



# **BEST PRACTICE GUIDELINES FOR CONCRETE BY-PRODUCT RE-USE AT CONCRETE BATCHING PLANTS QUEENSLAND**



**CEMENT CONCRETE  
& AGGREGATES AUSTRALIA**

## INTRODUCTION

Cement, Concrete and Aggregates Australia (CCAA) is the peak industry body for the heavy construction materials industry in Australia including the cement, pre-mixed concrete and extractive industries. Concrete batching plants throughout Australia produce 23.9 million m<sup>3</sup> of pre-mixed concrete per year. The industry is committed to ensuring that its operations are environmentally responsible and sustainable.

## OBJECTIVE

The objective of this document is to:

- Provide the industry with best practice management guidelines for concrete by-product re-use management that meets legislative requirements;
- Outline by-product minimisation strategies; and
- Detail the benefits of effective by-product management.

## DEFINITIONS

### Hardened returned concrete

**Hardened Returned Concrete** is plastic concrete that has been returned to a concrete plant and has been cured or hardened. Hardened returned concrete has the same properties of normal concrete and is generally free of reinforced materials such as steel reinforcement, and free of other types of contaminants such as wood, paper, plastic, and brick. Once hardened this concrete can be handled and stored onsite with little risk of contaminated runoff.



### Wash water

**Concrete Wash Water** has a high pH, and is highly alkaline, and has a high content of suspended solids, typically sand. Concrete wash water is generated from the washing of trucks, the clean out of agitator bowls, and the hosing of yard surfaces in concrete plants. Concrete wash water is generally stored on-site in pits or tanks and is generally reused into the concrete batching system, in place of fresh/town water.

### Liquid Wash Out

**Liquid wash out by-product** is material that settles out at the bottom of the settling pits at concrete batching plants. It contains a high quantity of alkaline material and is not re-used in concrete.

### Solid Wash Out

**Solid wash out by-product** is returned concrete which is then washed out of the trucks. It may be a mixture of aggregate and sand from the original concrete, and contains hydrated lime and other cementitious chemicals that give the material significant residual alkalinity. This material is typically taken out of washout pits, drained, dried, transported to quarries and recovered for re-use. The material is either re-processed into gravel and sand or is mixed with various other materials to become either road-base or another fill product.

## 02 REGULATORY OVERVIEW

### 2.1 Legislative Framework

Concrete by-products if not re-used are classifiable as waste in Queensland and are controlled by the

- *Environmental Protection Act 1994*
- *Environment Protection Regulation 2008*
- *Environmental Protection (Waste Management) Regulation 2000*
- *Environmental Protection (Water Policy) 2009 (EPP Water)*
- *Waste Reduction and Recycling Act 2011*

### 2.2 Waste Management Hierarchy

The principal legislation addressing pollution in Queensland is the *Environmental Protection Act 1994* and *Waste Reduction and Recycling Act 2011*. Environmental protection legislation also includes Environmental Protection policies, which outline quality objectives, recommendations and mandatory requirements for the protection of a particular aspect of the environment.

Section 9 of the *Waste Reduction and Recycling Act 2011* sets out a waste management hierarchy which prioritises waste management practices to achieve the best environmental outcome. The waste management hierarchy is as follows:

1. Reduce
2. Reuse
3. Recycle
4. Other recovery
5. Treat
6. Dispose

### 2.3 Regulated and Non-Regulated Waste

Due to their environmentally hazardous nature, regulated wastes are those that have been identified under the Environment Protection Regulation 2008 as unsafe for municipal or refuse landfill disposal. These wastes are listed in Schedule 7 of the Environment Protection Regulation 2008 and must be disposed through a licensed waste removalist. Operators must keep proof of proper disposal of hazardous wastes including regulated waste disposal facility docketts, waste manifest documents and licensed waste transport receipts.

## 03 LEGISLATIVE CLASSIFICATION OF BY-PRODUCTS

There are offences for dumping waste and allowing it to go into waterways or roadside gutters under sections 103 and 104 of the *Waste Reduction and Recycling Act 2011*, and section 440ZG of the *Environmental Protection Act 1994*.

### 3.1 Hardened returned concrete

Hardened concrete is transported back to a crushing plant for reprocessing is considered to be a waste but not a regulated waste and is not subject to tracking provisions.

### 3.2 Wash water

Wash water reused within the concrete plant is not considered to be regulated waste. Where the material is 100% reusable within the plant, it does not meet the definition of waste because it is not an unwanted by-product. However, if it were to be given to a third party for use or disposal offsite then it would be defined as a waste and because of its alkaline nature be classified as a regulated waste that is subject to the tracking provisions of the *Environmental Protection (Waste Management) Regulation 2000*.

### 3.3 Liquid Wash Out

Liquid wash out which separates out through various washout settling and recycled water collection pits is considered to be regulated waste due to its high pH nature and is subject to tracking provisions of the *Environmental Protection (Waste Management) Regulation 2000*.

### 3.4 Solid Wash Out

Solid wash out (aggregate and sand from original concrete) is returned to wash out pits then drained, dried and transported to quarries and recovered for re-use. Solid wash out that is transported offsite is considered a regulated waste due to its alkaline nature and is subject to the tracking provisions. Solid wash out that is reclaimed on-site is not required to be tracked.

## SUMMARY OF REGULATED AND NON REGULATED WASTE

Type of by-product	Regulated Waste	Tracking provisions
Hardened returned concrete	No	No
Wash water	No (if reused on-site in plant) Yes (if given to a third party for use or disposal offsite)	No Yes
Liquid Wash out	Yes	Yes
Solid Wash out	No (if reclaimed on-site in plant) Yes (if given to a third party for use or disposal offsite)	No Yes

Through the granting of a beneficial waste approval, both liquid and solid wash out can be re-used and recycled.

### 3.5 BENEFICIAL USE APPROVAL PROCESS

#### Beneficial Use Approvals under Chapter 8 of the *Waste Reduction and Recycling Act 2011*

The granting of an approval of a resource for beneficial use (otherwise known as a beneficial use approval), allows for the reuse of a waste as opposed to being disposed at a landfill by lawfully converting it to a resource. A beneficial use approval will likely be needed where wash water, liquid washout or solid washout waste will be reused offsite. Beneficially reusing a waste as a resource can reduce the need for production of raw materials.

#### Process for approval of a resource for beneficial use

For waste to be categorised as a resource, an application needs to be submitted to the Department of Environment and Heritage Protection (EHP). The application needs to include details of the waste, how it will be recycled or reused, and how it will be transported in order that environmental harm will not occur from its reuse.

#### Approval types

**A general beneficial use approval** is an approval for a resource of which anyone can have the benefit. There are no current general approvals under which concrete by-products can be reused.

**A specific beneficial use approval** is an approval of a resource, of which only a stated person has the benefit. For more information on beneficial use approvals, how an application can be made and what information is to be provided in an application, see the guideline *Approval of a resource for beneficial use*, published by the Department of Environment and Heritage Protection, available at [www.ehp.qld.gov.au](http://www.ehp.qld.gov.au).

## 04 BEST PRACTICE CONCRETE BY-PRODUCT MANAGEMENT

There are strong benefits to managing waste effectively and efficiently. In order to achieve best practice concrete by-product management, members should follow the principles of the waste hierarchy, that is:

1. Reduce
2. Reuse
3. Recycle
4. Other recovery
5. Treat
6. Dispose

### 1 Reduce

Minimisation is the preferred approach to concrete by-product management. This can be achieved by:

- Accurate ordering – educate clients on exact quantities required.
- Introduction of a penalty system for returns to the customer.
- Effective, water-efficient, wash out practices – higher levels of water used to clean agitators and in batching results in higher levels of wash out water.
- Reduce errors in batching.
- Site maintenance - avoid breakdowns in plant and agitators.

### 2 Re-use

Re-use of concrete by-products can occur at batch plants through processes such as:

- Re-tempering through the adjustment of the mix and slump value
- Water Reuse through the production process

**Re-use of hardened returned concrete can occur through:**

- Recycle through crushing and reworking of aggregate
- Block or other concrete product manufacture

**3 Recycling**

**There are various ways in which concrete by-products can be recycled including:**

**Solid wash out:**

- Taking materials to quarries or dedicated recyclers to be processed into aggregate materials (for example, dry and blend into road base).
- Masonry block manufacture through employing the use of settled fines.
- Reclaiming of concrete ingredients as raw materials by use of onsite reclaimers where products are separated into components and reused.

**Liquid and solid wash out:**

- Acid Sulfate Soil (ASS) treatment, and soil pH corrector.
- Neutralise acidic dam water – neutralisation of acid drainage water.

**Waste materials from other industries that can be used in the production of concrete may include:**

- Fly Ash: Pulverised fuel ash (PFA) or fly ash from coal fired power stations can be used as a supplementary cementitious material.
- Geo-polymers: Through the introduction of Geo-polymers there will be a corresponding reduction of CO<sub>2</sub> from using less Portland cement.
- Slag: Ground granulated blast furnace slag can be used as a supplementary cementitious material.
- Lightweight aggregates: Lightweight aggregates made from crushed blast furnace slag are used to replace normal aggregates.

**4 Other Recovery**

There are limited ways in which concrete by-products can be used for other recovery.

**6 Dispose**

Although not the most preferred option, concrete by-products may be used as land-fill material

**BENEFITS OF EFFECTIVE BY-PRODUCT MANAGEMENT**

There are many benefits to having efficient and effective by-product management such as the ability to:

- Meet and exceed regulatory requirements;
- Conserve resources of water, energy and raw materials;
- Control pollution of land, air, water;
- Reduce waste disposal costs;
- Reduce environmental footprint;
- Meet contractual obligations and ratings requirements;
- Promote your waste reduction successes; and
- Increase your profitability.





#### Links to other resources

- **EHP Guideline – Approval of a resource for beneficial reuse**  
[www.ehp.qld.gov.au/waste/beneficial-use-approvals.html](http://www.ehp.qld.gov.au/waste/beneficial-use-approvals.html)
- **UK Concrete Industry Sustainability Performance Report**  
[www.sustainableconcrete.org.uk/pdf/2011%20Sustainability%20Report\\_FINAL.pdf](http://www.sustainableconcrete.org.uk/pdf/2011%20Sustainability%20Report_FINAL.pdf)

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#### BRISBANE OFFICE:

Suite 2, Level 2  
485 Ipswich Road  
Annerley QLD 4103  
TELEPHONE: (61 7) 3227 5200  
FACSIMILE: (61 7) 3892 5655  
[www.ccaa.com.au](http://www.ccaa.com.au)

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