BARANGAROO ONSITE BATCH PLANT

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WATER MANAGEMENT PLAN

CONTROL SHEET

Rev.	Date	ELEMENT	REVISION DETAILS	APPROVED BY
01	31/08/12	Full Document	Barangaroo	RF

Last Saved:	31 August 2012
Author:	Richard FitzGibbon

TABLE OF CONTENTS

1. INTRODUCTION

This plan contains details of water management measures for the Barangaroo concrete batch plant operated by Boral Resources Pty Ltd.

Boral and its contractors shall ensure that all water management and treatment (and sediment control management) works undertaken will comply with this document and be in accordance with the Protection of the Environment Operations (POEO) Act.

Specifically this plan details the requirements to maintain the First Flush System at the state required in both wet and dry conditions in order to protect the local environment surrounding the Barangaroo batch plant.

All employees and subcontractors will be informed of their responsibilities in effectively managing waste and stormwater in order to eliminate the potential for pollution to surrounding areas. Details of induction and training are contained within the 'Site Licences and Regulatory Issues' management plan.

2. OBJECTIVES

In keeping with Boral and Lend Lease's environmental policy the objective of this water management plan is to provide instructions how to correctly operate and manage the water management system within the Barangaroo concrete batch plant.

This plan must be read in conjunction with Lend Lease environmental procedures pertaining to the Barangaroo project. If contradiction occurs, the appropriate Lend Lease representative must be contacted for clarification Immediately.

The outcomes from this Water Management Plan includes:

- Minimising the quantity of stormwater runoff from the site
- Reducing the use of town water by promoting the use of recycled water in plant processes
- Managing the containment and use of cementitious water within the site.
- Ensuring that sufficient "first flush" capacity is maintained at all times, in preparation for a rainfall event.
- Fostering an awareness of water management practices within the operational staff

3. STORMWATER MANAGEMENT AREAS

The total area of the Barangaroo concrete site is approximately **4,600m^2** . The site can be divided up into 3 main water management areas:

- Cementitious (elevate pH) catchment area
- Turbid 'Dirty' catchment area
- First Flush basins

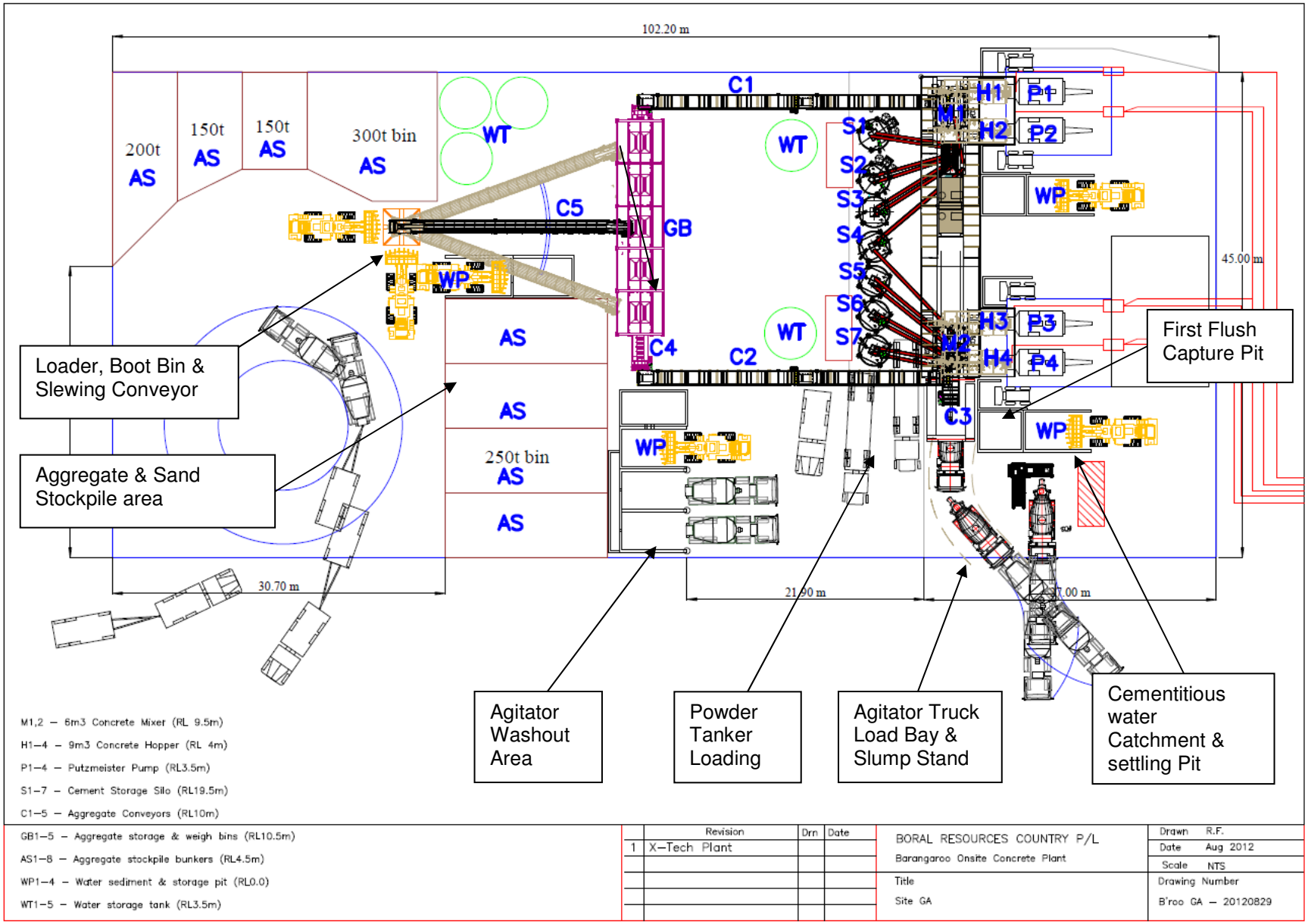
The definitions of the key elements in this water management plan are:

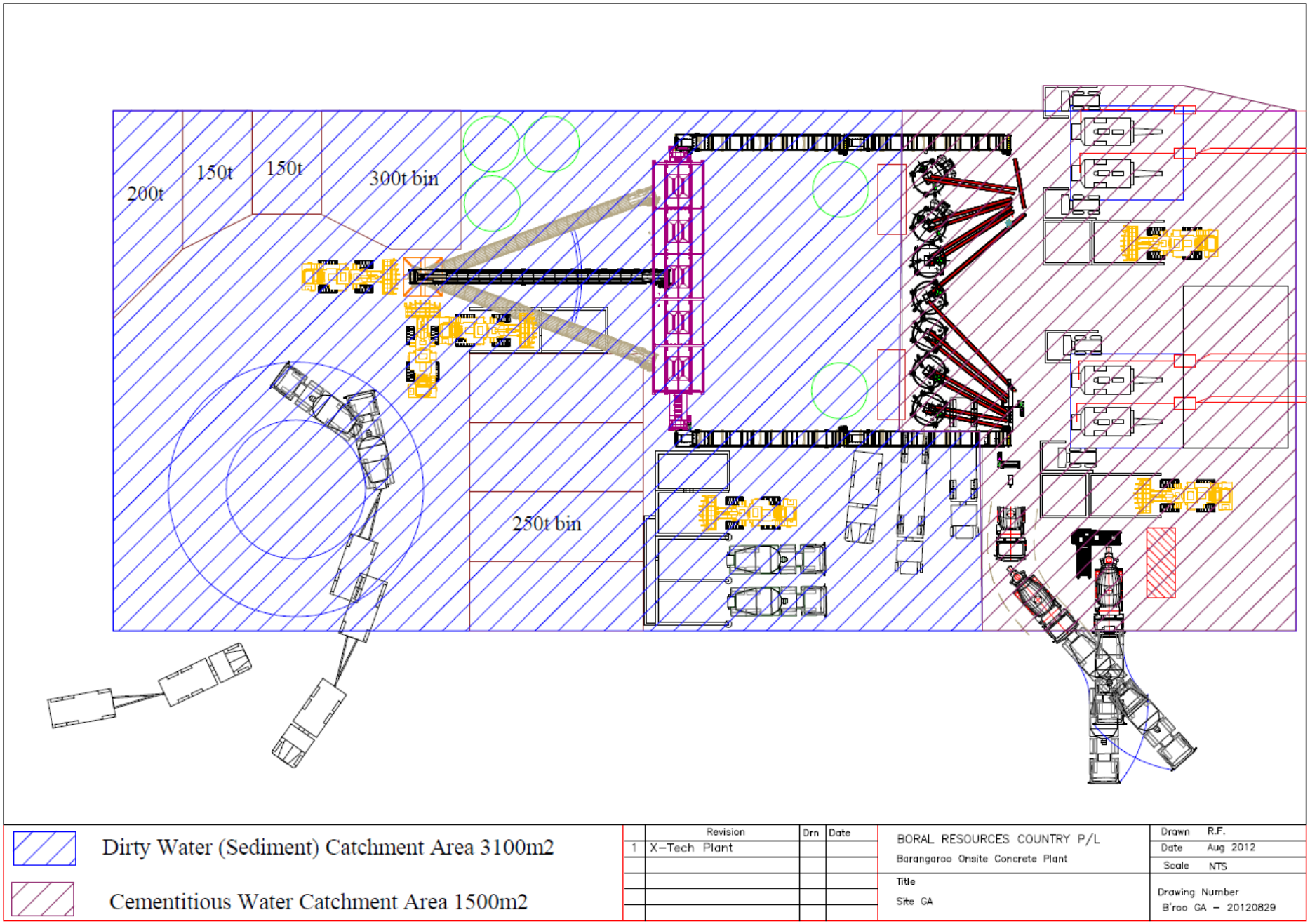
Contaminated Area	where stormwater or town water may contact cementitous material. This includes wash down water, concrete waste and slurry water arising from the washout of concrete delivery vehicles and the concrete mixer. Management of this water is through capture into a sediment basin (with overflow directed to first flush basin) and subsequent reuse. Discharge of Cementitious water is prohibited and is deemed an environmental incident with subsequent notification rules to be enacted. Approximate area of **1,500m2**
Dirty Area	stormwater may contain aggregate and sediments but no cementitous material. Management is by directing stormwater to Lend Lease's water management system on the northern side of the batch plant. Areas considered dirty are the material stockpile areas, underneath conveyors and general yard areas. Approximate area **3,100m2**
First flush	Boral targets a min **20mm** first flush capacity be maintained at all times within the first flush basin to capture the 'first flush' in any rainfall event. 20mm, therefore requires an onsite storage of **30,000L** minimum at all times in readiness for a rainfall event. Once the first flush capacity is reached, further runoff from within the Cementitious catchment

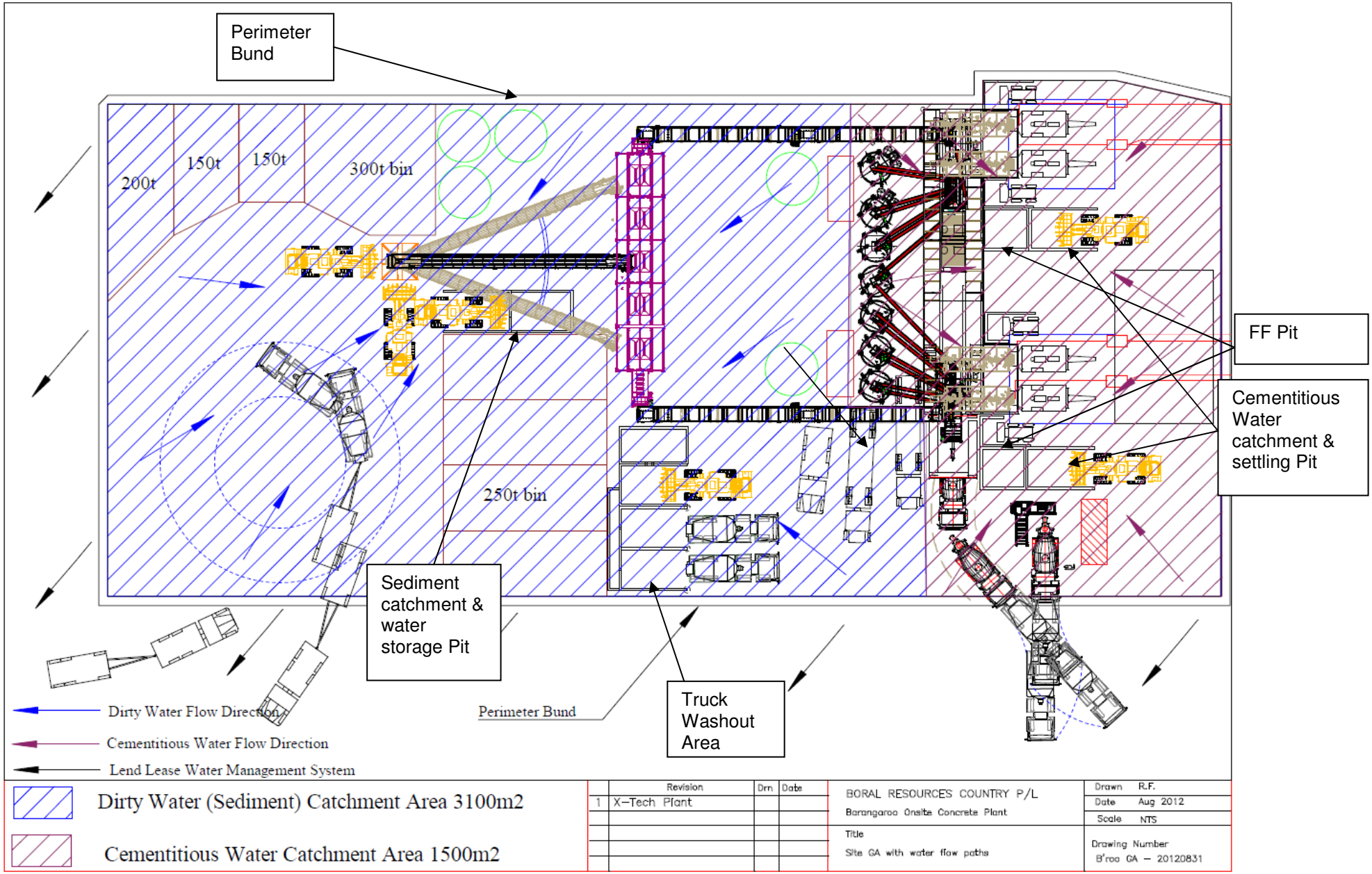
area will be allowed to flow into the Lend Lease controlled water management system via the first flush bypass system.

The exact first flush capacity for the Barangaroo concrete plant will be determined by the pit excavated, however, measurements will be made to ensure capacity for a **20 mm** rainfall event, additional to any working water storage before 'Cementitious area' stormwater diverts to the Lend Lease water management system.

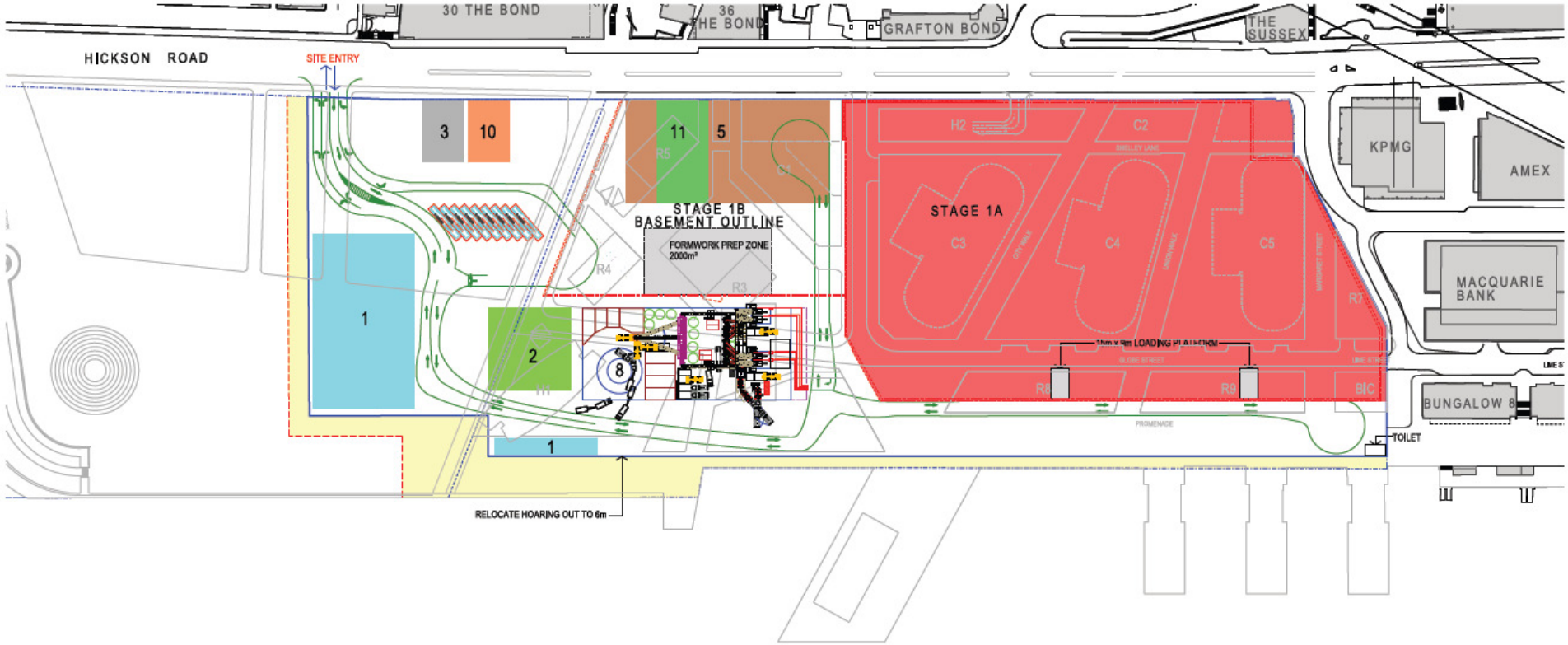
4. SITE PLAN AND STORMWATER AREAS




200t
150t
150t
300t bin
250t bin
Dirty Water (Sediment) Catchment Area 3100m2
Cementitious Water Catchment Area 1500m2
Revision
Drn
Date
1 X-Tech Plant
BORAL RESOURCES COUNTRY P/L
Barangaroo Onsite Concrete Plant
Title
Site GA
Drawn R.F.
Date Aug 2012
Scale NTS
Drawing Number
B'roo GA – 20120829


Perimeter Bund
200t
150t
150t
300t bin
250t bin
FF Pit
Cementitious Water catchment & settling Pit
Sediment catchment & water storage Pit
Truck Washout Area
Perimeter Bund
Dirty Water Flow Direction
Cementitious Water Flow Direction
Lend Lease Water Management System
Dirty Water (Sediment) Catchment Area 3100m2
Cementitious Water Catchment Area 1500m2
Revision
Drn
Date
1 X–Tech Plant
BORAL RESOURCES COUNTRY P/L
Barangaroo Onsite Concrete Plant
Title
Site GA with water flow paths
Drawn R.F.
Date Aug 2012
Scale NTS
Drawing Number
B'roo GA – 20120831

Water Management Plan – Barangaroo



LOT PLAN LEGEND

- Site boundaries
- Site hoarding
- Diaphragm Wall

SPATIAL REQUIREMENTS LEGEND

1. Water Treatment - 50 x 85 - 4250m²
2. Site Accommodation 40 x 40 - 1600m²
3. Site Entry, Introduction & Stabling - 8600m²
5. Spoil Management - 5000m²
8. Batch Plant - 5000m²
10. Subcontractor Storage - 20 x 30 -600m²
11. Cisco Trial - 25 x 50 - 1250m²

Construction Work
Construction Zone License Area
Other, Subcontractor Offices - 1200m²
Other, Road Network - 4600m²
Other, Vehicle Entry and Queuing
Other, Plant Set Down
Other, Pedestrian Circulation - 1000m²
Other, Truck Wash

CONSIDERATIONS

- WTP required for maintenance of the reduced water table.
- WTP required for ongoing stormwater treatment.
- Vehicular entry to the north end of the CZLA maintained.
- Cisco / Remediation works preparations.
- Site accommodation in existing location.
- Spoil management area modified in order to manage restricted and hazardous spoil.
- Concrete batch plant established.
- Bulk excavation and piling works at peak capacity during this period.
- Initial C4 podium structure taking shape.
- Basement structure progressing.
- C5 structure commenced.

PRELIMINARY

INDICATIVE LAYOUT ONLY

Lend Lease

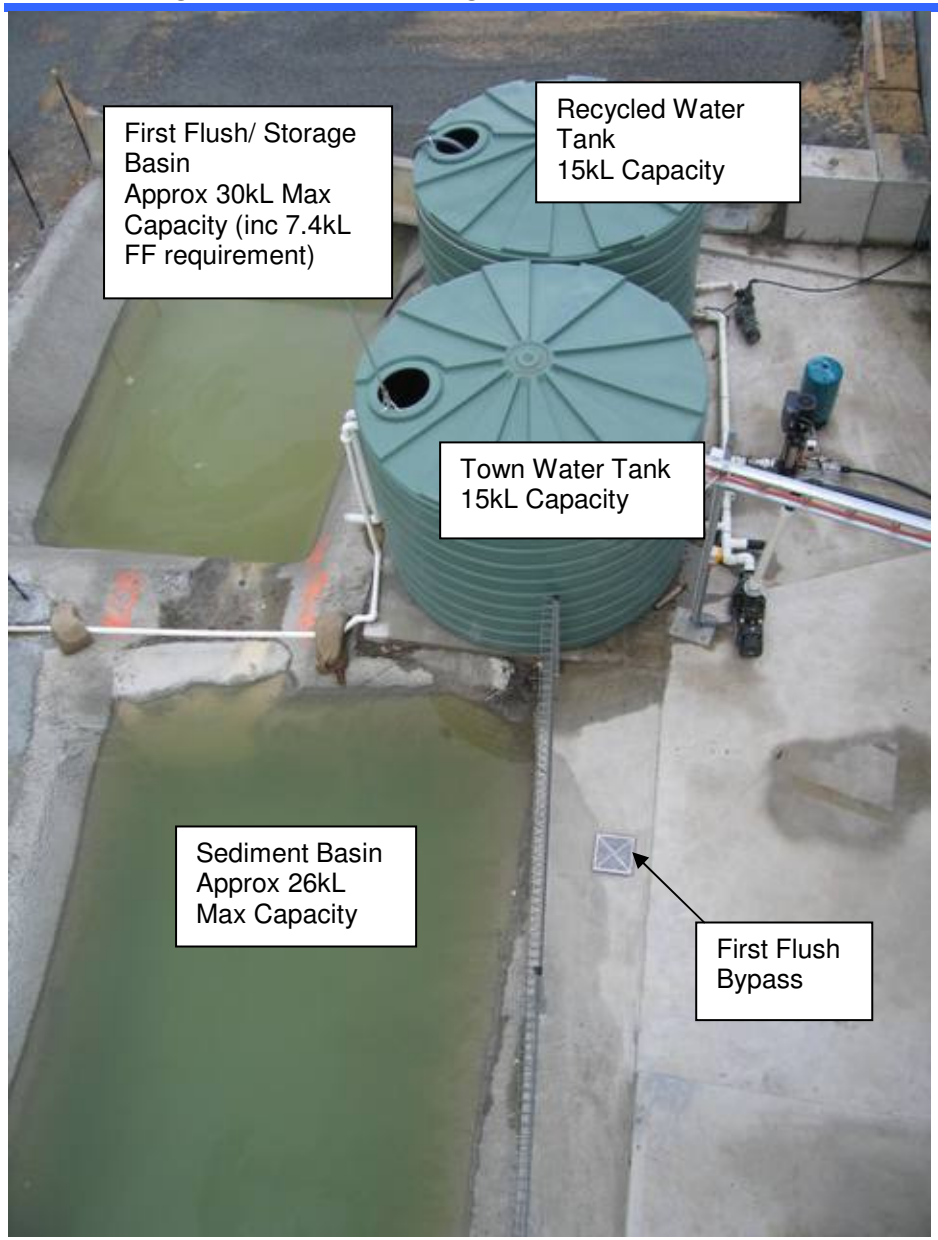
GRAHAM W JONES
Principal Architect
FRAIA NSW ARB 4005

BARANGAROO SOUTH
STAGE 1

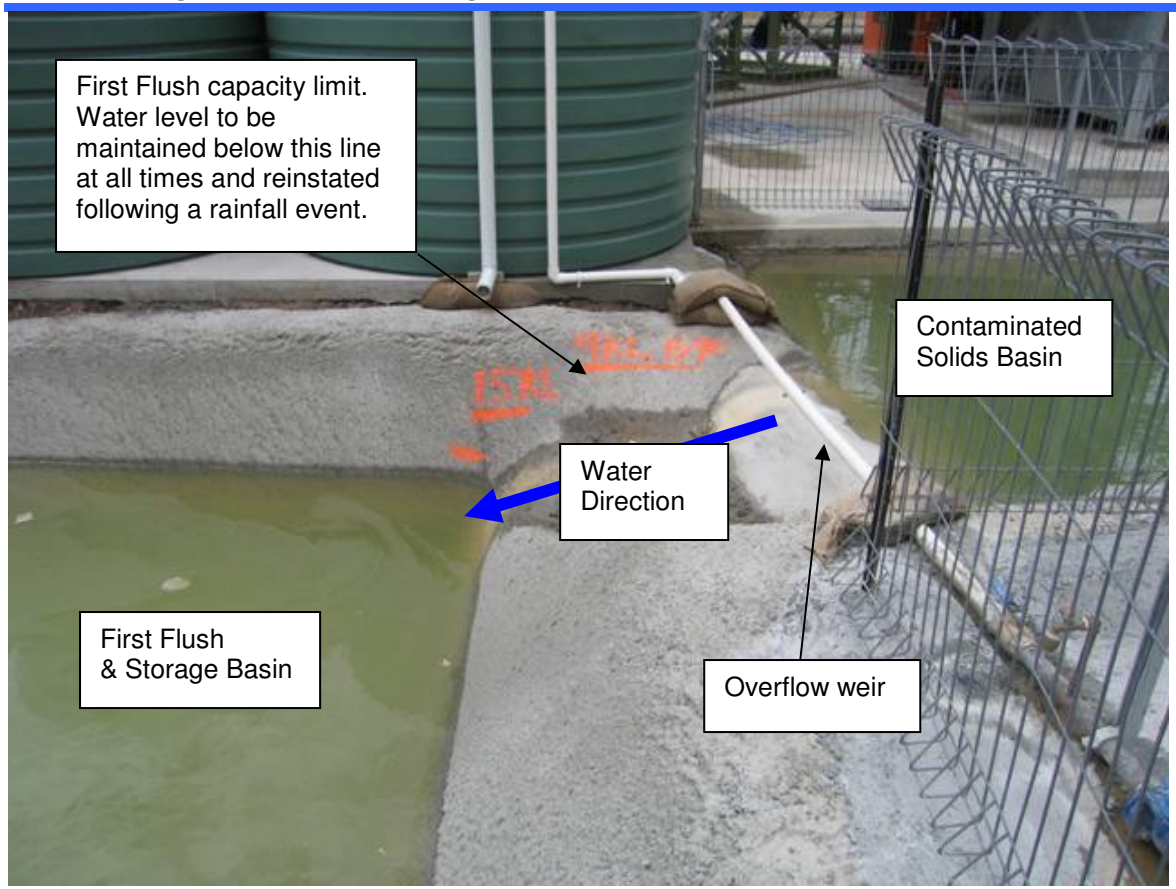
BARANGAROO SPATIAL REQUIREMENTS
OCTOBER 2012 - JUNE 2013

Scale 1:800 @ B1 1:2000 @ A3 N/A
0 20 40 60 80M

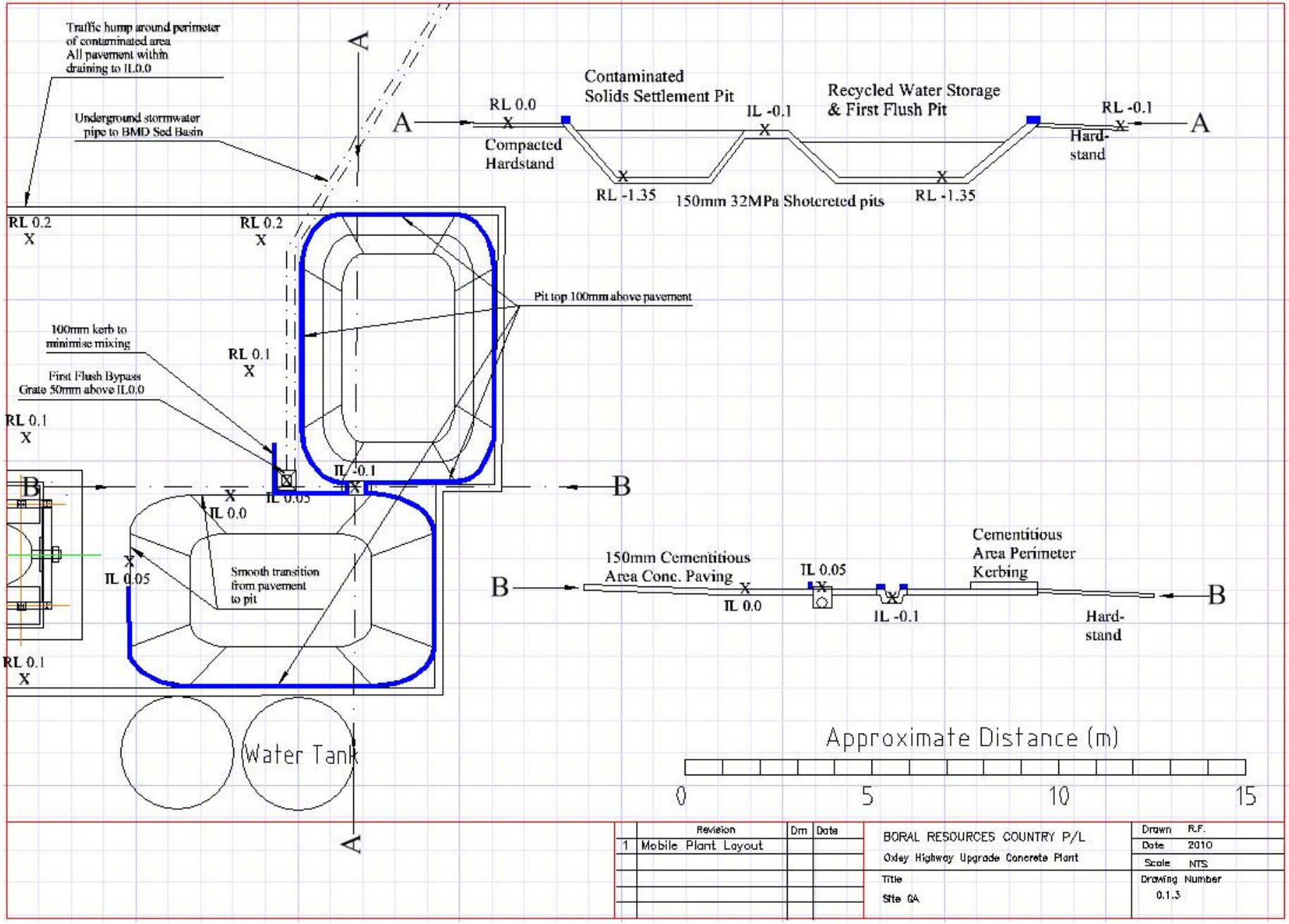
Drawing No. BB1_ASK_CO_0903
Date 29 August 2012 Revision 04



Example of similar Water Management System from F3 Expansion Project



Example of similar Water Management System from F3 Expansion Project.
Overflow weir between sediment basin (right) and First Flush/Storage Basin (left).



Cross sections of example pits and overflow weir/FF bypass

5. MANAGEMENT OF STORMWATER AREAS

5.1. CONTAMINATED AREA

There are 4 streams of Cementitious water on site; water recovered from concrete agitator washout (cleaning of residue concrete from inside barrel), pavement surface water draining from areas of exposed contamination (e.g. loading bay, around silo fill points, pumps, concrete hoppers), washout of concrete mixer and admixtures stored in bunded areas.

There is only one source of 'new' Cementitious water generated onsite, via rainfall within the Cementitious catchment area. The other 3 water streams are connected via a 'closed loop' system. Water from the FF/Storage basin is pumped to the recycled water tank, then pumped to the various hoses which then drains to the sediment basin and back into the FF/Storage basin, completing the cycle.

Batching of concrete will prioritise the use of recycled water at all times, eliminating the need for discharge of waste water generated across the site into receiving waterways. If recycled water is available to use, it will be sent first to batch concrete, if no recycled water remains only then will town water be used.

Boral will provide 200kL of total water storage onsite, this will be approximately 50% recycled and 50% town water. The town water capacity is required as a buffer to ensure sufficient volumes are available. The recycled water capacity includes the First Flush storage capacity of 30kL which will be maintained empty at all times in preparation for a rainfall event (see Section 5.4).

5.1.1. Concrete Agitator Trucks - Washout Water

Waste washout water from concrete agitators will be discharged into the above ground washout pits. Solids are allowed to settle out and surface water spills into the adjacent sediment pit for reuse within the production of concrete.

Water for washout of agitator trucks is from the recycled water tank.

5.1.2. Pavement runoff in Cementitious areas

The pavements within Cementitious water areas have the potential for cement residues, causing an increase in the water's pH. Contaminated pavement areas include the batch plant loading bay, cement tanker delivery area and around the concrete hoppers and pumps.

Contaminated water is directed into the sediment pit for harvesting back into the batching process.

5.1.3. Concrete Mixer

At the completion of production every day the concrete mixer requires a thorough cleaning with high pressure water to prevent concrete build-up within it. Water from this process contains concrete residue and is directed into the sediment pit for later re-use within the batching process.

5.1.4. Admixture bunds

The Concrete Mix requires the use of 'admixtures'. These liquids will be stored within poly tanks, which then are placed within a fully bunded area. The tanks & bunds will be located within the 'Cementitious catchment area'. In the extremely unlikely event of an admixture tank failing, the liquids will be contained within the bund and appropriate actions will be taken to rectify the incident. MSDS's for these products are stored onsite and are non-toxic, non-flammable, non-hazourdous, lignan based liquids from SIKA.

These bunds are to be routinely monitored for signs of leakage. Any spillages within the bunds are to be cleaned up and removed as promptly as possible using the spill kits provided or by contacting an accredited contractor.

5.2. TURBID WATER AREA

The main source of turbid or sediment laden water generated on site is the aggregate stockpile area. In the event of rainfall, all water within the turbid area drains to a sediment pit, then to an adjacent water storage pit, additional rainfall will cause runoff to be directed to the Lend Lease controlled water management system.

5.3. SPILLS KIT

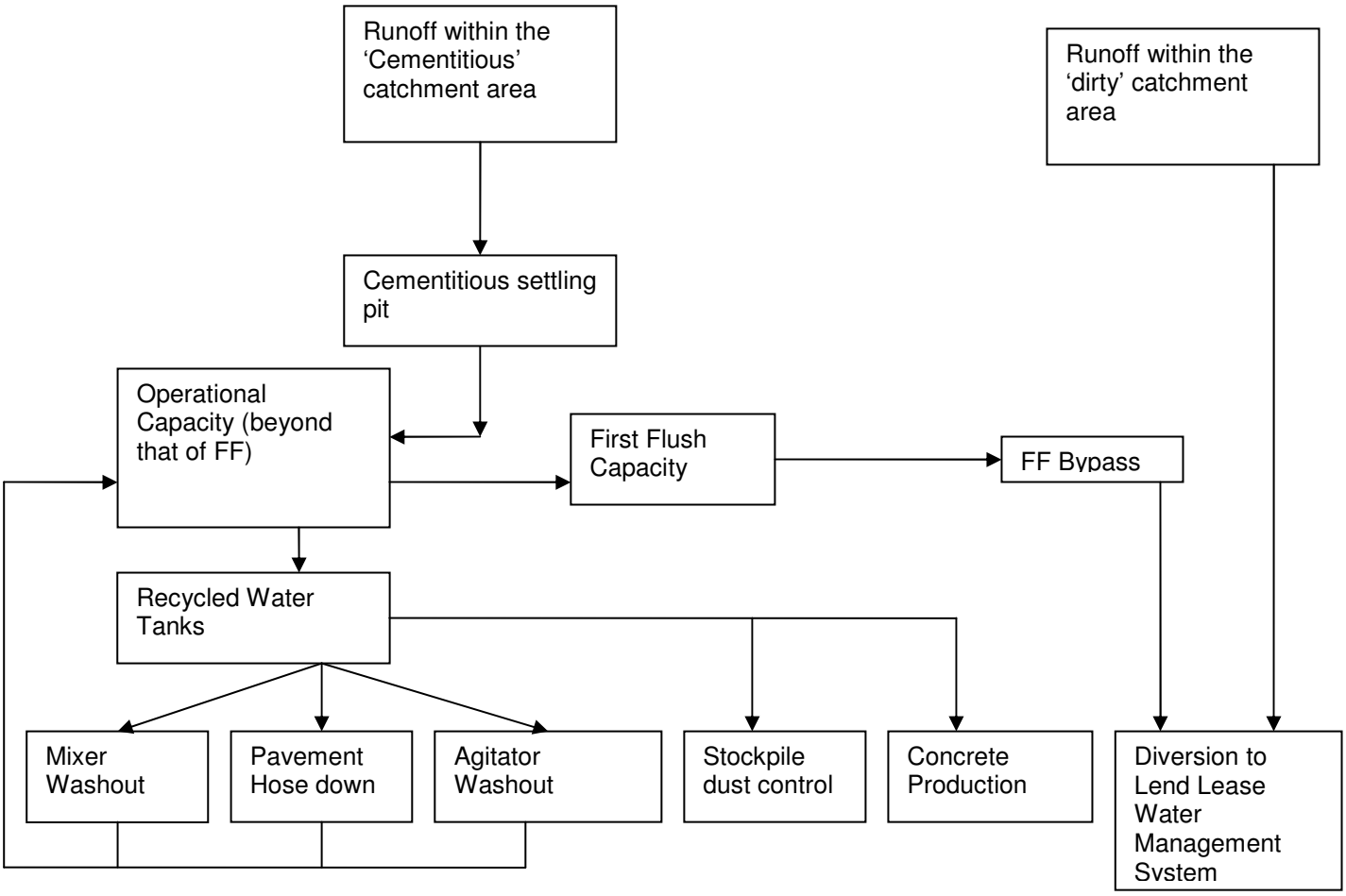
A spills kit will be located within the batch office. In the event of an incident requiring the use of the spills kit, an incident report will be produced and the Major Projects Manager will be notified as per the Incident Procedure.

5.4. FIRST FLUSH SYSTEM

A first flush bypass system will be in operation to capture the first 20mm of a rainfall event.
All pavements in the Cementitious catchment area is directed to one of two sediment pits (adjacent to each of the concrete mixers) to capture suspended solids, water then flows into a storage pit which also doubles as a First Flush pit. A pump float switch system maintains the level in the pit such that the 30kL First Flush capacity is always maintained ready for a rainfall event. The pump directs water to the recycled water tanks ready for use in the production of concrete.

A detailed water balance is described below.

6. WATER MANAGEMENT BALANCE



7. WATER SOURCES

The primary source of water at the batch plant is town mains water from Lend Lease's supply pipe. An approximately 100kL town water tank is filled via trickle top-up from a high/low level float switches. Additional tanks will be used to store up to 100kL of recycled water pumped from the various in ground water pits. The recycled water tanks allow for immediate reinstatement of the first flush capacity following a rain event.

The production of concrete requires large amounts of water (between 100-150L/m3), which due to the large volumes required per day (up to 2,000m3), mean that all recycled water generated onsite will be used within the production of concrete and not allowed offsite (into the Lend Lease controlled water management system. Only in the event of sustained rainfall and minimal or no production would the recycled water holding capacity of the batch plant be reached, in this instance the water will be directed to the Lend Lease water management system for further treating.

At the beginning and end of each day the batch plant supervisor must ensure the first flush pit has the required capacity by pumping water from the FF pit into the recycled water tank. Water in the recycled tank must then be used, both as washout water and within the production of concrete, to ensure capacity in the tank for the following morning.

8. WASHOUT PROCEDURE

- Driver to contact Plant Supervisor via 2-way radio when washout of agitator required
- Plant Supervisor to inform driver of position to park ie Washout pit #1 or #2
- Driver to washout inside of agitator barrel ensuring all spray and solids remain within the Cementitious catchment area
- Driver to inform Plant Supervisor when complete

Note: Washout procedure only applies to concrete residue within the agitator barrel itself, under no circumstance is oil or other similar substances to be washed into the batch plant water management system.

9. WASHDOWN PROCEDURE

No washdown of trucks will be allowed onsite, trucks must return to their respective depots to undertake this activity.

10. FIRST FLUSH REINSTATEMENT PROCEDURE

IMMEDIATELY AFTER A RAINFALL EVENT:

- CHECK IF ANY RUNOFF HAS LEFT BATCH PLANT SITE. IF SO MEASURE PH LEVEL, INFORM LEND LEASE AND RECORD IN SITE DIARY.
    - USING PH TEST KIT, SAMPLE WATER ENTERING THE LEND LEASE WATER MANAGEMENT SYSTEM FROM THE BATCH PLANT FIRST FLUSH BYPASS PIPELINE. REFER DETAILED INSTRUCTIONS WITHIN LEND LEASE PLAN
    - IF Ph IS LESS THAN 6.5 OR GREATER THAN 8.5, REPORT TO MAJOR PROJECTS MANAGER AND LEND LEASE REPRESENTATIVE IMMEDIATELY
- REINSTATE CAPACITY OF FIRST FLUSH PIT BY TRANSFERING A MINIMUM OF 30KL TO THE ABOVE GROUND RECYCLED WATER TANK (ASSUMING FF CAPACITY HAS BEEN EXCEEDED, IF NOT TRANSFER SUFFICIENT WATER TO REACH THE FF CAPACITY OF 30KL)
- AS SOON AS POSSIBLE, REDUCE LEVEL OF RECYCLED WATER TANK BY BATCHING CONCRETE

11. WATER MANAGEMENT CHECK LIST

DAILY VISUAL INSPECTIONS AND MANAGEMENT STRATEGIES:

- REVIEW LEVELS OF PITS INCLUDING FIRST FLUSH PITS TO ENSURE THERE IS A MINIMUM 30Kl CAPACITY
- SWEEP UP MATERIAL SPILLAGES IN MATERIAL LOADING AREA. PUSH ALL RAW MATERIAL INTO DESIGNATED STOCKPILE AREA BEFORE LEAVING SITE.
- CHECK FOR SPILLAGES AND LEAKS IN ADMIXTURE BUNDS.
    - IF LEAKS AND SPILLAGES OCCUR, CONTACT MAJOR PROJECTS MANAGER AND Lend Lease REPRESENTATIVE, CONFIRM APPROPRIATE METHOD FOR DISPOSAL.

WEEKLY VISUAL INSPECTIONS AND MANAGEMENT STRATEGIES:

- CHECK LEVEL OF SEDIMENTS IN FIRST FLUSH AND SEDIMENT PITS. IF LEVEL GREATER THAN 1/3 OF SEDIMENT PIT OR 1/10 OF FIRST FLUSH PIT ADVISE Lend Lease IMMEDIATELY TO REMOVE SEDIMENT
- WALK AROUND SITE AND CHECK FOR EVIDENCE OF OUT OF NORMAL PLANT AND EQUIPMENT.
    - REPORT ANOMOLIES IMMEDIATELY TO MAJOR PROJECTS AND Lend Lease
- CHECK FOR STRUCTURAL INTEGRITY OF WALLS FOR CONTAMINATED AND FIRST FLUSH PIT.