Environmental Management Guideline for Concrete Batch Plants

October 2019

CEMENT CONCRETE & AGGREGATES AUSTRALIA

IMPORTANT NOTICE – PLEASE READ

This document has been produced by Cement Concrete & Aggregates Australia (CCAA) in good faith and provides general guidance to assist its members in the appropriate management of potential environmental issues associated in Australian concrete batch plants. Specifically, this document aims to provide general guidance on the obligations in respect to environmental risks that may be associated with producing ready mixed concrete.

This guide has been developed in collaboration with the Environment Protection Authority Victoria (EPA), and CCAA gratefully recognises the contributions of EPA.

This document should be used in conjunction with members' own assessment of operational matters, environmental issues and legal obligations particular to their individual situation. It is not a substitute for expert advice (including expert environmental assessments), which should be obtained by members regarding the operation of a concrete batch plant. Further, CCAA does not represent or warrant that this document covers all applicable environmental and operational issues in relation to this subject matter.

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Further, CCAA acknowledges that it may be appropriate for members having taken their own independent expert advice on the operation of concrete batch plants and the associated risks to adopt operational measures that are at variance to the general guidance provided in this document. This document should be considered as part, but not in substitution for, an overall assessment by members of the circumstances relevant to their particular activities.

ENVIRONMENTAL MANAGEMENT GUIDELINE FOR CONCRETE BATCH PLANTS

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ABOUT CEMENT CONCRETE & AGGREGATES AUSTRALIA

Cement Concrete & Aggregates Australia (CCAA) is the peak industry body for the $15 billion-a-year heavy construction materials industry in Australia.

Our members are involved in the extraction and processing of quarrying products, and the production and supply of cement, pre-mixed concrete and supplementary materials.

CCAA members account for approximately 90 per cent of heavy construction materials produced in Australia and employ over 30,000 Australians directly and support the employment of a further 80,000 people.

Heavy construction materials play a vital role in delivering the infrastructure required for a modern Australian economy. Without these materials we would not have our roads, bridges, airports, homes or hospitals and almost all aspects of the built environment that we depend on.

People have relied on heavy construction materials for thousands of years because of their strength, durability and dependability, and while the technology and processes have improved, these materials are as important to modern society today as they have ever been.

1. INTRODUCTION

1.1 Purpose

Concrete is the world's most widely used architectural medium, owing to its incredible versatility. As a building material it has a unique ability to be shaped and sculpted into anything from roads and footpaths to art sculptures, residential homes and skyscrapers.

There are no limits to where and how concrete can be used and its inherent strength and durability underscores its credentials as one of the most sustainable building products.

Concrete batch plants play an important role in our daily lives. They produce the concrete that's used to build our roads, hospitals, schools and our homes, building a stronger Australia.

To ensure our infrastructure remains affordable, it's important that the concrete is made close to where it is used as it generally only lasts 90 minutes before it starts to harden. That's why there are concrete batch plants in and around the communities that use their product, supporting local jobs and reducing costs for local construction projects.

This document aims to provide guidance to operators of concrete batch plants to help them comply with their general environmental duty by outlining:

- The concrete batching process,
- The standard risk management process,
- What good environmental management looks like,
- Potential impacts on the environment,
- Suggested controls to mitigate the identified environmental risks,
- Environmental Management Systems, and
- Employee education.

1.2 Nature of Concrete Batch Plants

Concrete batching consists of producing concrete or concrete products by mixing cement with fine aggregate (sand), course aggregate (crushed rock or gravel) and water. Cement may be substituted in part by supplementary cementitious materials (SCMs) such as fly ash, slag or silica fume. Small quantities of admixture chemicals may also be added to the concrete to impart special properties such as longer or shorter setting times, increased early strength or more flowable concrete.

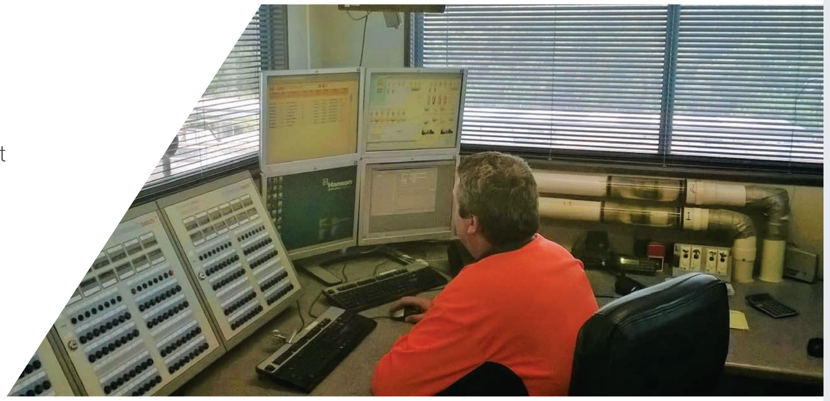
In a concrete batch plant, the raw materials are generally mixed using one of the following techniques:

FRONT END LOADER PLANTS

These are generally smaller capacity plants where a front end loader is used to transport coarse and fine aggregate from a ground level storage bin to an aggregate weigh hopper. The aggregate is then added to an agitator. Cement and any SCMs are weighed in a separate hopper and transferred to the agitator. The correct amount of water and any admixtures are added to the agitator. The agitator barrel rotates, mixing the concrete ready for final slump testing, inspection and transport to the customer/building site.

OVERHEAD BINS OR UNDERGROUND STORAGE PLANTS

In these generally larger capacity plants, coarse and fine aggregate is stored in separate overhead bins or in underground (drive over) storage bins. Aggregates are transported on conveyor belts from the bins to a compartmentalised overhead storage hopper. Aggregate is then dropped into a separate weigh hopper and then transferred into the agitator. Cement and any SCMs are weighed in a separate hopper and transferred to the agitator. The correct amount of water and any admixtures are added to the agitator. The agitator barrel rotates, mixing the concrete ready for slump testing, inspection and transport to the customer/building site.



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2. OVERARCHING ENVIRONMENTAL OBLIGATIONS

2.1 Australian Environmental Legislation

All states and territories within Australia have their own specific environmental legislation and regulations that aim to protect the environment from harm under their Environment Protection Act or similar. Variations in environmental laws do exist between states and territories and while every effort has been made to reflect these differences in this Guideline, it is important to familiarise yourself with the relevant laws in your jurisdiction.

Whilst there are differences between jurisdictions, there is a recent movement towards implementing an outcomes focused regulation with a 'general environmental duty' in most states.

Complying with the general environmental duty, industry in most instances needs to:

- understand the risks that pollution or waste from their activities might present to the environment
- identify and understand the ways those risks can be controlled
- put in place any reasonably practicable methods to eliminate or minimise an identified risk

These guidelines provide the industry state of knowledge and should assist the concrete batch plant operator to meet their general environmental duty.

Specific legislation, regulations and Codes of Practice relevant to environmental management of concrete batch plants in each jurisdiction, at the time of publication, is summarised in Table 1.

Table 1 – Summary of Australia's Environmental Requirements for Concrete Batch Plants

STATE OR TERRITORY	LEGAL INSTRUMENT	TITLE
Australian Capital Territory	Legislation	Environment Protection Act 1997
	Regulation	Environment Protection Regulation 2005
New South Wales	Legislation	Protection of the Environment Operations Act 1997
		Environmental Planning and Assessment Act 1979
	Regulation	Protection of the Environment (Waste) Regulation 2014
	Guideline	Concrete Works EIS Guideline 1996 Department of Urban Affairs & Planning
		Concrete by-product Recycling and Disposal Industry Guidelines, 2014, CCAA
		Noise Policy for New South Wales 2017, Environment Protection Authority
Northern Territory	Legislation	Waste Management & Pollution Control Act 1998
Queensland	Legislation	Environmental Protection Act 1994
	Regulation	Waste Reduction and Recycling Regulation 2011
	Code of Practice	General Environmental Duty. Code of Practice for the Concrete Batching Industry, 2014, EPA
	Guideline	Industry Environmental Guide for Concrete Batching 2015, Brisbane City Council
		Environmental Protection (Noise) Policy 2019, Department of Environment and Science
South Australia	Legislation	Environment Protection Act 1993
	Regulation	Environment Protection Regulations 2009
	Guideline	Air and Water Quality Guideline. Concrete Batching 2016, EPA
		Liquid Storage Guidelines, Bunding and Spill Management, 2016, EPA
Tasmania	Legislation	Land Use Planning and Approvals Act 1993
		Environmental Management and Pollution Control Act 1994
	Regulation	Environmental Management and Pollution Control (Waste Management) Regulations 2010
Victoria	Legislation	Environment Protection Amendment Act 2018
	Regulation	Environment Protection (Industrial Waste Resource) Regulations 2009*
	Guideline	Reducing risk in the Victorian pre-mixed concrete industry, 2019, EPA
Western Australia	Legislation	Environmental Protection Act 1986
		Waste Avoidance & Resource Recovery Act 2007
	Regulations	Environmental Protection (Concrete Batching & Cement Product Manufacturing) Regulations 1998
		Environmental Protection (Noise) Regulations 1997
		Environmental Protection (Controlled Waste) Regulations 2004
		Waste Avoidance & Resource Recovery Regulations 2008

* Regulations are expected to be replaced in 2020

2.2 As Far As Reasonably Practicable

A common principle associated with meeting your general environmental duty is to eliminate or minimise the potential harm to the environment as far as reasonably practicable. Whilst this terminology may vary slightly from state to state, the concept of as far as reasonably practicable includes:

1. the likelihood of those risks eventuating;
2. the degree of harm that would result if those risks eventuated;
3. what the person concerned knows, or ought reasonably to know, about the harm or risks of harm and any ways of eliminating or reducing those risks;
4. the availability and suitability of ways to eliminate or reduce those risks; and
5. the cost of eliminating or reducing those risks.

3. RISK MANAGEMENT

The environmental risks associated with operating concrete batch plants, like any other risks, are best controlled using a risk management approach. The objective of risk management is to enable people to systematically assess all the factors to minimise risk of harm to the environment as far as reasonably practicable.

This approach will help people make a judgement about the associated risks and put in place appropriate control measures.

The risk management approach involves an ongoing, continuous improvement cycle of:

1. Identifying hazards that pose a risk.
2. Assessing the degree of risk created by the plant, environment and work processes.
3. Determining and implementing appropriate control measures.
4. Recording the assessment and any action or work procedure established for the workplace.
5. Monitoring and reviewing the effectiveness of the chosen control measures.
6. Each company should undertake the above process in accordance with its own risk management policies and procedures.

Figure 1 – Steps in controlling hazards and risks[1]

Hierarchy of Control

Once risks have being identified they must be controlled to eliminate or minimise harm to the environment as far as reasonably practicable. Risk can be controlled by deciding on one of the following mechanisms for reducing or eliminating the risk:

Eliminate hazard: is the most effective means of hazard control and involves the physical removal of the hazard and risks.

Substitute hazards: by removing something that produces a risk or hazard and replacing it with something that does not produce any hazards or risks.

Engineering Controls: do not eliminate hazards, but rather introduces physical controls that keep people isolated from the risks and hazards. Examples include bunding and automatic shutdown systems for machinery.

Administrative controls: involve changing the way people work and include procedures, policy, training and signage. Examples include induction processes, permitting systems and competency training.

Personal protective equipment: is the least effective way to control hazards. Should only be used if individuals could be directly exposed to harm.

Figure 2 – Hierarchy of controlling hazards and risks[2]

1 Assessing and controlling risk: A guide for business. EPA Victoria Publication 1695.1 August 2018
2 Ibid

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4. WHAT GOOD ENVIRONMENTAL PERFORMANCE LOOKS LIKE

Each concrete batch plant will be slightly different in design and layout but the common attributes of a plant that demonstrates good environmental performance are outlined below. These issues are managed through a structured Environmental Management System.

DUST

Raw materials are transported to site in enclosed trucks. Sand and aggregate are transferred to underground storage via drive over grates. Transfer of material to overhead storage hoppers is via fully enclosed conveyor belts. Weigh hoppers are situated beneath storage hoppers allowing direct transfer of material via enclosed chutes. All hoppers are fully enclosed. Loading bays are fitted with dry dust extraction systems.

In above ground storage batching plants, sand and aggregate is stored in 3 sided above ground storage bays and kept damp by well-maintained sprinkler systems. Dampened aggregate is transferred by front end loaders to weigh hoppers.

Vehicles are cleaned prior to leaving the site to minimise track out of material onto neighbouring roads.

CEMENT AND SCMS

These materials are stored in sealed, dust tight storage silos fitted with fully enclosed pneumatic transfers, emergency pressure alert and automatic cut-out overfill protection, back-up over-fill protection, high quality dust filters and burst-bag detector system ducted to vent just above ground-level adjacent to the filling pipe.

WATER

Water management on the site is conducted according to whether the water is polluted (high pH and suspended solids), dirty (suspended solids) or clean. Contaminated water should be captured and retained on site in pits and tanks and subsequently reused. Dirty water can typically be reused on site after the solids have settled out of suspension for such uses as concrete batching, cleaning trucks or controlling dust. The settled sand and aggregate can also be reused in the concrete batching process. Clean (rain) water should be stored separately and used in the batching process. Mains water use is minimised through effective water recycling.

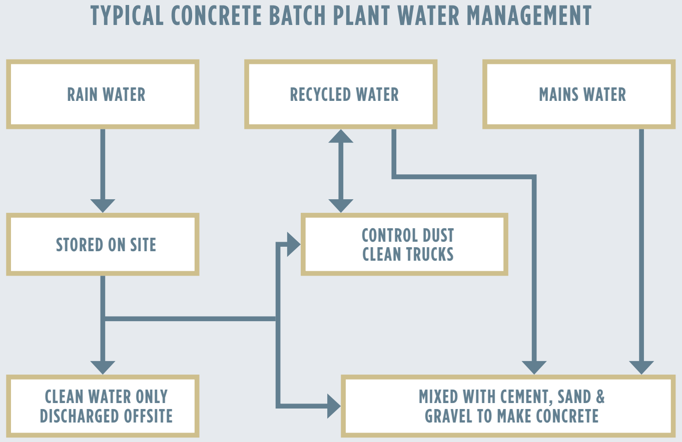

Figure 3 – Typical Concrete Batch Plant Water Management

NOISE

Noise mitigation measures compliment the planning zoning requirements and may include underground storage, conveyor belt transfers, silencing devices on all pressure operated equipment, efficient muffling on all engines, enclosed pumps and compressors, sound barriers, broadband reversing beepers and working within approved operating hours.

CHEMICALS/FUELS

Stored chemicals and fuels such as diesel and petrol are labelled and stored separately in a roofed and enclosed area within adequate capacity secondary containment bunds. Safety Data Sheets (SDS) are kept on site and applied in practice. Staff are trained in chemical safety and read, understand and apply the SDS in daily operations. Functional spill kits are equipped, ready for use and any spills are immediately and correctly cleaned by trained staff.

WASTE

Regulated or controlled wastes are disposed of in accordance with the relevant State waste regulation. In general, returned concrete is minimised by careful planning of production to match sales. Any wet waste concrete is recycled back into the concrete batching process, subject to quality requirements and solid concrete is crushed to aggregate at an appropriate recycling facility and reused in the concrete batching process or alternative uses such as road base. Material is transported to a licensed landfill as a last resort only.

A recycling program is established for aluminium cans, glass bottles, plastics, paper, cardboard and packaging materials.

5. ENVIRONMENTAL RISKS OF CONCRETE BATCHING

There are a range of environmental risks associated with concrete batching but with proper management and good site design they can be eliminated or reduced to as low as reasonably practicable by a range of well understood controls.

Key environmental risks include:

- **Excessive Dust** – Dust at a plant can come from the delivery, storage and transfer of cement, sand and gravel, truck movements and the concrete batching process.
- **Excessive Noise** – Noise at a plant can be generated from activities such as:
  - o delivery of cement, sand and gravel
  - o handling, loading and mixing of concrete
  - o truck movements
  - o reversing beepers
  - o the running of machinery such as pumps, conveyor belts, compressors and motors
  - o de-dagging of agitator bowls
- **Polluted Wastewater** – wastewater from plants may contain potential pollutants such as cement and aggregates that can increase the turbidity of local waterways and cement contaminated water can also be highly alkaline. Inappropriate storage and handling of chemicals/fuels onsite can also lead to polluted surface and ground waters.
- **Inappropriate disposal of waste** – unused wet waste concrete, waste oil, chemicals, contaminated water or other admixtures such as bagged oxide and silica should not be disposed of down stormwater drains or dumped on land.

6. RISK CONTROLS FOR CONCRETE BATCH PLANTS

In order to address the identified key environmental risks of operating concrete batch plants, a range of controls are provided that help to eliminate or reduce the potential harm to the environment as far as reasonably practicable.

The operator should assess these controls through their risk assessment process and use the controls that best deal with their site specific situation. This list should be viewed as a menu of suggested options. All controls may not need to be in place to eliminate or reduce the risks as low as reasonably practicable. Alternatively, the operation may be able to meet a performance outcome in a way that is not listed but still achieves the required performance measure.

Implementing these industry good practice controls will help the operator to meet their performance outcomes of minimal dust, minimal noise, maintaining the environmental values of the adjacent land and water with appropriate disposal of waste and hence achieve the required environmental objectives.

6.1 Environmental Risk – Excessive Dust

Performance Target - Dust and particulate emissions from all concrete batching activities is controlled to prevent or minimise environmental harm.

Suggested control measures include:

Transport of sand and aggregate

- transport sand and aggregate in trucks with enclosed top covers
- Transport damp sand and aggregate or wet on receipt, to avoid dust dispersal during unloading
- Transport cement and SCM in fully enclosed containment systems

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Storage of sand and aggregate

Underground storage

- Underground storage optimised for moisture levels, to avoid dust dispersal during transfers
- 'Do-not-overfill' management procedures in place and enforced to prevent over-filling

Above ground storage bays

- Bays enclosed on three sides by solid walls
- Bays fitted with additional screening over and above wall height as required (e.g. shade cloth)
- Bays fitted with functional, well-maintained, effective sprinkler systems
- Bays - stockpiles kept damp to maintain adequate moisture levels to prevent dust dispersal
- Bays - stockpiles kept at least 0.5 m below the top of walls and 0.5m inside open end of bays
- Bays clearly sign-posted instructing staff: "Do not overfill"
- Other 'do-not-overfill' management procedures in place and enforced

Storage of cement and SCM in overhead silos

- Fitted with fully enclosed pneumatic transfers
- Fitted with emergency pressure alert and automatic cut-out overfill protection
- Fitted with back-up over-fill protection
- Fitted with high quality dust filters that ensure maximum performance: such as jet pulse filters
- Burst-bag detector system ducted to vent just above ground-level adjacent to filling pipe
- Emergency pressure alert/overfill protection systems well maintained and maintenance records kept
- Filters regularly maintained and replaced and maintenance records kept
- Emergency management plan, procedures for cement and SCM recovery and lawful disposal in place to prevent air emissions and stormwater contamination in the event of catastrophic equipment failure resulting in silo 'blow-out'
- Burst protection for silo socks to contain product if the sock bursts

More information is available from the *CCAA Guidelines for Delivery of Bulk Cementitious Products to Premixed Concrete Plants 2018.*

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Transfer of sand and aggregate

- Front-end loader transfers prevent dust emissions by maintaining adequate moisture levels
- Hoppers and dusty transfer points – all screened (or otherwise sheltered) from wind
- Dry dust extraction systems fitted around hoppers; open sides of enclosure
- Open sides of hoppers can be enclosed and encased within plant structure where appropriate
- Conveyor belts fully enclosed
- Conveyor belts enclosed on side of prevailing winds/partially enclosed
- Conveyor belts - spill trays to capture spillage fitted to contain spillage and dust accumulation
- Conveyor belts - smooth operation ensured by regular maintenance and maintenance records kept
- Spills from conveyor belts and other equipment monitored and promptly cleaned

Hardstand or paved or sealed surfaces

- Hardstand - installed across entire site
- Hardstand - all internal roadways sealed
- Hardstand - installed in key production areas:
  - o Internal roads used by agitator trucks
  - o Underneath silos (cement/SCM storage areas)
  - o Concrete-mix loading bays
  - o Slumping stations
  - o Truck/wheel wash areas
  - o All areas of water recycling system
  - o All areas of concrete recycling system
  - o Reclaimed water storage tank area
  - o Truck maintenance areas
  - o Chemical storage areas
  - o Other areas as required
- Hardstand – appropriately designed, contoured and bunded
- Hardstand - adequately maintained by regular cleaning to prevent tracking out of contaminants
- Hardstand - management process in place to prevent and promptly clean spillages
- Street sweepers or sweeper attachments on front-end loader/forklift used to clean the hardstand
- Hardstand - management process in place to prevent dust accumulation on driveways, internal roads, along property boundaries, etc.
- Hardstand - cracks promptly repaired
- Speed limit on internal unsealed roads enforced (to 'drop dust')

Agitator truck loading

- Loading bays roofed or otherwise enclosed
- Loading bays and slumping stations fitted with grated floors to capture sediment/water
- Loading bays fitted with dry dust extraction systems or fitted with water dust suppression spray bars
- Loading bays fitted with plant socks to direct materials into agitator

Agitator trucks and plant machinery

- All diesel vehicles and machinery fitted with diesel particulate filters (DPF)
- DPF filters regularly replaced and maintenance records kept
- Regular maintenance of all agitator trucks and maintenance records kept
- Regular maintenance of all plant equipment and maintenance records kept
- Regular maintenance on all emission-control equipment and maintenance records kept

Boundary screening

- Additional screening at boundaries of premises and around dust-generating areas where physically possible

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6.2 Environmental Risk – Excessive Noise

Performance Target - Noise emissions are minimised to prevent harm to sensitive receptors

Minimising noise - general principles

- All individual sources of noise pollution on site identified
- Minimising noise emissions considered as part of the Environmental Management System
- Plan for noise mitigation for each possible point source (listed below), and implement where appropriate:
  - o delivery and tipping of raw materials
  - o general movement of heavy vehicles and machinery on site such as loaders, excavators, forklifts, tip trucks, cement and SCM delivery trucks
  - o agitator truck engine noise, air brakes, reverse-warning devices
  - o agitator truck engine revving to turn heavy loads during concrete mixing
  - o sand and aggregate transfers to storage bins and hoppers
  - o front-end loader work, engine noise, reverse-warning devices
  - o forklift engine noise, reverse-warning devices
  - o swinging, scraping, loading devices
  - o hydraulic pumps
  - o compressors
  - o conveyor belts
  - o air valves
  - o filters
  - o alarms
  - o radios
  - o de-dagging of agitator bowls

- Natural topography and layout of the plant used to best advantage as noise barriers where possible
- Quieter new equipment replacing old, noisier equipment in a commercially appropriate process
- Alter or enclose equipment to reduce noise at point source
- Acoustic shielding, barriers, enclosures of sound-absorbing materials to isolate noise at point source and prevent noise travel over distance
- Use of equipment silencing (e.g. pneumatic valves) and muffling devices (e.g. loaders and agitators)
- Replace horn warnings or signals with light systems or use noise sensitive reversing beepers

SOME INDIVIDUAL CONTROL MEASURES

Surfaces

- Hardstand/paved/sealed surfaces
- Internal roads sealed
- Underground (drive over) aggregate storage

Enclosure of noise (at point source)

- All pumps and electric motors enclosed
- All compressors enclosed, where it is safe to do so without causing over heating
- Compressors located where buildings act as a noise buffer
- All pressure-operated equipment fitted with silencing devices
- All engines fitted with efficient muffling devices

Use of sound-absorbing materials (at point source)

- Hoppers - lined with sound-absorbing material (e.g. rubber)

Sound-barriers and buffers (prevention of noise travel over distance)

- Buffers between plant and neighbours erected (screens, barriers, trees, shrubs, etc.)
- Noise-generating equipment located behind sound barriers or other absorbers

Locating within site to increase distance to sensitive receptors

(Note this is a good design criteria rather than a noise control for existing operations)

- Entrance and exits sited away from noise sensitive areas.
- Noise-generating equipment located away from noise sensitive areas
- Sirens located away from sensitive areas and used only in an emergency

Substituting quieter equipment

- Visual alarms used in lieu of audible alarms, where appropriate and not contravening OHS requirements
- Agitator truck and mobile plant reversing alarms are 'squawker type' rather than 'beepers'

Maintenance

- Regular good practice maintenance of all equipment, heavy machinery and trucks and maintenance records kept
- Regular good practice maintenance of all sound-reducing equipment and maintenance records kept

Operating hours

- Operating only within approved operating hours
- Operation of trucks and heavy machinery to appropriate hours wherever practicable
- If operating outside normal business hours for specific circumstances, liaise with the local community

Community liaison

- Liaise with the local community to prevent, and promptly respond to and resolve issues
- System for capturing and addressing community complaints in place

6.3 Environmental Risk – Discharge of Polluted Water to the Environment

6.3.1 Performance Target - Storm water and process water is managed to prevent or minimise the release of contaminants offsite and to groundwater

Process water capture and recycling

- Plants operate to a well-developed water management plan
- Stormwater management plan regularly reviewed
- Plans available on site for inspection
- All process water from concrete manufacture recycled back into production via a fully integrated system including, collection, reclamation, capacity storage, and re-use
- Process water recycling system is fully isolated from stormwater drains
- Stormwater is directed to a sump to be recycled and does not divert to stormwater drains
- Reclaimed process water storage tank capacity matches batching plant output capacity

Stormwater capture on site (First flush capture)

- Tank storage capacity above includes provision for first flush, contaminated water capture following rain events
- First flush storm water capture in place
- First flush system size: system contains and re-uses runoff from first 20 mm of rain over a 24-hour period
- First flush storage size calculated based on surface area that generates polluted run-off:
  storage capacity (m3) = 0.02 (m) x catchment area (m2)

First Flush

The first flush is typically the first 20 mm of rainfall within the contaminated area during a rain event over 24 hours. Once the first flush has been captured, subsequent rainwater impacting the contaminated area is deemed clean, and can be discharged off site.

Segregate Areas

Note that if there is no segregation between the polluted/contaminated areas and the dirty areas, water running from the dirty areas can become contaminated and hence the first flush capacity may need to be increased. With no site segregation an entire yard could be classed as polluted/contaminated. The site should be segregated to prevent water from polluted/contaminated and dirty areas from intermixing.

Upstream Diversion

Upstream diversion is a method of separating rainwater from the captured first flush. The system should be able to divert all rainwater subsequent to the first flush without passing through the contaminated water storage, and discharge directly to stormwater.

More detail is available in the *CCAA Guideline First Flush and Water Management Systems: Guide and Principles, 2013.*

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Water Management Plan

A good practice Water Management Plan should consider the following aspects:

Clean Area

Areas of the site where stormwater runoff is unlikely to become contaminated with concrete related pollutants such as sand, cement, admixtures or wastewater. Clean areas normally include sealed car parks, roofs and offices and water sourced from these areas should be stored separately and used in the batching process.

Dirty Area

Areas of the site where stormwater runoff is likely to become contaminated with pollutants associated with sand and aggregate storage, but not by cement which causes elevated pH. These areas pose a risk of environmental harm through high sediment water discharge. This water can typically be discharged off site after solids are settled out of suspension or reused.

Polluted/Contaminated Area

Areas of the site where stormwater runoff is likely to become contaminated with pollutants that may have a cementitious component. The main sources of contaminants in these areas include concrete wash water, liquid washout/slurry and solid washout. Contaminated areas pose a higher risk than dirty areas and have the potential to cause high pH and/or high sediment water discharge. This water should be captured and retained on site in pits and tanks, and subsequently reused.

Hardstand/sealed/paved surfaces

- Installed as per Section 6.1
- Incorporated into process water reclamation and recycling systems by being contoured and bunded
- Contoured and bunded to direct all process water on site to front-end loader accessible settling pits
- Contoured and bunded to intercept process water at site entrance/exit points (to prevent tracking out)
- Contoured and bunded to intercept all stormwater drains and direct process water away from drains to sediment-settling pits
- Contoured and bunded to direct process water from slumping stations to sediment-settling pits
- Contoured and bunded to direct all process water from truck-wash stations to sediment-settling pits
- Sediment settling pits are cleaned out regularly
- Drainage system servicing hardstand areas is regularly checked and maintained to ensure drains and recycling systems do not become blocked with sediment
- Bunded along the edge of premises to contain process water, rain events, and dust on site
- Maintained by adequate cleaning to prevent sediment build-up and tracking out of contaminants

Load slumping & truck wash on dispatch area

- Slumping and truck washing with recycled or rain water
- Wash water directed to sediment settlement pits
- Area fitted with grated floors to direct run-off to sediment settlement pits
- Grated floors system regularly maintained to prevent blockage

Stormwater drains

- Process water recycling system fully isolated from storm water drains
- Triple interceptor system or equivalent in place for water treatment prior to discharge
- Triple interceptor or equivalent system sediment-settling pits are regularly maintained
- Triple interceptor or equivalent system final water: pH monitored and adjusted prior to discharge and pH records kept
- Triple interceptor or equivalent system: final turbidity monitored and adjusted prior to discharge and NTU records kept
- If any stormwater drain discharges need to occur: discharges take place via the triple interceptor or equivalent system, and only after water pH and turbidity requirements are adjusted and met

6.3.2 Performance Target - Storage and handling of all chemicals, including waste is managed to prevent or minimise releases off-site and to groundwater

Ensure all systems in place to guarantee only clean water leaves site

- First Flush system in place
- Triple interceptor system or equivalent in place
- Oil /water separator systems in place
- Uncontaminated storm water diverted away from all areas where contaminants may occur
- Dedicated roofed chemical storage area in place
- The following are located within bunded areas or within other secondary containment areas
  - o Chemical and fuel delivery & dispatch
  - o Chemical, including admixtures storage
  - o Piping and transfer areas
  - o Process tanks areas
  - o Vehicle/equipment cleaning areas
  - o Fuel, fuel additives, lubricants, oil storage area
  - o Derived liquid wastes

Chemical and liquid storage area (including chemical waste storage)

- Dedicated roofed impervious solid walled bunded area
- All fuel and admixture tanks must be fully bunded
- Isolated from storm water or recycled water to prevent rain entry, pollutant overflow, rusting of metal drums and storm water or recycled water contamination
- Well-ventilated e.g. vents in walls, ceiling, or open windows to cool, and prevent fume build-up
- Bund holds 110% volume of largest tank or 25% maximum drum inventory, whichever greater
- Bund holds 110% of combined volume of ALL tanks where tanks are connected
- Containers and tanks set back from edge of bund
- Drain valves and pump-out valves locked in closed position
- Storage segregated to keep apart materials that cannot be stored safely together
- Clearly labelled, displaying relevant warning signs and well lit
- Regularly inspected and maintained (whole area and bunding) to ensure free from cracks
- Chemical spill kits on site that is prominently sited & labelled, is service-ready with relevant staff trained in its use
- Secured against unauthorised access

Acceptable types of temporary bunding or other secondary containment

- Temporary bunds may not replace chemical storage requirements above, and are non-combustible, resistant to chemicals stored and positioned to prevent flow out of the bund
- Commercial pallet bunding units may be used for minor temporary chemical storage
- Splash shields may be used to deflect leaks within a bunded area

Chemical management & handling (including waste chemicals)

- Chemicals ordered/stored in smallest quantity practicable to reduce storage needs
- Surplus chemicals do not accumulate
- Up-to-date records of chemicals and volumes stored
- Safety Data Sheets (SDS) on site that are up-to-date, accessible and are applied in practice
- Containers are labelled and display hazard ratings from point of entry to correct disposal
- Staff adequately trained in chemical use and safety
- Staff read and understand chemical labels and SDS of products they use
- Emergency management plan is in place to manage spills
- Chemical spills/leaks are cleaned-up promptly and no chemicals leave the site and escape to the environment
- Additional storage requirements for acids and flammable chemicals is in place

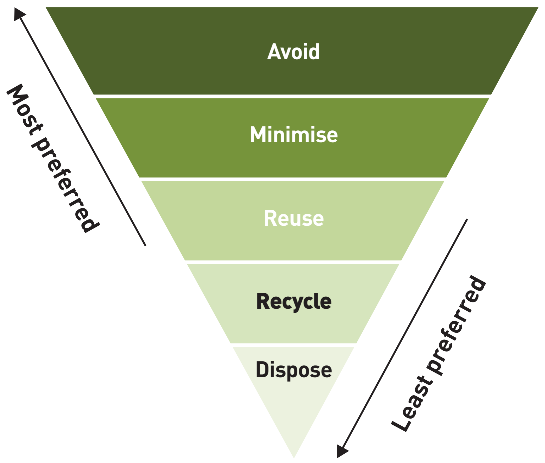
Cleaning of all plant and equipment is managed to prevent or minimise contamination of soil and water

- Use of all wash chemicals and detergents minimised
- Least environmentally toxic wash chemicals and detergents used
- Dedicated equipment washing area segregates this water from process water recycling
- Truck and equipment wash areas drain to separate water collection and recycling pits which may not be connected to process water sediment settling pits and recycling system
- Wash chemicals prevented from entering stormwater drains in all other ways

6.4 Environmental Risk – Inappropriate Disposal of Waste

Performance Target - Waste generation and disposal is managed to prevent or minimise harm to the environment

Figure 4 - Waste management hierarchy implemented for all wastes



Waste concrete management

- Minimise generation of waste concrete by careful planning and execution of concrete production
- Recycle wet-waste concrete back into concrete batching as much as feasible
- Recycle wet-waste concrete into other production, e.g. concrete manufacture of low strength concrete products
- Recycle remaining solid waste concrete back into concrete production or used as road based as aggregate by crushing at an approved recycling facility
- Minimum solid waste concrete is disposed of to a licensed landfill

Agitator truck wash-out after delivery

- Agitator truck rinsing after concrete delivery back at batching plant
- Agitators are rinsed with recycled water or rain water
- Wash-out reclaimed and recycled back into production as:
- Wash water directed from wash stations to sediment settling pits and recycled
- Wet concrete mix recycled directly back into production as much as feasible
- Waste concrete dried and recycled as aggregate by crushing or to a licensed landfill as a last resort

Note the definition and treatment of waste varies in detail from state to state. For example, more information for New South Wales specifically is available from the *CCAA New South Wales Concrete by-product Recycling and Disposal Industry Guidelines, 2014*.

ENVIRONMENTAL MANAGEMENT GUIDELINE FOR CONCRETE BATCH PLANTS

7. ENVIRONMENTAL MANAGEMENT SYSTEM

An Environmental Management System (EMS) provides a structured approach to planning, implementing and regularly checking an operation's environmental performance. An EMS helps to integrate environmental management into a company's daily operations, long term planning and other management systems. Depending on the business, it may be beneficial to certify the EMS under standards such as the internationally recognised *AS/NZS ISO 14001:2016* Environmental *Management Systems – Requirements with guidance for use.* This standard provides useful guidance and a framework to develop a recognised system even if the EMS is not certified.

An EMS should achieve the following outcomes:

- Management commitment to implementing good practice environmental management,
- All potential environmental risks from the activity are identified and control measures are in place to prevent or minimise the potential for environmental harm,
- Contingency measures are in place to avoid environmental harm in the event of unforeseen circumstances or natural disasters (e.g. flood),
- Management and staff are trained and aware of their responsibilities to ensure regulatory compliance,
- Reviews and audits of environmental performance are undertaken periodically,
- Effective community engagement, and
- Records of monitoring, incidents and complaints are kept.

By developing and following an EMS your business should be able to demonstrate that all reasonable care is being taken to avoid causing environmental harm. Your business may be able to use this reasonable care, or due diligence, as a defence for compliance purposes.

The performance outcomes and example controls listed in this document forms an industry good practice basis for creating your own EMS.

8. EMPLOYEE EDUCATION

Appropriate staff training is an important part of running any business as it is your staff that will ensure that your operation remains compliant by recognising and minimising environmental hazards.

That is why an EMS should include a training register documenting staff induction, training and refresher training that records who, what and when.

All staff should be trained on how to properly conduct their duties in a way that prevents or minimises harm to the environment (i.e. pollution) as well as how to deal with any environmental incidents, i.e. how to use pollution control equipment, undertake clean ups and report incidents.

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