Nucon
North MacLean (Greenbank) Concrete Plant

OPERATIONAL MANAGEMENT PLAN

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PF24-06-RP-116

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1 GENERAL

1.1 PURPOSE

The purpose of this document is to provide a summary of the day-to-day operation of the concrete batch plant.

1.2 SCOPE

This document is limited to describing the operation of the new concrete batch plant at Greenbank (the "Site") by Nucon.

1.3 REFERENCES

PF24-06-RP-102	Design criteria – vehicles
PF24-06-RG-117	Chemical register

1.4 DEFINITIONS

FA	Fly ash
FEL	Front End Loader
GGBFS	Ground Granulated Blast Furnace Slag

2 CONCRETE PLANT OPERATION

All activities are carried out in accordance with the Queensland Government, Department of Environment, Tourism, Science and Innovation "Code of Practice for the concrete batching industry".

2.1 CONCRETE PRODUCTION PROCESS

Concrete is a mixture of:

- Cementitious materials (cement, fly ash, and GGBFS)
- Coarse aggregate
- Fine aggregate (sand)
- Water
- Admixtures (retarders, accelerators, super-plasticisers, air entrainers, *etc.*)
- Additives (coloured oxides, steel fibres, plastic fibres, *etc.* which are manually added to the mix)

Concrete has a limited life, usually a maximum of 60 mins., from loading to being discharged on the customer's site. Concrete plants thus need to be located relatively close to the customer. Customers have a preference to take delivery of the concrete early in the morning allowing the rest of the day for finishing. A typical daily production profile is shown in *Figure 1*. Concrete is sensitive to temperature, and therefore will occasionally need to be delivered to customers in the cool of the night or in line with specific project requirements.

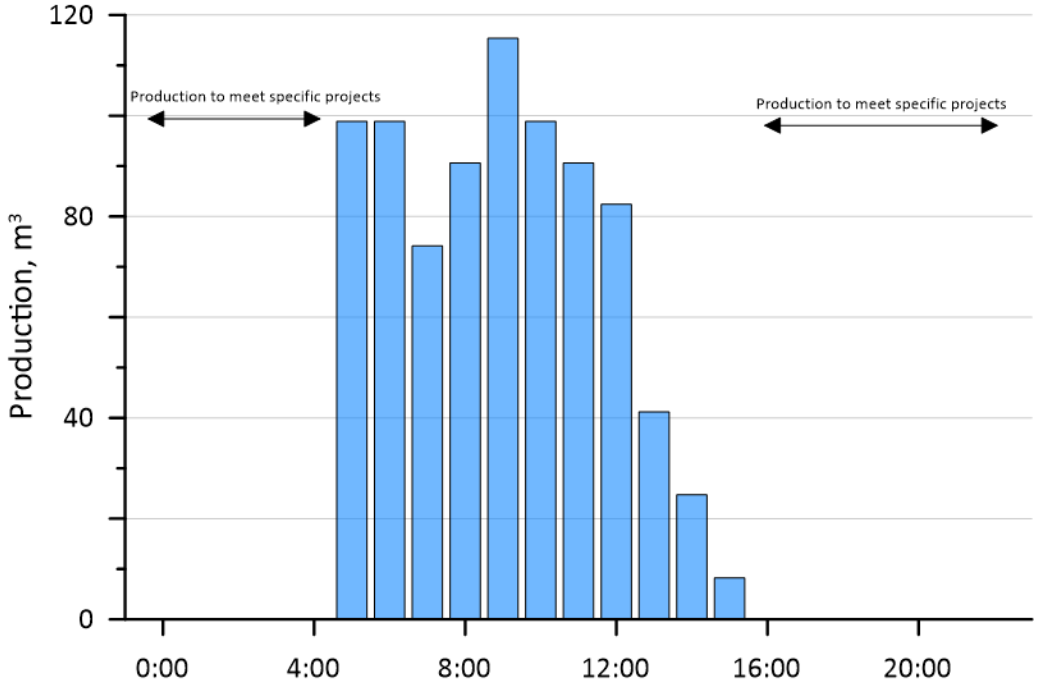

Figure 1. Production profile – typical peak production day: 824m³/day

2.2 RAW MATERIAL DELIVERIES

Raw materials are usually delivered during normal business hours. However, there will be times when deliveries, for example cement, are needed to ensure production can continue. For example, project work may require production overnight and thus the replenishment of cementitious materials.

2.2.1 Hazardous Materials and Dangerous Goods

Project document PF24-06-RG-117 "Chemical register" provides a preliminary assessment of the materials which will be stored on the Site and is summarised in *Appendix A*. No Dangerous Goods are stored in excess of their placard quantity in accordance with Schedule 11 of Queensland Workplace Health and Safety Regulation 2011.

2.2.2 Cementitious materials

Cementitious materials include cement, fly ash (FA), ground granulated blast furnace slag (GGBFS), and blends of these three materials. The materials are delivered in road tankers (see *Figure* 2) which can transport up to 49t of material. Such a tanker typically requires 60 mins. to unload which includes setup and dismantling of transfer hoses.

Cementitious materials are pneumatically transferred from the tanker to the silo. The tankers are pressurised using an air blower mounted on the tanker and the material blown into the plant's silos. The air displaced during the filling of the silo is vented to atmosphere through filters which are automatically cleaned. The silo is protected from overfilling by interlocks between the silo high level probe and a valve in the blowup line from the tanker. The silo is protected from over-pressurising by a pressure relief valve.

Both the silo overpressure relief valve and the clean side of the filter are ducted to ground such that the driver can observe and take action should any cementitious material appear in this vent.

Figure 2. Typical tanker used for the delivery of cementitious materials.

2.2.3 Aggregates

Aggregates are delivered in tipper trucks. A typical aggregate truck is shown in *Figure 3*. Maximum capacity is approx. 47.5t. Aggregates are delivered from the quarry with the material damped down with water and covered.

Aggregate is stored in a number of ground bins. These bins have walls on three-sides and have water sprays to control dust and temperature. Decorative aggregates will be stored at this Site to provide a range of architectural finishes and colours which are increasingly being specified for new driveways.

Figure 3. 3-axle truck and 4-axle trailer being loaded at a quarry.

2.2.4 Water

Water is a component in concrete and is also used for housekeeping activities. Housekeeping activities include dust suppression, washing out agitator trucks, and removing dust from pavements. The water collected from these housekeeping activities is used in the concrete whenever possible. Water is also harvested during rain events for use in concrete. These measures provide a sustainable solution with water (housekeeping and rain) being captured and reused. At times, these sources of water are supplemented with water from the council reticulated systems ("mains" water) and bore water.

2.2.5 Admixtures

Admixtures are added to the concrete to modify the performance, for example accelerators to reduce the setting time. Admixtures are delivered in a range of tanker sizes. Deliveries are infrequent and are expected to be less than once/week. Admixtures will be stored in tanks in a bunded, undercover area. Admixtures are not classified as a Dangerous Good.

2.2.6 Additives

The term additives is used here to describe those materials which are added manually, usually in bags, to the concrete to modify performance. Examples include steel fibres and coloured oxides. Additives are delivered on pallets in a range of trucks and unloaded using a forklift. Additives are stored undercover.

2.3 CONCRETE PRODUCTION

The primary function of a concrete batching plant is the mixing of raw materials (aggregates, cementitious materials, admixtures, additives, and water) to manufacture concrete. This mixing of raw materials (termed "batching") is the primary noise, odour, and air (dust) emitting aspect of the use. This aspect is undertaken indoors, within a structure that is enclosed by walls, and is roofed. The batching plant enclosure has solid side walls, a roof, and fast acting entry door which encloses an agitator truck during the batching process. The batching plant structure effectively contains noise and includes dust filters and water sprays to effectively control and contain odour and air emissions

All the materials are weighed and delivered to the agitator truck (see *Figure 4*), and the agitator truck used to mix the materials. All materials are added dry to the agitator hence the use of the term "dry-mix" concrete plant. Dust and noise produced during mixing are mitigated by enclosing the load bay on the sides and roof, and having doors which automatically close on the entry. Examples of the enclosure and doors are shown in Figure 5, Figure 6, and Figure 7. Dust extraction from the load bay further mitigates any dust emissions. The agitator truck needs to operate at high speed during mixing.

Once concrete has been added to the agitator, the agitator moves forwards to the Slump Stands where a quality check is carried out. The agitator will continue to operate at mixing speed to ensure that the concrete is fully mixed before leaving the Site.

Typically, an agitator truck would be expected to be loaded once an hour spending the rest of the time either travelling to and from the customer's site, or unloading at the customer's site.

Figure 4. Agitator truck.

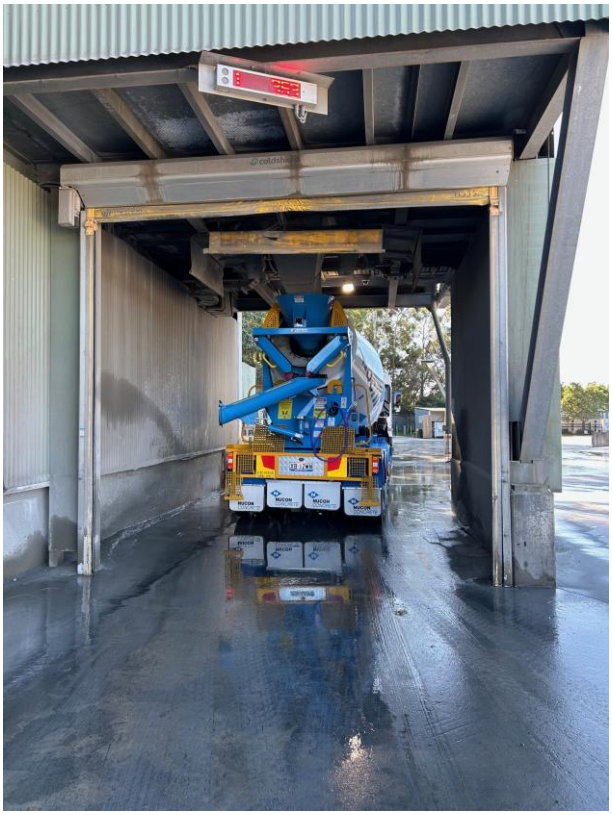

Figure 5. Concrete agitator truck inside batching enclosure (before batching).

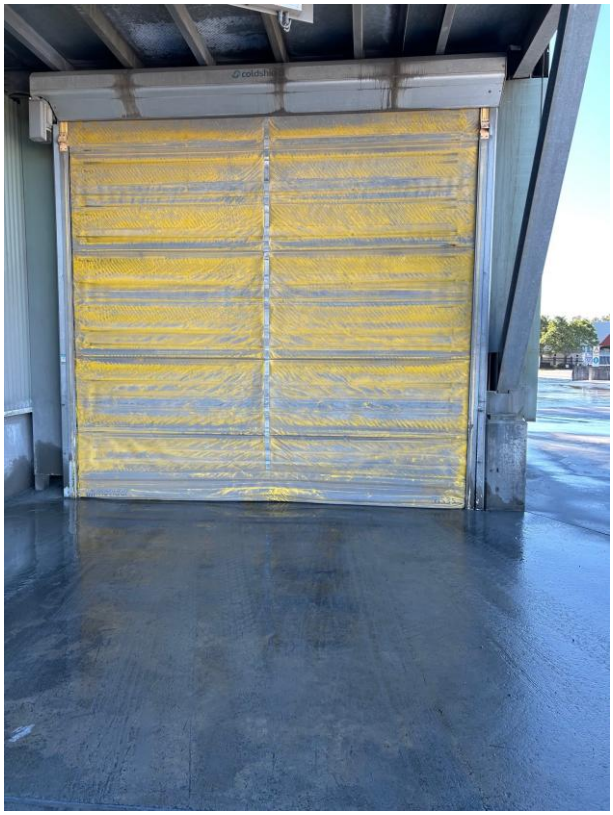

Figure 6. Concrete agitator truck inside batching enclosure (during batching - door closed).

Figure 7. Concrete batching plant with double batching enclosures (illustrative purposes only).

2.4 TRAFFIC MANAGEMENT

The arrival and departure of all vehicles can be estimated from the production profile provided in *Figure 1* which takes into account the resupply of raw materials and concrete sales (departure of agitator trucks from the Site). The forecast traffic flow based on this production profile (*Figure* 1) is shown in *Figure 8*. A detailed description of the vehicles movements and assumptions is provided in project document PF24-06-RP-102 "Design criteria – vehicles".

Market analysis suggests that approximately 50% of concrete production will be to the east of the Site. 50% of agitator trucks are therefore expected to turn left out of the Site towards Mt. Lindesay Highway.

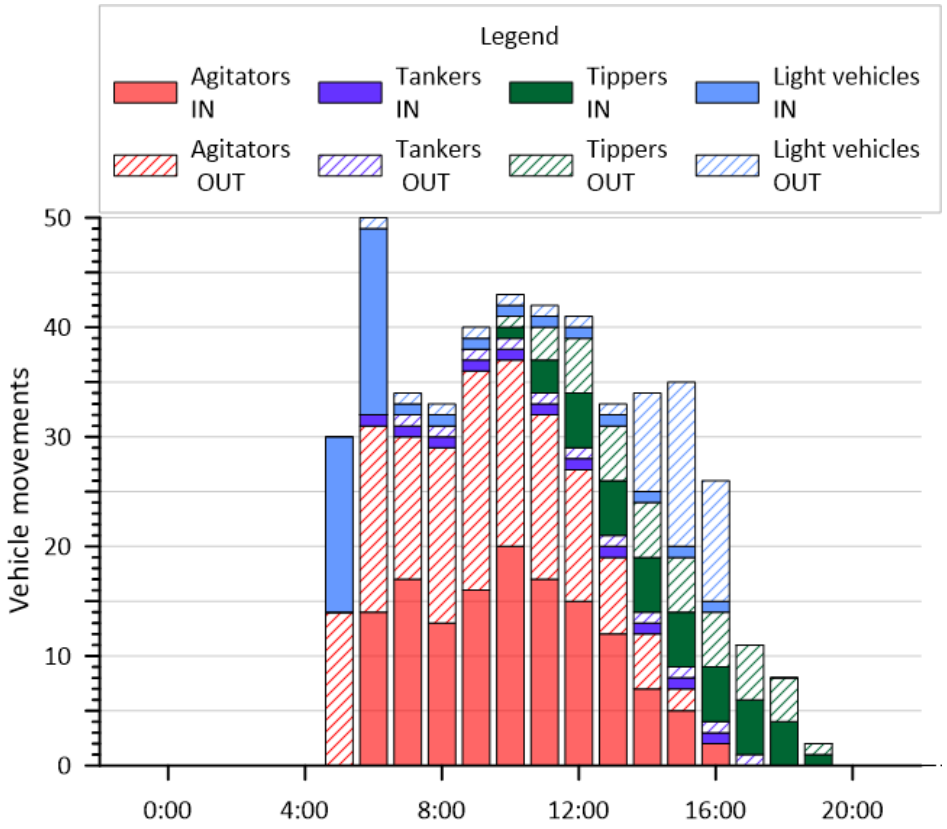

Figure 8. Traffic movements for the peak production day shown in Figure 1.

2.5 ROLES & RESPONSIBILITIES

The major Site roles and responsibilities are summarised in *Table 1*. The Plant Supervisor (the "Batcher") is responsible for all activities on the Site including production, deliveries, safety, maintenance, and implementation of environmental measures. Communication with authorities (including local and state governments) is managed at a more senior level.

Table 1. Summary of roles and responsibilities.

Role	Responsibility	Site interaction
Site Supervisor (Batcher)	Coordination of all site activities Ensuring safety, environmental, and security policies and procedures are implemented Process control Ordering of raw materials	On site during all operating hours
Yardman	Housekeeping Some preventive maintenance tasks (*e.g.* lubrication) Replenishment of live aggregate bins using FEL	On site during all operating hours

Role	Responsibility	Site interaction
Agitator drivers	Loading and delivery of concrete	On Site only to load concrete Start and end day on Site
Cement tanker driver	Delivery of cementitious materials	On Site to unload cement tanker
Aggregate trucker driver	Delivery of aggregate	On Site to unload aggregate trucks
Maintenance personnel	Specialised mechanical and electrical maintenance work (preventive and breakdown)	As requested by Site Supervisor

2.6 24-HOUR OPERATIONS

There will be times when concrete needs to be produced outside typical business times to meet specific project requirements, for example producing at night when the temperatures are low. The ability to operate 24 hours/day is therefore necessary to meet the market demand. Any restrictions on operations will be managed by the Plant Supervisor. The automated nature of concrete production allows recording of Site activities for review at a later time should there be any community issues. For example, all agitator trucks are tracked using GPS.

Any raw material replenishment or production outside of typical business hours will be carefully managed by the Plant Supervisor to ensure any potential impacts are minimised.

2.7 SITE SECURITY

The Site will be fully fenced. Access gates will be locked after hours. A lockable pedestrian gate provides access from Greenbank Road to the office on the Site without being exposed to the vehicle traffic entering and leaving Site. CCTV will allow monitoring of all activities on Site, including boundary security.

APPENDIX A. SUMAMRY OF CHEMICAL REGISTER

Substance	Form	Hazardous Substance (HSNO)	HazChem Classification	Dangerous Goods Class & Packing Group (PG)	Main Storage Area	Storage/Package	Maximum Stock	Hazardous Chemical symbol
Cement (GP, HE, White, SL)	Powder	YES	H315 H319 H335 H350i H373	No	Plant	Silo	2x 100m3	
Fly Ash	Powder	YES	H319 H332 H350i H373	No	Plant	Silo	1x 100m3	
Ground Granulated Blast Furnace Slag (GGBFS)	Powder	YES	H315 H319 H335 H373	No	Plant	Silo	1x 100m3	
Recycled Water	Liquid	YES	H315 H318 H335	No	Washout area	Tanks	200kL	
Aggregate	Granules	No	H350 H373	No	Aggregate bin	Bin	4,000t across multiple bins	
WRDA PN40	Liquid	No	H315 H319 H335	No	Admixture Store	Tank	20kL	
MIRA VL12	Liquid	No		No	Admixture Store	Tank	20kL	
ADVA 650	Liquid	No		No	Admixture Store	Tank	20kL	
DARATARD 1000	Liquid	No	H315 H319 H335	No	Admixture Store	Tank	20kL	
DARASET AF	Liquid	YES	H302 H315 H318 H319 H335	No	Admixture Store	Tank	20kL	
DAREX AEA	Liquid	YES	H301 H314 H318	No	Admixture Store	Tank	20kL	
ECLIPSE Floor AN	Liquid	YES	H227 H315 H319	No	Admixture Store	Tank	20kL	
TYTRO RC430	Liquid	YES	H315 H318	No	Admixture Store	Tank	20kL	
VMAR-3 SF	Liquid	YES	H313 H315 H319	No	Admixture Store	Tank	20kL	
VMAR-6	Liquid	No		No	Admixture Store	Tank	20kL	
Diesel	Liquid	YES	H227 H304 H320 H336 H350	Category 4 Classified as a DG for storage	Refuelling station	Tank	9kL	
Barrell Kleen Safe	Liquid	YES	H290 H315 H319 H335	YES Class 8 PG III	Admixture Store	IBC in bund	1x 1kL	

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