (1 mm/s)	Standard hours, upper limit (2 mm/s)	Cosmetic Damage to Heritage Buildings, (3 mm/s)	Cosmetic Damage to Dwellings, (5 mm/s)	Cosmetic Damage to Commercial Buildings, (20 mm/s)	Continuous Vibration, (15 mm/s)	Intermittent Vibration, (30 mm/s)
Hydraulic breaker – Energy classes as per column 2	400	32.5 m	10.9 m	5.8 m	4.0 m	2.5 m	0.7 m	0.9 m	0.5 m
	600	39.0 m	13.1 m	7.0 m	4.8 m	3.0 m	0.9 m	1.1 m	0.6 m
	800	44.5 m	14.9 m	7.9 m	5.5 m	3.4 m	1.0 m	1.3 m	0.7 m
	1000	49.3 m	16.5 m	8.8 m	6.1 m	3.8 m	1.1 m	1.4 m	0.7 m
	1500	59.2 m	19.8 m	10.6 m	7.3 m	4.6 m	1.3 m	1.7 m	0.9 m
	2000	67.5 m	22.6 m	12.0 m	8.3 m	5.2 m	1.5 m	1.9 m	1.0 m
	2500	74.7 m	25.0 m	13.3 m	9.2 m	5.8 m	1.6 m	2.1 m	1.1 m
	3000	81.1 m	27.2 m	14.5 m	10.0 m	6.3 m	1.8 m	2.3 m	1.2 m
	4000	92.5 m	31.0 m	16.5 m	11.4 m	7.2 m	2.0 m	2.6 m	1.4 m
	5000	102.4 m	34.3 m	18.2 m	12.6 m	7.9 m	2.2 m	2.9 m	1.6 m
	6000	111.2 m	37.2 m	19.8 m	13.7 m	8.6 m	2.4 m	3.2 m	1.7 m
	8000	126.7 m	42.4 m	22.6 m	15.6 m	9.8 m	2.8 m	3.6 m	1.9 m

Mechanical Plant / Equipment	Input Energy (J)	Minimum Working Distance							
		Human Comfort			Buildings			Underground Services	
		Non-standard hours, lower limit (0.3 mm/s)	Standard hours lower limit, Non-standard hours upper limit (1 mm/s)	Standard hours, upper limit (2 mm/s)	Cosmetic Damage to Heritage Buildings, (3 mm/s)	Cosmetic Damage to Dwellings, (5 mm/s)	Cosmetic Damage to Commercial Buildings, (20 mm/s)	Continuous Vibration, (15 mm/s)	Intermittent Vibration, (30 mm/s)
Hydraulic breaker – Specific models as per column 2	CAT H95 S (2033 J)	68.0 m	22.8 m	12.1 m	8.4 m	5.3 m	1.5 m	1.9 m	1.0 m
	CAT H115 S (4065 J)	93.2 m	31.2 m	16.6 m	11.5 m	7.2 m	2.0 m	2.7 m	1.4 m
	CAT H130 S (6098 J)	112.0 m	37.5 m	20.0 m	13.8 m	8.7 m	2.5 m	3.2 m	1.7 m

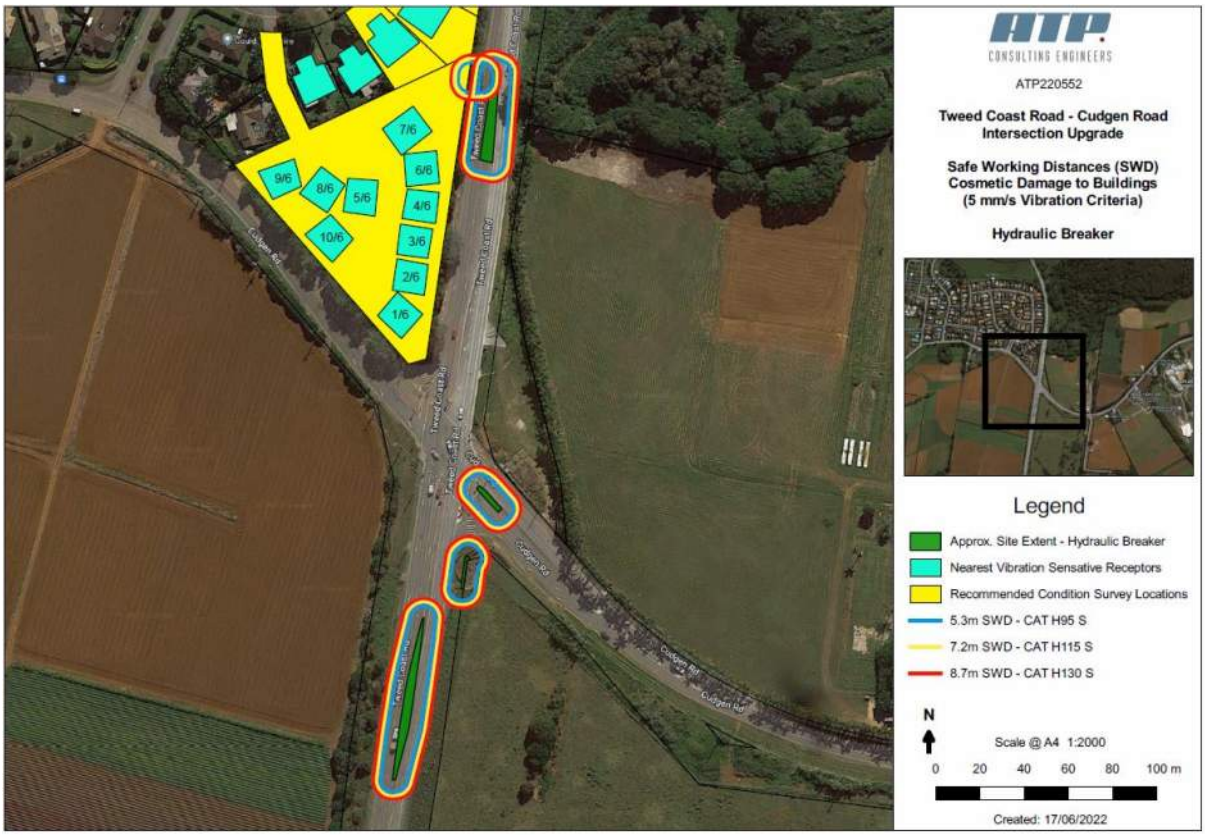


Figure 3 Safe working distances for hydraulic breaker to prevent cosmetic damage to buildings.

Table 9 Safe working distances for vibratory roller.

Mechanical Plant / Equipment	Model and Vibration Setting	Minimum Working Distance							
		Human Comfort			Buildings			Underground Services	
		Non-standard hours, lower limit (0.3 mm/s)	Standard hours lower limit, Non-standard hours upper limit (1 mm/s)	Standard hours, upper limit (2 mm/s)	Cosmetic Damage to Heritage Buildings, (3 mm/s)	Cosmetic Damage to Dwellings, (5 mm/s)	Cosmetic Damage to Commercial Buildings, (20 mm/s)	Continuous Vibration, (15 mm/s)	Intermittent Vibration, (30 mm/s)
Vibratory roller – Specific models as per column 2	CAT CS56B, Low-setting	130.1 m	50.2 m	28.6 m	20.4 m	13.1 m	3.5 m	4.7 m	2.2 m
	CAT CS56B, High-setting	316.4 m	124.0 m	71.9 m	52.1 m	34.5 m	10.5 m	13.6 m	7.1 m
	DYNAPAC CC10, High-setting	96.9 m	37.7 m	21.7 m	15.6 m	10.2 m	3.3 m	4.2 m	2.3 m
	BOMAG BW 213 D-40, Low-setting	127.0 m	49.0 m	27.9 m	19.8 m	12.7 m	3.4 m	4.6 m	2.1 m

Mechanical Plant / Equipment	Model and Vibration Setting	Minimum Working Distance							
		Human Comfort			Buildings			Underground Services	
		Non-standard hours, lower limit (0.3 mm/s)	Standard hours lower limit, Non-standard hours upper limit (1 mm/s)	Standard hours, upper limit (2 mm/s)	Cosmetic Damage to Heritage Buildings, (3 mm/s)	Cosmetic Damage to Dwellings, (5 mm/s)	Cosmetic Damage to Commercial Buildings, (20 mm/s)	Continuous Vibration, (15 mm/s)	Intermittent Vibration, (30 mm/s)
Vibratory roller – Specific models as per column 2	BOMAG BW 213 D-40, High-setting	281.7 m	110.3 m	63.8 m	46.2 m	30.5 m	9.1 m	11.9 m	6.2 m

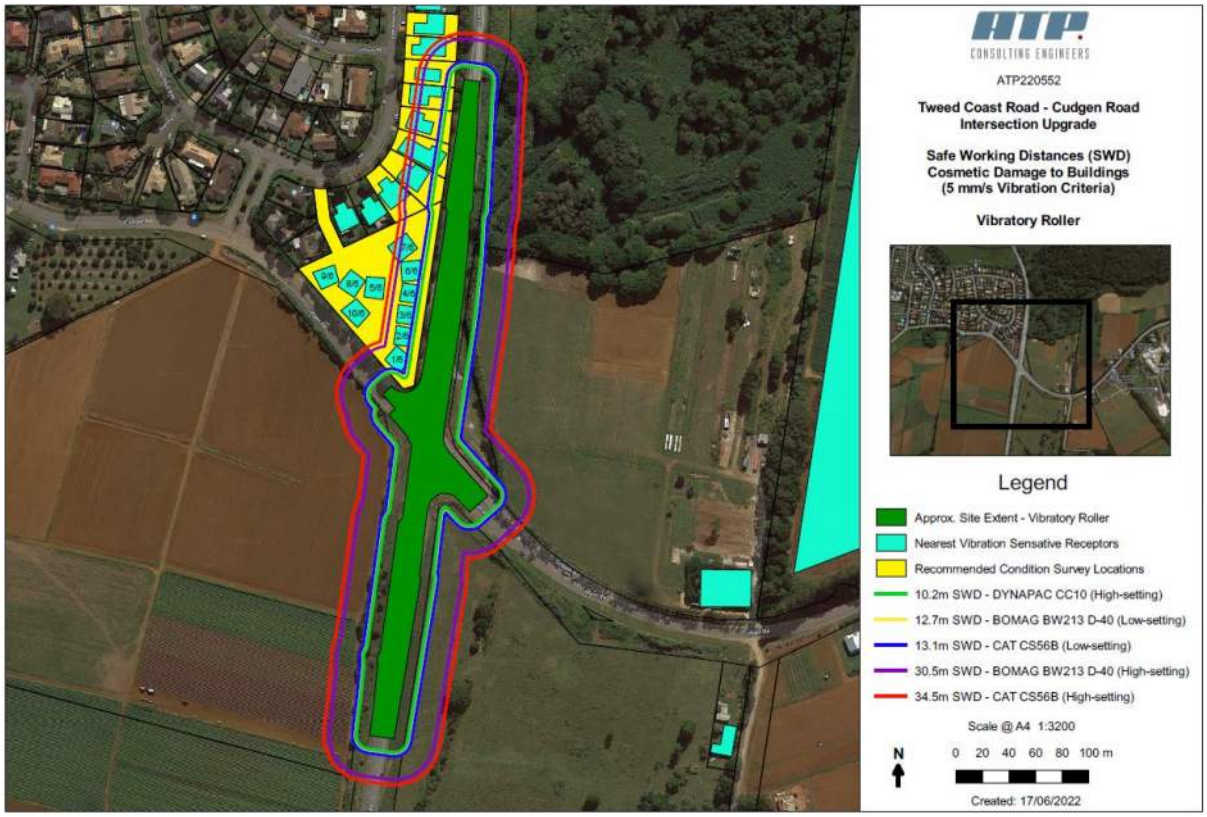


Figure 4 Safe working distances for vibratory roller to prevent cosmetic damage to buildings.

Table 10 Minimum construction clearance distance.

Asset owner	Minimum construction clearance distance			
	Jackhammers, pneumatic breakers	Vibrating plates, wacker packers	Mechanical excavators	Boring equipment (in-line, horizontal, vertical)
AARNet	1.0 m	0.5 m	1.0 m	2.0 m
NBN Co.	0.5 m	0.5 m	1.0 m	–
Optus	1.0 m	0.5 m	1.0 m	2.0 m
Telstra	1.0 m	0.5 m	1.0 m	2.0 m

Care should be taken to adhere to both the minimum safe working and construction clearance distances presented in Tables above. Adequate soil cover must be maintained when using mobile plant over underground services.

5.4 Condition Surveys

Conditional surveys are applicable to vibration sensitive buildings that are within the safe working distances of chosen vibration generating equipment.

Based on the results of this assessment, there is potential for exceedance of the building damage criteria only if working closer than the safe working distances presented in Section 5.3.

Condition surveys will be undertaken at locations recommended in the Construction Vibration Assessment (ATP, 2022) in Appendix A. The table below outlines the properties and scope of surveys.

1	1/6 John Rob Way, Cudgen NSW	Residential duplex	External areas of east elevation and surrounds only
2	2/6 John Rob Way, Cudgen NSW	Residential duplex	External areas of east elevation and surrounds only
3	3/6 John Rob Way, Cudgen NSW	Residential duplex	External areas of east elevation and surrounds only
4	4/6 John Rob Way, Cudgen NSW	Residential duplex	External areas of east elevation and surrounds only
5	5/6 John Rob Way, Cudgen NSW	Residential duplex	External areas of east elevation and surrounds only
6	6/6 John Rob Way, Cudgen NSW	Residential duplex	External areas of east elevation and surrounds only
7	14 John Rob Way, Cudgen NSW	Residential single storey	External areas of east elevation and surrounds only
8	16 John Rob Way, Cudgen NSW	Residential single storey	External areas of east elevation and surrounds only
9	18 John Rob Way, Cudgen NSW	Residential single storey	External areas of east elevation and surrounds only
10	20 John Rob Way, Cudgen NSW	Residential single storey	External areas of east elevation and surrounds only
11	22 John Rob Way, Cudgen NSW	Residential single storey	External areas of east elevation and surrounds only

5.5 Noise and Vibration Monitoring

Noise and vibration monitoring shall be undertaken at the location shown in figure 5 below.

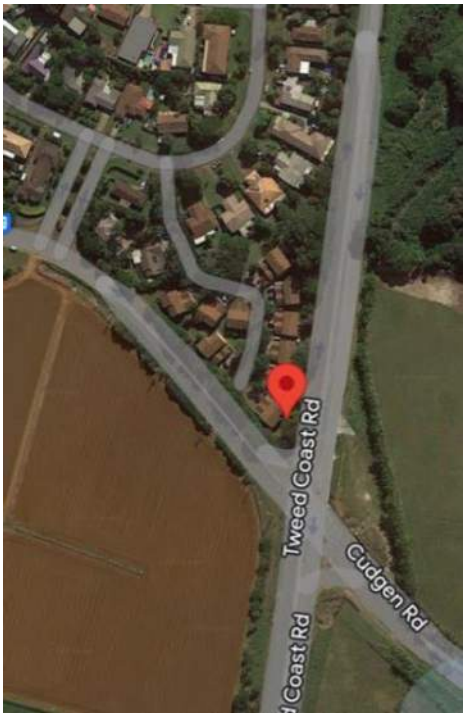


Figure 5 Location of noise and vibration monitoring.

Monitoring will consist of:

- Noise monitoring to record noise levels generated by construction activities to ensure that appropriate notification occurs in the event that the construction noise level exceeds 75dB(A) Laeq(15min) at a receiver.
- Vibration monitoring to ensure that notification occurs in the event that vibration levels exceed the prescribed criteria identified in the Noise and Vibration Impact Assessment for SSDA Tweed Valley Hospital Stage 2 (JHA, 2019).

Specific details of vibration and noise monitoring shall be included in monthly reports. Vibration monitoring is likely to consist of a vibration logger geophone burried at a depth of 300mm.

The vibration monitoring shall be carried out at an appropriate location.

The duration and timing of the vibration monitoring shall be long enough to encompass and measure the "worst case" construction vibration operations. The vibration monitoring shall measure the resultant PPV vibration levels and compare them to the vibration limits.

Vibration monitoring summary reports should be made available on a monthly basis.

The Project Manager or authorised staff member should maintain the following records:

- Daily record of the construction operations carried out (e.g. construction details, number of trucks arriving and leaving the site) for reference with any complaint investigation and noise and/or vibration monitoring.
- Noise and/or vibration monitoring records.
- Any complaints as per the Complaint Procedure in the EMP.

  - These records will be available for audit by the relevant Administrative Authority on request and supplied in monthly reports.
- The Project Manager or authorised staff member will notify any complaints to TSA.
- If the results of monitoring indicate exceedance of the noise and/or vibration limits, appropriate mitigation measures should be implemented to reduce the vibration levels, with consideration of:
  - Types of construction work to be carried out;
  - Durations of the construction work; and
  - Terrain characteristics.
- The Project Manager/Site Foreman will carry out regular reviews of the implementation of the noise and vibration management practices. The audit will especially consider the level of compliance with the following:
  - Implementation of the requirement for noise emissions to be kept as low as practicably possible;
  - Implementation of the requirement for vibration control (by maintaining the recommended safe distances from sensitive receptors); and
  - Auditing compliance by assessing the number of noise and vibration complaints.

5.6 Corrective Action

The Project Manager/Site Foreman will be responsible for immediate rectification of any identified non-conformance with the objectives of this NVMP.

In the event that a non-conformance occurs as a result of poor practices, personnel on site will be made aware of the problem and informed of acceptable work practices.

Observations and complaints shall be used to guide implementation of additional measures, if and when required.

5.7 Contingencies

During construction the Contractor shall allocate sufficient resources (personnel and materials) to the site to immediately attend to any non-conformance and/or emergency event.

Corrective actions may be agreed upon, dependent upon the severity of non-conformance and/or emergency and parameter involved, between the Contractor, any sub-contractors and the regulatory authorities.

5.8 Responsibilities

The primary responsibility for the implementation of the noise control measures rest with the Project Manager and all employees, as well as any Sub-Contractor and employees. The specific responsibilities that pertain to this NVMP are presented in the table below.

Party	Primary responsibility
Project Manager	• Overall implementation of the NVMP and management of potential noise or vibration impacts and risks. • Responsible for reporting any incidents to relevant authorities if required. • Issue and distribution of NVMP. • Revision of the NVMP, as required, to reflect site conditions and instructions from the regulatory authorities. • Revisions are to be made by replacing the entire document by consecutively numbered amendments.
Project engineer / Site foreman	• Implementation of strategies, requirements, procedures and measures to ensure that appropriate noise and vibration control measures are in place. • To attend construction at all times during working hours. • Site inspections to ensure adherence to the commitments under the NVMP. • Direct actions, as required, to protect the noise amenity of the local environment and to minimise and/or rectify any concerns. • Direct actions, as required, to prevent vibration impacts which may cause nuisance, cosmetic or structural damage.
All other site personnel	• Responsible for a General Environmental Duty under the Environmental Protection Act 1994. • Responsible for environmentally sound management of operations and reporting any observed incidents to the Site Foreman. • Adherence to Site Safety Rules, the Emergency Plan and the NVMP.
Environmental Manager	• Assist with implementation, monitoring, reporting and corrective actions as required by the Project Manager.

5.9 Complaints and Incidents

Complaints received by external parties will be subject to investigation.

Should an incident of noise or vibration impact occur during construction the Contractor shall take prompt action to minimise any impact and, where necessary, seek the advice of the Administrator.

Complaints will be assessed and will contain the following information listed below and as outlined:

- Identification of all work practices and equipment to which the complaint relates;
- Identification of all the nearest sensitive receptors in the vicinity of the project area to which the complaint relates;
- Noise and/or vibration monitoring methodology and instrumentation;

- Noise and/or vibration levels measured at the most exposed location at the nearest sensitive place where the complaint has originated; and
- Analysis of the data and discussion of the results relative to the relevant criteria.

If the results of the noise and/or vibration monitoring indicate exceedance of the noise and/or vibration limits, appropriate mitigation measures should be implemented to reduce the noise and/or vibration levels, with consideration of:

- Types of construction work to be carried out;
- Durations of the construction work; and
- Terrain characteristics.

5.10 Awareness and Training

A copy of this NVMP will be available from the following officers at the site:

- Project Manager;
- Environmental Manager; and
- Safety Advisor.

Awareness and Training forms shall be part of Safety Inductions conducted prior to commencement of the construction work. As part of site induction and training all personnel engaged in construction shall be made aware of the provisions of the NVMP in order to promote a general awareness of the potential for noise and vibration generation and to minimise any potential impacts. Evidence of environmental induction of personnel in this project shall be maintained on project records.

Appendix A – Construction Vibration Assessment

Appendix H – Air Quality Management Plan

Appendix G

Air Quality and Dust Management Sub Plan

Prepared for

Tweed Coast Road – Cudgen Road Intersection

DOCUMENT CONTROL & DISTRIBUTION

REVISION REGISTER

Rev.	Date	Prepared by	Reviewed by	Approved by
0	13/07/22	[redacted]	[redacted]	[redacted]
1	31/08/22	[redacted]	[redacted]	[redacted]

REVISION STATUS

Rev.	Section Changes
0	Issue for Construction

DISTRIBUTION LIST

Position	Name	Organisation
Principal's Authorised Person	[redacted]	TSA Mgt
Operations Manager	[redacted]	HBQ
Project Manager	[redacted]	HBQ
Senior Project Engineer	[redacted]	HBQ
Project Supervisor	[redacted]	HBQ
Project Environmental Officer	[redacted]	HBQ
Senior Safety Advisor	[redacted]	HBQ
Project Safety Advisor	[redacted]	HBQ

Contents

1 Introduction

1.1 Purpose

The actions specified within this Air Quality Management Sub-Plan (AQMSP) aim to reduce and manage the potential impacts to the environment during the construction of the Tweed Coast Road and Cudgen Road Intersection. This AQMSP is to be read in conjunction with the Hazell Bros' (BH) Environmental Management Plan (EMP).

The purpose and objectives of this Sub-Plan are to:

- Describe how construction impacts on air quality will be minimised and managed for the duration of the project.
- Ensure full compliance with the relevant legislative requirements and project approvals.
- Ensure training on best practice air quality management is provided to all construction personnel through site inductions.

This Plan has been developed by [redacted] (BSc Env Sci), Hazell Bros' Environmental Scientist and is to be reviewed by Council post approval from TSA. This Plan has been developed for Stage 2 works of the development and as such this new plan is be consistent with the air quality and dust control measures adopted in the Stage 1 CAQDMSP for SSD-9575.

1.2 Existing Environment

The site is located on the outskirts of Cudgen village and more broadly intensive agricultural and rural land holdings. Air quality within the locality is expected to be reasonable with no known offensive or foul industries located nearby. Tweed Coast Road would be the primary source of fugitive emissions associated with vehicles within the subject site.

1.3 Addressed Approval/ Request for Tender Conditions

Project Approval/ Request for Tender conditions addressed in this sub-plan are summarised in **Table 1.1**.

Table 1.1 Project Approval/ Request for Tender Conditions Addressed in this Sub-Plan

Condition No.	Requirement	Section of the Plan
Conditions of Consent		
B20.	B20. The Construction Air Quality Management and Dust Management Sub-Plan (CAQDMSP) and the plan must address, but not be limited to the following:	This Plan.
B20.a	be prepared by a suitably qualified expert, in consultation with Council;	Section 1.
B20.b	be consistent with the air quality and dust control measures adopted in the Stage 1 CAQDMSP for SSD-9575	Section 1.
B20.c (i)	describe the measures that would be implemented on Site to ensure: (i) the control of air quality and odour impacts of the Development, in particular, during rock crushing and piling activities; fire incidents or any other activity agreed by the Planning Secretary	Section 4. No rock crushing or piling activitie to occur.
B20.c (ii)	(ii) that these controls remain effective over time;	Section 3.2.
B20.c (iii)	(iii) that all reasonable and feasible air quality management practice and measures are employed, with specific reference to the rock crushing and piling activities;	Section 4. No rock crushing or piling onsite.
B20.c (iv)	(iv) the air quality impacts are minimised during adverse meteorological conditions or extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Planning Secretary;	Section 4.
B20.c (v)	(v) compliance with the relevant conditions of this consent.	Section 4.
B20.d	include performance objectives for monitoring dust and ensuring no off-site air quality impacts to users of Kingscliff TAFE, and nearby residences and other businesses;	Section 3.1
B20.e	includes an air quality monitoring program that: (i) is capable of evaluating the performance of the construction works; (ii) includes a protocol for determining any exceedances of the relevant conditions of consent and responding to complaints; (iii) adequately supports the air quality performance objectives; and (iv) evaluates and reports on the effectiveness of air quality management for the construction works.	Section 4.
B20.f	details on monitoring weather conditions and communicating changing conditions to the workforce.	Section 4.
C23.	The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent.	Section 4.
C24.	During construction, the Applicant must ensure that: (a) exposed surfaces and stockpiles are suppressed by regular watering; (b) all trucks entering or leaving the site with loads have their loads covered; trucks associated with the development do not track dirt onto the public road network; (d) public roads used by these trucks are kept clean; (e) land stabilisation works are carried out progressively on site to minimise exposed surfaces; and (f) minimise air quality impacts of the project during adverse meteorological conditions.	Section 4.

Condition No.	Requirement	Section of the Plan
C25	The Applicant must install and operate equipment in line with best practice to ensure that the construction works comply with all load limits, air quality criteria / air emission limits and air quality monitoring requirements as specified in the CAQMSP.	Section 4.
C26	Dust deposition monitoring must be undertaken during the construction works (as per AS/NZS 3580). Monitoring locations must include sensitive receivers that are most likely to be affected. The locations and frequency of the monitoring are to be detailed within the CAQMSP.	Section 3.2 and Section 4.

2 Environmental Impacts

2.1 Potential Impacts

Air quality impacts during construction of the proposal are possible due to dust generation and vehicle and machinery emissions. Dust emission sources are likely to include:

- Material handling during earthworks.
- Loading and dumping of material.
- Levelling, grading and compacting of disturbed soil surfaces.
- Wind erosion of exposed unstable soil surfaces and localised stockpiles.
- Traffic movements and plant operation.
- Soil handling and stockpiling.
- Storage and handling of materials.

The Review of Environmental Factors (TSC) indicated that the level of dust generation associated with road construction work under worst case meteorological conditions could result in short-term dust impacts.

Vehicle exhaust emissions during the construction phase have the potential to impact on air quality. However the impact is likely to be negligible given the limited amount of equipment, distance to receptors and the short-term construction period. Management controls and strategies to mitigate these impacts are provided in Section 4 below.

The closest receptors to site are located in Catchment C, which is comprised of residential and agricultural land use. It is not expected that works will impact Catchment A or B.

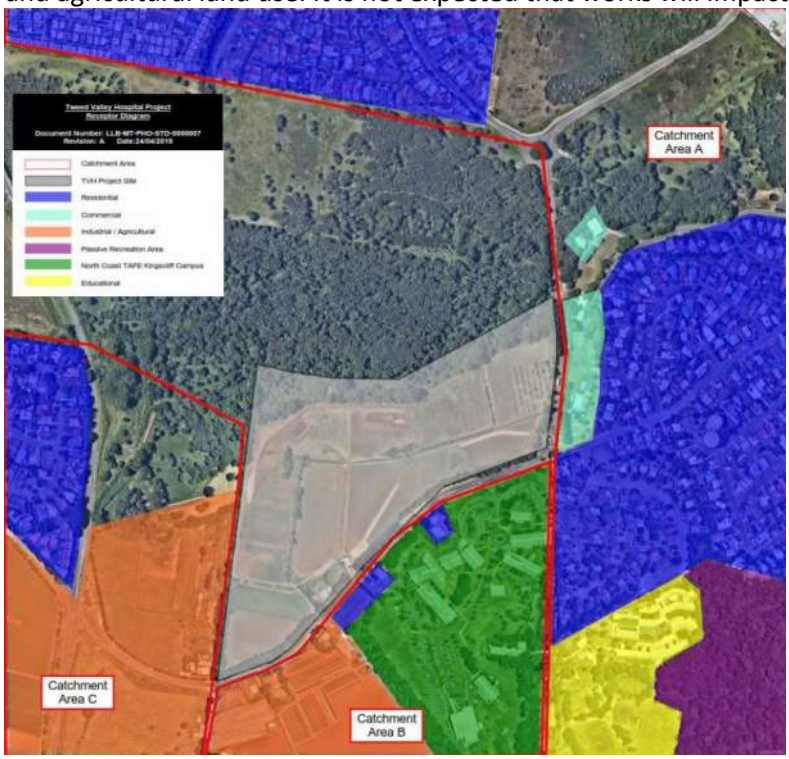


Figure 1 Noise catchments and surrounding land uses.

3 Performance Criteria

3.1 Performance Criteria

- Impacts from dust emissions are minimised.
- No adverse air quality impacts or complaints at sensitive receivers.
- Vehicle exhaust emissions during the construction are minimised.

3.2 Monitoring and Inspections

3.2.1 Inspections

Regular monitoring and inspections will be undertaken throughout construction to ensure air quality management measures are being implemented. The following monitoring and inspections will be undertaken:

- **Daily inspection**: -Daily inspections of environmental controls, the weather through (BOM website and local conditions) and construction works will be undertaken by the Site Supervisor. This includes visual monitoring for dust and ensuring daily inspections of plant are undertaken.
- **Weekly inspections**: Will be undertaken by the Environmental Officer (or delegate) (including inspection of stockpile areas). The inspection would focus on ensuring the environmental controls of this Sub-Plan are implemented (e.g. dust surpression). If any maintenance and/or deficiencies in environmental controls or in the standard of environmental performance are observed, they will be recorded. Records will also include details of any maintenance required, the nature of the deficiency, any actions required and an implementation priority.

3.2.2 Dust Monitoring

Depositional dust monitoring will be undertaken in accordance with AS/NZ 3580 throughout construction to record dust generated by construction activities at a nearby location. Results will be provided in monthly reports.

Dust monitoring will be undertaken at the corner of Tweed Coast Road and Cudgen Road intersection and is shown below.

Figure 2 Location of dust monitoring.

Duration of monitoring will be for the entire construction period. Reports will be generated for the monitoring results each month. This report will summarise the data and discuss any exceedances. Calculation may be performed to determine the dust at the sensitive receivers near site.

Data collected will be assessed against a dust deposition rate of 4g/m^2/month.

All equipment will be installed and operated in line with best practice to ensure that the construction works comply with all load limits, air quality criteria, air emission limits and air quality monitoring requirements (when required).

3.3 Reporting

Monitoring and inspection results as detailed in Section 3.2 will be provided in each monthly report. The reports would include a summary of:

- Weather conditions during construction (noting high dust risk conditions where relevant).
- Environmental controls implemented to manage air quality.
- Any incidents.
- A review of the project progress against the performance criteria detailed in Section 3.1.

In the event of an incident, the Incident Management and Reporting Procedure documented in the EMP will be followed. Typically, environmental incidents will be notified to Council and TSA verbally immediately and in writing within one hour of any incident occurring. Incident reports will be provided to TSA within 24 hours of the incident occurring, including lessons learnt from each environmental incident and proposed measures to prevent the occurrence of a similar incident.

All efforts will be undertaken immediately to avoid and reduce impacts of incidents and suitable controls put in place. Incidents will be closed out as quickly as possible, taking all required action to resolve each environmental incident

3.4 Complaints

In the event of any air quality related complaints the details of the complaint will be recorded in the complaint register, details will include, but not be limited to:

- Complainant contact details
- Date
- Description of complaint
- Works being undertaken during time of complaint
- Meteorological conditions during time of complaint
- TSA and TSC to be notified.

For further details of complaint management refer to the Community Liaison Plan (HB, 2022).

4 Management Measures

Ref. No.	Hazard	Control	Timing	Record	Responsibility
Inductions					
AQ1	Air quality impacts	All personnel working on site will undergo site induction/tool box training relating to air quality management issues.	Pre-construction/ Construction	Induction/ toolbox material and records	Project Manager/ Environmental Officer
Dust Management					
AQ2	Dust impacts	• Comply with all relevant project approvals and conditions of consent. • Dust generation will be monitored visually, and where required, dust control measures such as water spraying would be implemented to control the generation of dust (especially on hot, dry or windy days). • If dust is generated or high dust risk conditions are present (e.g. dry material, hot conditions, windy, etc), works will stop until control measures (e.g. water cart) are available and implemented before commencing works. • Materials transported to and from the site will be covered to reduce dust generation in transit. • Access points will be inspected to determine whether sediment is being transferred to the surrounding road network. If required, sediment will be promptly removed from roads to minimise dust generation.	Construction	Monthly reports	Project Manager / Project Engineer / Supervisor / Environmental Officer

Ref. No.	Hazard	Control	Timing	Record	Responsibility
		• Any exposed surfaces will be stabilised, and final landscaping implemented, as soon as practicable following completion of construction. • Where available stormwater, recycled water or other water sources of appropriate chemical and biological quality will be used for dust control, in preference to potable water.			
AQ3	Dust impacts	• Clear definition of trafficable and material storage areas to prevent unnecessary vehicle movement into other areas; • Use of water cart to dampen work areas and exposed soils to prevent the emission of excessive dust; • Installation of a wheel shaker grid and/or wash down facilities at the vehicle egress point; • Ensuring trucks transporting materials to and from the site use covers to prevent windblown dust or spillage; • Ensuring truck tailgate locking mechanisms are operational and in use; • Periodic inspection of surrounding roads to ensure no construction contamination and initiation of road sweeping if required; • Careful selection of materials for temporary road surfacing; • Watercarts/water trucks will be in permanent use on site during excavation and civil works. • Continuous monitoring of weather forecast to stop dust generating activities in case that high winds are expected.	Construction	Weekly environmental inspections/ monthly report	Project Manager / Project Engineer / Supervisor / Environmental Officer

Ref. No.	Hazard	Control	Timing	Record	Responsibility
		• Staging of disturbance to reduce extent of exposed area. Areas will be stripped at the latest possible date to comply with the program. • Progressive stabilisation of exposed areas to be undertaken as practical. • Construction haul roads and temporary carparking will maximise the use of permanent infrastructure. These roads/carparks will have a • Subcontractors to maintain equipment / machinery to ensure exhaust emissions comply with relevant legislation and guidelines; • All waste material to be sorted, collected or transported and removed from site (for recycling where possible); • Dust screens and airlocks to be utilised with interior works; • Controlling dust close to its source by installing sprays and sprinkler systems to prevent off-site migration; and • Maintaining the site access to prevent dust generation and tracking off-site.			
AQ4		• Air quality monitoring (dust only) to be undertaken throughout construction.	Construction	Monthly Reports	Project Manager/ Environmental Officer
Emissions Management					
AQ5		• All plant and machinery will be fitted with emission control devices complying with relevant Australian Standards. • Machinery will be turned off when not in use and not left to idle for prolonged periods.	Construction	Monthly reports	Project Manager / Project Engineer / Supervisor / Environmental Officer

Ref. No.	Hazard	Control	Timing	Record	Responsibility
		• Vehicle movementswill be limited to designated entries and exits, haulage routes and parking areas. • Daily inspections and regular surveillance will be undertaken to identify any vehicle, plant or equipment that is causing visible emissions. If any defective vehicles, plant or equipment are identified, operation of this machinery will cease and service/ maintenance will be undertaken.			