Hanson Construction Materials Pty Ltd

Water Cycle Management Plan: Lot 3, Lot 4 & Part Lot 5, DP 1225803 Hanson Eastern Creek Resource Recovery Facility, NSW

martens consulting engineers

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

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PROJECT MANAGEMENT

P1806739JR03V05
August 2021

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Document and Distribution Status

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Revision No.	Description	Status	Release Date	Document Location			
				File Copy	Hanson Construction Materials		
1	For SSDA Submission	Final	27/10/2020	1E,1P	1P		
2	For client review	Draft	18/02/2021	1E,1P	1P		
3	For SSDA Submission	Final	03/03/2021	1E,1P	1P		
4	For SSDA Submission	Final	15/03/2021	1E,1P	1P		
5	For client review	Draft	23/07/2021	1E,1P	1P		
6	For SSDA Submission	Final	04/08/2021	1E,1P	1P		

Distribution Types: F = Fax, H = hard copy, P = PDF document, E = Other electronic format. Digits indicate number of document copies.

All enquiries regarding this project are to be directed to the Project Manager.

Contents

1 Introduction

This Water Cycle Management Plan (WCMP) has been prepared on behalf of Hanson to support a state significant development application (SSDA) that seeks approval for a resource recovery facility at Lot 3, 4 and 5 DP 1225803, Eastern Creek within the Blacktown City Council (BCC) local government area (LGA). The site is approximately 4.5 km west of Prospect Reservoir. The site fronts a cul-de-sac to the west and has a northern and western frontage to Hanson Place, with an area of approximately 5 hectares.

The site was used historically for industrial uses associated with quarrying, aggregate processing and concrete production. The site has a major project concept approved for a resource recovery facility.

A review of the available documentation for the previous Hanson Place Estate (the estate) subdivision (approved under MP06_0225 Concept MOD 2) which included lots 1 - 5 in DP 1225803 and lots 61 and 62 in DP 1234758, identified a Costin Roe 'Civil Engineering Report' for the development. It was titled *Civil Engineering Report for S75w Infrastructure Application* (2016), hereafter referred to as the "Costin Roe report". The Costin Roe report, used DRAINS for hydraulic modelling and MUSIC for water quality modelling consisted with the site's concept approval. A water quality and onsite detention (OSD) basin for the estate was documented then constructed.

Recent advice from Blacktown City Council (BCC) relating to a separate Hanson proposal in the same estate is that Council understands and accepts that the constructed basin addresses water quality and quantity considerations other than the gross pollutants. BCC's advice is that the GPT installed as part of the estate's development is undersized and additional GPTs are required for any further development within the estate.

This Water Cycle Management Plan is prepared to provide:

- A description of the existing site conditions;
- A sediment and erosion control plan during construction;
- A site water balance assessing water demands, supply sources and opportunities for onsite reuse;
- A stormwater management system to prevent potential offsite water quality and quantity impacts;

- Identification of wastewater sources and development a site wastewater management solution; and
- A water monitoring plan including mitigation measures.

2 Site Description

The site is identified as Lot 3, 4 and 5 DP 1225803 with a total area of approximately 5 hectares. The site slopes gently to the south west. The proposed development area comprises all of Lot 3 and 4 and part of Lot 5.

At the time of preparing this report the site was vacant, bulk earthworks as part of previous site subdivision works had created two "tiers" with a ramp constructed from Hanson Place to the south portion of the site. A stormwater retention and water quality basin / bioretention system servicing the local estate located in the west of lot 5. The site was mostly cleared of vegetation, having been cleared during previous earthworks.

An aerial photo of the site is shown at Figure 1.

The site is adjoined by rural uses to the south and west and industrial uses in all other directions. Recently subdivided industrial lots to the north west, vacant industrial lots and distribution centres to the north east respectively.

Figure 1: The site (Lot 3, 4 & 5 DP1225803) and proposed development footplant.

2.1 Proposed Development

Construction and operation of the "Eastern Creek Resource Recovery Facility", comprising a concrete recycling plant with a processing capacity of 100,000 tonnes per year and a material storage depot with a capacity of 36,000 tonnes per year (SEARs, SSD 9774). The plant will operate 24 hours per day, seven days per week and employ up to 28 employees or contractors.

Site development is expected to be near to the existing grade and significant cut / fill works are not expected (IP, 2018).

2.2 Rainfall and Evaporation

The Eastern Creek area is characterised by an average annual rainfall of 875 mm/year. Rainfall varies throughout the year as shown in Table 1, with a late summer/early autumn peak. Comparison with evaporation data indicates that the regional area surrounding Eastern Creek experiences a significant moisture deficit on average. Evaporation exceeds precipitation most months except late autumn and early to mid winter.

Table 1: Monthly climatic information based on average monthly rainfall from Prospect Reservoir (67019) and evaporation data from Parramatta Monthly Areal PET.

mm	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall	95.3	96.5	97.7	76.1	69.4	77.2	55.7	50.4	45.9	58.1	72.8	75.9	875.0
Evap.	172.7	128.2	115.9	75.6	50.2	38.4	38.4	55.5	75.0	77.9	145.5	154.1	1169.5

2.3 Topography and Drainage

The site typically slopes southwest at gradients <5%. A steep batter (with grade of approximately 30%) separated the upper portion of the site (Lot 3) from the lower portion (Lots 4 & 5). Site elevation ranges between approximately 81 mAHD (northeast of Lot 3) and 69.5 mAHD (southwest of Lot 5) (Costin Roe Consulting, 2016).

2.4 Geology and Soils

The Sydney 1:100,000 Geological Sheet 9130 (NSW Dept. of Mineral Resources, 1983) describes geology at the site being underlain by shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

The NSW Environment and Heritage eSPADE website identifies the site as having clay loams or loams.

2.5 Previous Stormwater Modelling

As part of their report, Costin Roe used DRAINS for hydraulic modelling and MUSIC for water quality modelling. These models have accounted for the modifications listed in MP 06_0225 MOD 1 (24 October 2013), which are generally consistent with the land uses in the current MP 06_02225 MOD 3 in regards to lot sizes and land use. Comparing the source nodes of the site in the Costin Roe report and the current design of the recycling facility shows that there would be a decrease in the pollutant generation due to the inclusion of a large roofed area, large area of vacant permeable land for equipment storage, and reduction in the area of road. Furthermore, the impervious area is significantly decreased (from 98% to 35%) in the proposed recycling facility layout compared to that assumed by Costin Roe.

No further water quality or quantity modelling is considered necessary as the constructed estate basin is considered (by Martens and BCC) to have adequately addressed the water quality and quantity considerations for the original design and the proposed use shall generate less runoff and reduced pollutant loads.

3 Water Supply Strategy

3.1 Overview

The water supply strategy was created based on an analysis of likely water demands and supply sources from the proposed resource recovery facility.

The water generation rates summarised below are average daily values based on 365 production days per year.

3.2 Methodology

The assessment can be separated into three components:

1. Site Water Demand: Estimation of average daily water demands for the proposed development.

2. Site Water Supply: Consideration of available water supply options including: townwater, stormwater runoff from roofs and hardstand, and recycled wastewaters.

3. Site Water Balance: Undertaken to determine supply requirements to meet long term water demands for the proposed development.

3.3 Water Demand

Table 2 summaries site water demand as provided by the Client. These values are based on an average daily demand (365 days per year) to be compatible with MUSIC modelling units (Table 3). This is necessary as water balance calculation (Section 3.5) and water quality assessment use MUSIC.

Table 2: Summary of water demands for the Eastern Creek Resource Recovery Facility.

Demand [1]	Average Daily Demand (kL/day)
Dust Suppression for Crusher [2]	10.96 [2]
Amenities	0.612

Notes

1. Information provided by Hanson (2020).
2. Calculated based on the proposed 100,000T of product produced per year and 40 L/T of water demand is required: 100,000 / 365 X 40 = 10, 958 L/day
3. Calculated based on 20 fulltime staff based on 27 L/day and 8 part time staff based on 9 L/day: 20 X 27 + 8 X 9 = 612 L/day. See Section 4.2 for more details.

3.4 Water Supply

The proposed development relies on three water supply sources:

1. Stormwater roof runoff to be used for amenities and dust suppression in crusher.

2. Stormwater from the stormwater tank to be used for dust suppression in crusher.

3. Town water used for potable uses and to supplement other supplies as required.

As the development does not require collection or extraction of other surface water or groundwater, no Water Management Act licence is required for the proposed development.

3.5 Water Balance

The concrete recycling facility demand is met via a combination of reuse from the on-site stormwater tanks and from town water supply Town water is to be used only when on-site stormwater tanks are empty.

3.5.1 Modelling Methodology

Overview

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC, Version 6.33) was used to evaluate the site water balance and stormwater reuse system.

Modelling has been undertaken in accordance with BCC Water Sensitive Urban Design (WSUD) (2013) with the developed site based on the conceptual site layout and catchment area details (refer to Attachment B).

The model proposed reflects the proposed Hanson site development on lot 3, 4 and (part) 5 to assess the available stormwater for reuse for the site rainwater tanks and the stormwater tank.

Climate Data

MUSIC was run on a 6 minute timestep using the MUSIC link function for Blacktown City Council data obtained from *eWater*.

Input Parameters

Input parameters for source nodes have been obtained from the approved Costin Roe report. Input parameters for treatment notes have been obtained via the MUSIC link function for Blacktown City Council and are consistent with BCC WSUD (2013).

Catchment Areas

Catchment areas were subdivided into areas corresponding to roofs, roads and hardstand areas. Catchment area details, with the post development MUSIC model layout, are provided in Attachment B.

Rainwater Tanks

It is proposed that six aboveground rainwater tanks with a total volume of 278.4 kL (6 x 46.4 kL) are to be provided to collect runoff from roofs. Modelling specifications are summarised in Table 3. Water is preferentially drawn from these tanks before water is drawn from the stormwater tank for use.

Table 3: Summary of rainwater tanks details.

Description	Volume (kL)	Reuse Demand (kL/day)
Rainwater tanks (6x46.4 kL)	222.72 [1]	8.6

Notes

1. Storage volume has been modelled as 20% smaller than the proposed volume.

Stormwater tank

A 24 kL underground stormwater tank is proposed to collect surface runoff from Lot 5 and overflow from the proposed rainwater tanks. This tank will require water to be pumped out and reuse for dust suppression. Location of the tank is shown in Attachment B. Modelling specifications are summarised in Table 4.

Table 4: Summary of underground stormwater tank details.

Description	Volume (kL)	Reuse Demand (kL/day)
Underground stormwater tanks	20[1]	2.97

Notes
1. Storage volume has been modelled as 17% smaller than the proposed volume.

3.5.2 Water Balance Results

Details of the water balance model for the site is reflected on Table 5 and summarised as:

- Demand of 10.96 kL/day for dust suppression in crusher is supplied with 6.38 kL/day by aboveground rainwater tank, 2.38 kL/day from the underground stormwater tank and the remainder 2.20 kL/day from townwater.
- Demand of 0.61 kL/day for staff amenities will be supplied from the aboveground rainwater tanks.
- With a total site use of 11.57 kL/day, 9.37 kL/day is supplied by stormwater sourced from the proposed rainwater tanks and stormwater tank. 81% of the total site water demand is supplied by stormwater reuse.

Table 5: Water balance for the development site.

Use	Demand (kL/day)	Supplied by Aboveground Rainwater Tank (kL/day)	Supplied by Belowground Stormwater Tank (kL/day)	Supplied by Town Water (kL/day)
Dust Suppression for Crusher	10.96[1]	6.38[2]	2.38[2]	2.20
Amenities	0.61	0.61	0.00	0.00
Total	11.57	6.99	2.38	2.20

Notes

1. Demand to be preferentially satisfied by stormwater. When inadequate stormwater is available town water to be used. Modelling results show 81% of total site water demand is from stormwater supply.
2. MUSIC modelling results.

3.6 Recommendations

Final design of the system shall be undertaken at the construction certificate stage. A suitably qualified engineer should undertake all elements of the water supply system design.

3.7 Conclusion

The proposed site water supply strategy satisfied Council DCP requirement that 80% of non potable site water demand is satisfied by stormwater reuse.

4 Site Wastewater Management Plan

4.1 Overview

The proposed site wastewater management system has been designed to provide a sustainable outcome for the proposed development.

4.2 Wastewater Sources and Generation Rates

4.2.1 Staff Amenities Wastewater

According to information supplied by the client, 20 full time, and a further 8 staff who will only be on site part time (i.e. truck drivers), are expected daily. Amenities are to be provided for both drivers and site staff.

Based on site occupancy data and NSW Health (2012), the site's wastewater generation rate is approximately 612 L/day.

4.2.2 Industrial Wastewater

There are no significant wastewaters produced by the operation. As such no industrial wastewater requiring offsite disposal is generated. Contamination of surface water is avoided by enclosure of all stockpiles and processing activities within a shed.

Roof water of the shed will be captured by the proposed rainwater tanks for dust suppression in crusher and manual wash down of trucks wheel when required.

4.3 Proposed Wastewater Management System

Only sewage water from staff amenities (approximately 612 L/day) shall be disposed of offsite, it is to be discharged to Sydney Water sewer.

5 Stormwater Management Strategy

5.1 Stormwater Quantity Assessment

5.1.1 Concept Site Drainage Network

The site drainage plans provided in Attachment A – Stormwater Concept Drainage Plan, has been prepared by Martens in order to address the conveyance of stormwater within and through the site. A few existing stormwater drainage lines have been made redundant to suit the proposed layout which have no impacts on the approved stormwater management system under MP06_0225 Concept MOD 2.

Outlet pipes from the site have been sized to covey the minor storm flows - 5% AEP in accordance with council's requirements.

5.1.2 Stormwater Detention

BCC (2015) requires on site detention for all industrial developments where an infiltration system is not permitted.

The existing estate onsite detention (OSD) system designed by Costin Roe services the site and *approved* under MP06_0225 Concept MOD 2. Previous Costin Roe modelling assumed that the site would be 98% impervious. The development plans show the concrete recycling facility will be 35% impervious. As the site has reduced proposed impervious percentage compared to that assumed for the basin design in Costin Roe's model, the OSD shall adequately detain stormwater from the site to achieve design performance. Therefore, no further OSD modelling or assessment is required and no further site OSD management measures are required or proposed.

5.2 Stormwater Quality Assessment

The existing estate stormwater quality treatment system designed by Costin Roe has been constructed as a regional facility that services the site . The regional facility caters for the site's TSS, TP and TN WSUD removal requirements which meet the growth centres pollutant reduction targets. This conclusion has been previously confirmed by BCC in assessment of another estate development.

Previous Costin Roe modelling assumed that the site would be 98% impervious. The development plans show the concrete recycling facility will be 35% impervious. Further, the site development's plan includes considerable area of roof which are in places of previously modelled roads. The pollutant generated from roof is considerably less than roads

which further reduces the pollutant loads to the estate basin. As the site has reduced proposed impervious percentage compared to that assumed in Costin Roe's model and find surfaces with lower pollutant generation capacity for TSS, TP and TN the regional basin with water quality structure, shall adequately meet the growth centres pollutant reduction targets. Therefore, no further stormwater quality modelling or assessment is required for TSS, TP and TN.

Whilst the water quality objectives for the estate have been achieved it is understood from previous BCC advice that GPT(s) sized for the 4EY flow are required on site to capture litter, debris and other pollutants before discharge offsite.

GPT devices (Vortsenty HS) has been provided at each stormwater outlets from the site including the overflow from the underground stormwater tank tanks. Proposed GPTs have been sized to treat the 4EY flow and are shown on Attachment A – Stormwater Concept Drainage Plan.

5.3 Flooding

The site is located on a high elevation area between Ropes Creek and Eastern Creek with minimum elevation of approximately 61 mAHD, located in the swale at the southern end of the site. The entirety of the site is located outside of Council's flooding precincts based on 'BLEP 2015 Maps online'. The proposed development is not flood affected and shall not impact on flood regime.

The existing cul-de-sac located immediately north of the proposed building within Lot 5 is at a low point and affected by local upstream stormwater catchment flows from the road. By reviewing of the CC plan completed by Costin Roe Consulting (C010726.13, 2016), a trap low point with a sag pit is located on the western side of the cul-de-sac, connecting to a 1350 mm diameter outlet pipe under a 9.8 m wide trapezoidal channel which runs along the north western boundary of the site and discharges into to the estate basin.

Comparison of the upstream catchment flows with the capacity of the existing estate pipe and channel is summarised below:

Total upstream catchment flow (Q_{tota})

Q_{total} = CIA

C20 = 1.0 (Table 3.4 - bcc engineering guidelines)

i = 184 mm/hr (Table 3.0 - bcc engineering guidelines)

a = 16.5 ha (catchment upstream)

Q_{totol} = 8433 l/s

Pipe capacity ($Q_{pipe\ cap}$)

Diameter = 1350 mm

Pressure slope = 1.2% (minimum pipe slope)

$Q_{pipe\ cap}$ = 6334l/s

$Q_{pipe\ cap}$ with 25% blocked = 5776 l/s

Excess overland flow entering channel ($Q_{overland\ flow}$)

$Q_{overland\ flow}$ = Q_{totol} - $Q_{pipe\ cap}$ with 25 % blocked

= 2667 l/s

Channel capacity ($Q_{channel\ cap}$)

bottom width = 5 m

top width = 9.8 m

depth = 0.8m

Longitudinal grade = 1.2% (minimum swale slope)

$Q_{channel\ cap}$ = 13011 l/s > Q overland flow

Results show that the existing estate pipe (25% blocked) and swale can cater for the upstream overland flows in the 1% AEP event. Therefore, we consider that the proposed development is adequately protected by the existing drainage infrastructure.

6 Water Monitoring Plan

6.1 Objective

The objective of the site water monitoring plan is to provide means to assess the effectiveness of the implemented stormwater reuse management solution. Monitoring of site water movements is proposed to confirm site stormwater reuse targets are achieved.

6.2 Monitoring Locations

The following locations shall be metered and monitored:

1. Outlet of rainwater tanks.
2. Outlet of stormwater tank.
3. Delivery of water pumped from rainwater tanks and the stormwater tank.
4. Sydney Water supply to nonpotable system.

6.3 Sampling Methodology

Flow meters are to be read monthly and results are to be reviewed monthly, quarterly and annually to assess site compliance with 80% non potable supply target.

6.4 Mitigation Measures

According to Blacktown City Council DCP (2015) Part J, industrial and commercial developments must supply 80% of their non potable demand using non potable sources. In the event that long term data

indicates less than 80% of flow is from stormwater supply, the following measures are to be taken:

- Confirm the pumps are operating correctly.
- Review site demand to determine if it is consistent with anticipated rates.
- Confirm site non potable demands are being preferentially supplied with stormwater collected in the proposed on-site stormwater/rainwater tanks.

Where it is found that the total site stormwater supply of non potable demand is less than 80% and above measures have not resolved the issue further assessment would be required.

7 Integrated Water Cycle Management

7.1 Overview

This section provides a summary of the site water management for the development including water supply for site demands, stormwater quality and quantity management, and generation, reuse and disposal of wastewaters.

7.2 Water Supply Analysis

Water supply for site demands comes from two sources:

- Stormwater reuse; and
- Town water.

Water balance modelling shows that reuse of stormwater results in a reduction in town water demand of approximately 81% for non potable demand. Stormwater is drawn both from on-site rainwater and stormwater tanks.

7.3 Wastewater Management

Staff will generate approximately 612 L/day of wastewater that will be disposed of to town sewer.

There is no significant wastewater produced by the operation. As such no industrial wastewater requiring offsite disposal is generated.

7.4 Stormwater Management

7.4.1 Stormwater Quantity

A concept stormwater drainage system has been developed for the proposed concrete recycling facility by Hanson. The proposed drainage system has been designed to convey site runoff via reuse and treatment to the discharge point.

The estate OSD basin shall adequately detain stormwater from the site to achieve design performance as the site has reduced proposed impervious percentage compared to that assumed for the basin design in Costin Roe's model. Therefore, no further OSD modelling or assessment is required and no further site OSD management measures are required or proposed.

7.4.2 Stormwater Quality

The existing estate stormwater quality treatment system designed by Costin Roe has been constructed as an estate facility that services the site. The estate facility caters for the sites TSS, TP and TN WSUD removal requirements (confirmed previously by BCC) meet the growth centres pollutant reduction targets. GPT sized for the 4EY flow is to be installed on site to capture litter, debris and other pollutants. This pre treatment device removes the larger pollutants prior to the stormwater water discharging offsite to the road and estate stormwater facility.

7.5 Additional Works

Detailed design of a number of water cycle management system components presented in this report shall be provided during the construction certificate (CC) stage. These include:

1. Detailed design of the stormwater collection tanks.

2. Design of the stormwater collection, reticulation, treatment and transfer/supply system, including GPT(s), pump specifications, pit and pipe sizes etc.

8 References

Blacktown City Council (2015). *Development Control Plan 2015 - Part J: Water Sensitive Urban Design and Integrated Water Cycle Management*.

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NSW Office of Environment & Heritage. *Stormwater First Flush Pollution.* accessed 58 May, 2018,
https://www.environment.nsw.gov.au/water/stormwatermao.htm

Secretary's Environmental Assessment Requirements (2018).

9 Attachment A – CONCEPT DRAINAGE PLAN