LOGOS

Stormwater Infrastructure Operation and Maintenance Plan

Moorebank Logistics Park- West Precinct Stage 2

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Moorebank Logistics Park – West Precinct Stage 2

SSD 7709

Stormwater Infrastructure Operation and Maintenance Plan

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Acronyms and Definitions

Acronym / Term	Meaning
CoC	Conditions of Consent
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DotEE)
DPE	Department of Planning and Environment (formerly the Department of Planning, Industry and Environment)
DotEE	Department of the Environment and Energy
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FCMM	Final Compilation of Management Measures
GP	Gross Pollutant
GPTs	Gross Pollutant Traps
HSE	Health, Safety and Environment
IMT	Intermodal Terminal
km	kilometres
LCC	Liverpool City Council
LGA	Liverpool Local Government Area
MLP	Moorebank Logistics Park
MPE	Moorebank Precinct East
MPW	Moorebank Precinct West
MPW Concept Approval	MPW Concept Approval (SSD 5066), granted by (the now) DPE on 29 September 2014 for the development of an intermodal terminal facility including a rail link connecting the site to the Southern Sydney Freight Line, an intermodal terminal, warehousing and distribution facilities and a freight village.
MUSIC	Urban Stormwater Improvement Conceptualisation
OEMP	Operational Environmental Management Plan
OSD	On-site detention
PMP	probable maximum precipitation
POEO Act	Environment and Operations Act 1997
SDDR	Stormwater Development Design Report
SIOMP	Stormwater Infrastructure Operation and Maintenance Plan
SSD	State Significant Development
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Soils
the Development	MPW Stage 2 development
WHS	Work Health and Safety
WSUD	Water Sensitive Urban Design

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1. Introduction

1.1. Background

The Moorebank Logistic Park (MLP) is an integral component of the freight, ports and transport strategies of both the NSW and Commonwealth governments located approximately 27 kilometers (km) south-west of the Sydney Central Business District and 26km west of Port Botany within the Liverpool Local Government Area (LGA).

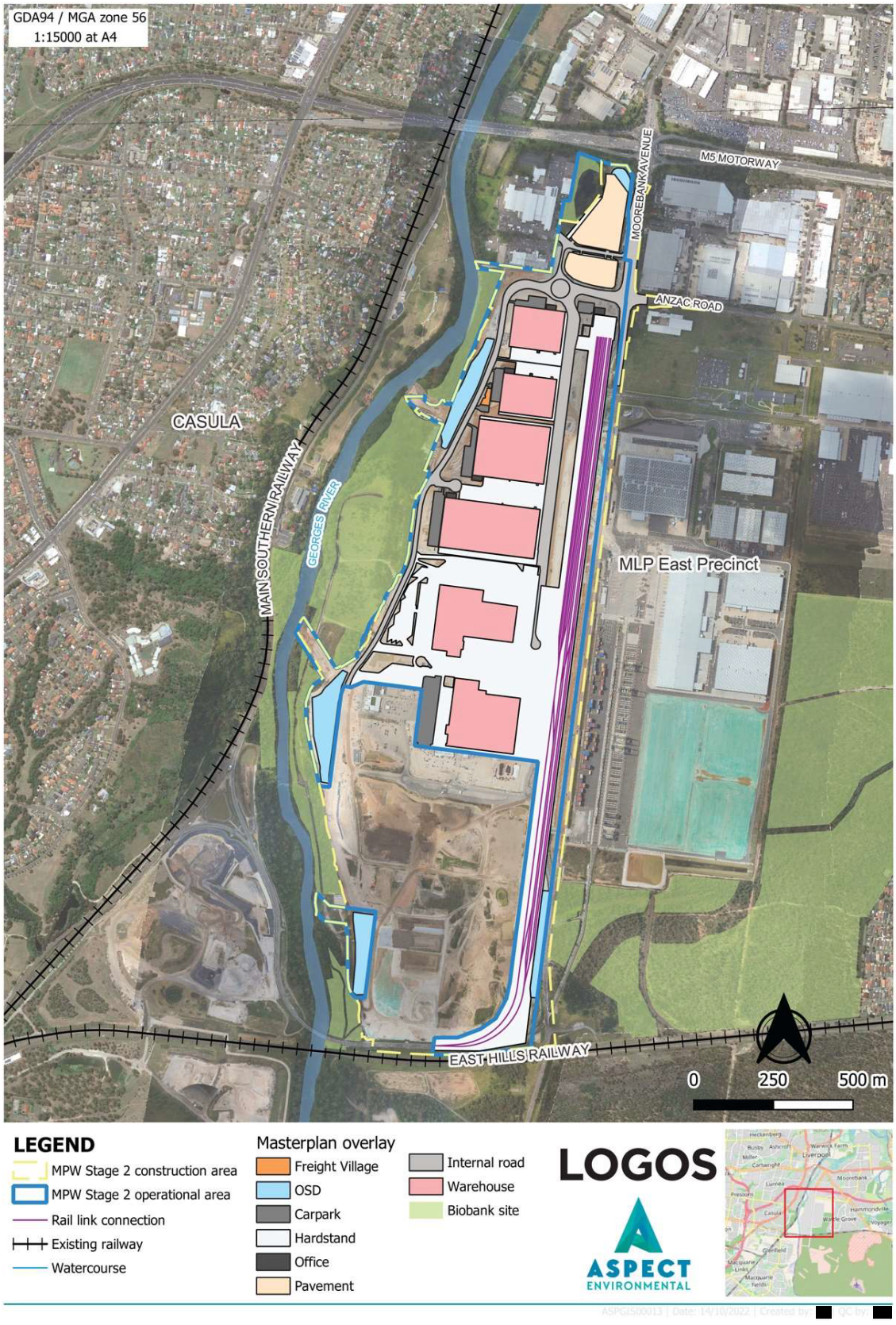
The MLP aims to streamline the freight logistics supply chain from port to store, deliver savings to businesses and consumers, and help service the rapidly growing demand for imported goods in south-west Sydney. On completion, MLP will move 1.55 million shipping containers annually by rail instead of road. It will also feature Australia's largest purpose-built warehouse and distribution precinct serviced by the latest automated technology, which will see driverless shuttle carriers collect and transport containers around the precinct to be processed, unpacked and stored on site prior to distribution.

The MLP is divided into the Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW) developments.

The approval for the construction and operation of Stage 2 of the MPW development (State significant development (SSD) 7709), which comprises the second stage of development under the MPW Concept Approval (SSD 5066) was received in November 2019 by the Independent Planning Commission.

The MPW Stage 2 development (the Development) involves the construction and operation of a multi-purpose Intermodal (freight) Terminal facility, rail link connection, warehousing, freight village, and upgrades to the Moorebank Avenue and Anzac Road intersection and the subdivision of site including ancillary works. Details on the key components of the Development are included in Schedule 1 of the Development Consent and Section 2.1 of this plan. The layout of the Development is shown in (Figure 1-1).

Figure 1-1 MPW Stage 2 development layout



1.2. Purpose

This Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) is a sub-plan to the Operational Environmental Management Plan (OEMP) and has been developed to address the requirement of MPW Stage 2 (SSD 7709) Conditions of Consent (CoC) B36 prior to the commencement of operation.

This SIOMP identifies the operational environmental management measures that will be applied to activities undertaken across the Development to manage identified stormwater risks associated with stormwater infrastructure. The specific conditions relevant to the development of this plan are identified in Section 2.2.

Prior to operation of the stormwater infrastructure system, a construction certificate will be obtained and provided to the Secretary certifying that the stormwater infrastructure system has been constructed in accordance with the most up to date construction drawings and the approved SIOMP and Stormwater Management Plans. All permanent stormwater infrastructure will be maintained on an ongoing basis in accordance with Section 3.3 of this SIOMP.

This SIOMP has also been technically reviewed by Costin Roe Consulting, the stormwater specialists for the Development, who provided a letter confirming consistency with the requirements of the CoCs, as well as other relevant documentation. This letter is included as Appendix B.

The most recent, approved version of this plan will be implemented to manage stormwater risks associated with Development operations and activities.

1.3. Structure of the SIOMP

The structure of the SIOMP is as follows:

- **Section 1** provides a brief overview of the MPW Stage 2 development and summary of activities being undertaken as well as the purpose of the SIOMP.
- **Section 2** outlines the statutory requirements and obligations which need to be fulfilled during operation of the Development and provides a description of the roles and responsibilities for employees involved in the operation of the Development.
- **Section 3** details the potential operational risks and impacts and identifies the stormwater management measures to be implemented for safety during operation of the Development.
- **Section 4** provides the details for monitoring of environmental risks through environmental reporting and auditing, and how environmental incidences and non-conformance are managed during the operation of the Development.

1.4. Objectives and Targets

Table 1-1 outlines the objectives and targets set out for the MPW Stage 2 development for the management of stormwater during operation. These objectives and targets were developed based on collective industry experience and best practice. They reflect the requirements of the EIA and CoC and have been endorsed by the Development's Environmental Representative.

Table 1-1 Objectives and targets

Objective	Target	Timeframe	Accountability
Minimise adverse impacts pollutants can have on downstream receiving waters	Stormwater quality treatment measures will reduce the average annual load of the following pollutants: • Gross Pollutants (GP) 90% • Total Suspended Soils (TSS) 85% • Total Phosphorous (TP) 65% • Total Nitrogen (TN) 45% • Total Hydrocarbons (TH) 90% Detain water to control volume and velocity of stormwater leaving the site	Duration of operation and monitored in accordance with Table 4-2	Site, Health, Safety and Environment (HSE) Manager
Reduce potable water demand uses such as toilet flushing and irrigation	100% of rainwater captured from warehouse roof areas will be reused onsite	Duration of operation and monitored in accordance with Table 4-2	Site, Health, Safety and Environment (HSE) Manager

2. Statutory Requirements

The operation of the Development was approved under both the *Environment Planning & Assessment Act* 1979 (EP&A Act) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act). Both these approvals have stormwater infrastructure management conditions relevant to the operation of the Development, which are discussed in Section 2.1 below. The operation of the Development is required to comply with all relevant legislation, permits, licences and development approvals applicable to the site and these are detailed in Appendix F of the OEMP.

The following policies, standards and guidelines relating to the management of stormwater infrastructure were considered during the development of this plan:

- Australian Dangerous Goods Code Edition 7.4
- AS 1940-2004 The Storage and Handling of Flammable and Combustible Liquids
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2018)
- Australian Rainfall and Runoff – Volume 1 (2001), Engineers Australia
- Gold Coast City Council, Water Sensitive Urban Design Guidelines (2007)
- Environmental Management Plan Guidelines for Infrastructure Projects (DPIE (now DPE) 2020)
- State Environmental Planning Policy (Resilience and Hazards) 2021
- Liverpool City Council Development Control Plan (2008) (Water Sensitive Urban Design)
- Managing Urban Stormwater: Soils and Construction (‘the Blue Book’) (Landcom 2004).

2.1. Development Consent

The operational stormwater management requirements for the Development, including impact mitigation and management, are documented in the following documents:

- Consolidated MPW Stage 2 SSD 7709 development consent
- EPBC Act Approval (EPBC 2011/6086), Department of the Environment and Energy ((DotEE) (now Department of Climate Change, Energy, the Environment and Water (DCCEEW)), September 2016
- MPW Stage 2 Environmental Impact Statement (Arcadis Australia Pacific Pty Limited, October 2016)
- MPW Stage 2 Response to Submission (Arcadis Australia Pacific Pty Limited, July 2017)
- MPW Stage 2 Stormwater Design Development Report.

2.2. EPBC Act Approval

The EPBC Act Approval for the MPW Concept was granted by DotEE (now DCCEEW) in September 2016 (No. 2011/6086). This approval was provided for the impacts on listed threatened species and communities (Sections 18 and 18A of the EPBC Act) and Commonwealth land (Sections 26 and 27A of the EPBC Act). The operation of the MPW Stage 2 development would be consistent with the EPBC Act Approval conditions.

The specific EPBC Act Approval stormwater infrastructure management conditions and commitments relating to this SIOMP are detailed in Appendix A Compliance Table.

2.3. Roles and Responsibilities

Key roles and responsibilities applicable to this SIOMP are presented in Table 2-1.

Table 2-1 Roles and responsibilities

Roles	Responsibilities
Asset Manager/ Development Manager	• Accountable for the environmental performance of the MPW Stage 2 development • Provides sufficient resources (including the Maintenance Contractor) to implement and maintain stormwater infrastructure throughout the operating life of the Development • Implement stop work procedures where they believe a work activity to be an actual or potential cause of pollution to the environment anywhere within the Development • Approves changes to SIOMP
Area Managers / Terminal Manager	• Communicates the requirements of the SIOMP and environmental obligations to operation team • Has the authority to stop work processes within the area of responsibility to prevent environmental non-conformances from occurring or continuing as a result of impacts on stormwater infrastructure • Monitors operations against the requirements of the SIOMP and CoC and takes action to resolve issues where required • Reports incidents to Asset Manager/ Development Manager in accordance with SIOMP
Site HSE Manager	• Act as the primary contact point in relation to environmental performance of the stormwater infrastructure • Reviews and implements this SIOMP and monitoring programs such as the Stormwater Quality Monitoring Program required under the CoC and other relevant permits and licences • Monitors operations against this SIOMP through regular site inspections to evaluate compliance with the CoC • Has the authority to implement reasonable steps to avoid or minimise unintended or adverse stormwater infrastructure impacts, including to direct that relevant actions be ceased immediately should adverse impacts be likely to occur • Reports stormwater infrastructure incidents to Asset Manager/ Development Manager and Area Managers/ Terminal Manager where required, in accordance with the Incident reporting system outlined in the OEMP • Monitors deficiencies in stormwater infrastructure control strategies and implements resolutions and monitors work activities until deficiencies are rectified • Receives and record complaints and inquiries in relation to stormwater infrastructure

Roles	Responsibilities
	• Maintains a register of incidents relating to stormwater incidents and potential incidents with actual or potential significant off-site impacts on people or the biophysical environment
Maintenance Contractor	• Responsible for undertaking maintenance activities in accordance with the requirements outlined in the SIOMP • The following assessment criteria will be undertaken to select a reputable experience maintenance contractor: – Must demonstrate the ability to carry out the full scope of work associated with maintenance set out in this plan – Must demonstrate experience in delivering stormwater operations and maintenance work on industrial facilities – Personnel must be fully licensed and trained – Appropriate WHS accreditation must be held – Must demonstrate sufficient capability to manage the scope of work and – Provide 24-hour service provision
Tenants	• Report any spills or dumping that occurs within their lease boundary or wider MPW Stage 2 development to the Site HSE Manager • Maintain their stormwater systems e.g. rainwater tanks and oil separator

3. Implementation

This section addresses the stormwater infrastructure within the Development, key stormwater risks associated with operation of the Development and the maintenance measures that will be implemented to manage these risks.

3.1. Existing Environment

3.1.1. Existing Regional Environment

The Development is generally bounded by the Georges River to the west, Moorebank Avenue to the east, the East Hills Railway Line to the south and the M5 Motorway to the north. The Development is located entirely within the catchment area of the Georges River, while the rail corridor is located within the mid-Georges River catchment and the Liverpool District sub-catchment. The south-eastern portion of the Development drains eastward and is an upper catchment area of Anzac Creek. The remainder of the Development drains westward to the Georges River, either via Moorebank Avenue, or more directly from areas grading westward.

Anzac Creek is a small tributary of the Georges River. A flood study of the area (BMT WBM, 2008) indicated that the Anzac Creek catchment covers an area of 10.6km^2 and is 4km long forming in the MPW development. Anzac Creek flows to the north past the suburb of Wattle Grove and underneath the M5 Motorway at the intersection with Heathcote Road. From there, the creek continues northwards through Ernie Smith Recreation Reserve (fringed by the Moorebank Industrial Area to the west and the suburb of Moorebank to the east), under Newbridge Road and through McMillan Park into Lake Moore at Chipping Norton. Anzac Creek discharges to the Georges River approximately 2.5km to the north-east of the MPE development and is classified as a first order stream, having a defined channel where water flows intermittently.

The Georges River enters the Liverpool LGA from the south on the western side of the Defence lands at Holsworthy and flows to the north, meeting with Glenfield Creek at Casula. The river then continues to flow north past the Liverpool City Centre, under Newbridge Road, past Lighthorse Park and over the Liverpool Weir. Downstream of the Liverpool Weir, the Georges River becomes brackish and subject to tidal influences.

3.1.2. Potential Operational Impact

The operations of the Development including INTS, rail link and warehousing activities have the potential to impact upon the existing local area hydrology, Anzac Creek and the Georges River, which are discussed below.

3.1.2.1. Stormwater Quantity

DRAINS software was used as part of the MPW Stage 2 EIS to generate rainfall runoff models that represent both existing site conditions and post development site conditions to enable a comparison of discharges and quantify on-site detention (OSD) performance.

The model catchments, impervious areas and drainage systems were determined based on aerial photography and laser survey, ground survey of the site where available, site inspection to clarify catchment features and recent works associated

with development of the north-eastern neighbouring property. The DRAINS modelling was run for storm durations of 5 minutes to 36 hours for the 2 year, 5 year, 10 year, 20 year, and 100 year ARIs, and 15 minutes to 6 hours probable maximum precipitation (PMP) events, and 30 hours and 36 hour extreme events (represented by 5x100year ARI).

A summary of peak flows discharging from the Intermodal Terminal (IMT) is presented in Figure 3-1.

Figure 3-1 Comparison of existing conditions and proposed peak discharge (Source: MPW Stage 2 EIS, 2016)

Discharge Location	Site Condition	Catchment Area (ha)	DRAINS Model Label	Flow (m^3/s)		
				5yr ARI	100yr ARI	PMF
8 Georges River MPW Site South	Existing	11.17	F Outlet 8	1.2	2.3	19
	Proposed	**18.45**	**F PR Outlet 8**	**0.5**	**0.9**	**27**
6 Georges River MPW Site (6+8)*	Existing	55.30	F Outlet 6	9.3	16.5	88
	Proposed	**85.24**	**F PR Outlet 6**	**2.3**	**5.3**	**110**
5 Georges River MPW Site (MPE + 5+6+8)*	Existing	155.53	F Outlet 5	16.0	29.1	168
	Proposed	**190.61**	**F PR Outlet 5**	**9.2**	**14.3**	**259**
4a MPW Site (at ABB Eastern Site boundary)	Existing	26.14	F EX G02	4.2	7.6	44
	Proposed	**10.65**	**F EX G02**	**3.0**	**4.6**	**21**
4 Georges River MPW Site North (4+4a+5+6+8)*	Existing	184.47	F EX Georges	19.4	34.8	199
	Proposed	**204.5**	**F PR Georges**	**11.7**	**18.5**	**277**
10 Georges River Rail MPW Site	Existing	1.48	C EX RAIL	0.0	0.1	0.6
	Proposed	**0.25**	**C PR RAIL**	**0.0**	**0.0**	**0.2**
3a Anzac Creek MPW Site South-east Site Boundary	Existing	24.82	F EX A3 Total	1.0	2.1	14
	Proposed	**11.77**	**F Anzac Culvert**	**0.5**	**1.2**	**17**

3.1.2.2. Stormwater Quality

Operation of the Development has the potential to reduce stormwater quality through surface runoff from the impervious surfaces, which has the potential to pick up pollutants such as litter, sediments, oil, and nutrients imported to the site through fertiliser use.

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) modelling was undertaken to assess performance of the stormwater quality measures within the Development as part of the stormwater and flooding environmental assessment. A summary of the stormwater quality performance, with and without treatment for the Development is provided in Table 3-1 and Table 3-2.

Table 3-1 MPW Stage 2 summary of stormwater quality performance- with and without treatment (reduction target) (Source: MPW Stage 2 Appendix R of the EIS, 2016)

Scenario	Pollutant Loads (kg/year)			
	GP	TSS	TP	TN
Proposed (no treatment)	29,600	235,000	450	2,520
Proposed (with treatment)	0	23,100	101	1,180
% Reduction achieved	100	90	77	53
% Reduction target (Table 1-1)	90	85	60	45

Table 3-2 MPW Stage 2 summary of stormwater quality performance- with and without treatment (NorBE target) (Source: MPW Stage 2 Appendix R of the EIS, 2016)

Scenario	Pollutant Loads (kg/year)			
	GP	TSS	TP	TN
Existing	15,800	126,000	248	1,510
Proposed (with treatment)	0	23,100	101	1,180
% Reduction achieved	100	82	59	22

3.2. Aspects, Impacts and Risks

3.2.1. Operational Site Condition

3.2.1.1. Permanent Stormwater

As required by CoC B33 and B34, all temporary construction stage erosion and sediment control infrastructure that is intended to be converted to permanent stormwater quality or OSD infrastructure must be constructed in accordance with the revised stormwater design drawings approved by the Planning Secretary under Condition B4, and will comply with requirements specified in Stormwater Development Design Report (SDDR) and Construction Soil and Water Management Plan as follows:

- Where construction basins are being converted to operational basins, the permanent stormwater treatment features (e.g. vegetation and filtration media) will be appropriately protected from the adverse effects of sediment runoff per the details provided on PIWW-COS-CV-DWG-0251.
- Constructed sediment basins will be maintained and fully operational throughout the construction period and until each basin's catchment has a potential soil loss less than 200T/year or 150m^3/year or stabilisation has been achieved with C factor of 0.05 or permanent stabilisation.
- Immediately prior to the conversion of a construction basin to an operational basin as a permanent stormwater treatment device, appropriate flow bypass conditions will be established to prevent sediment-laden water entering the device.

- Immediately following the construction of the filter media of the permanent stormwater treatment device, the filter media will be covered by heavy-duty filter cloth (minimum Bidim A44 or equivalent) and a minimum 200mm layer of earth or in accordance with the IFC construction drawings for the operational basin. Such earth and filter cloth will not be removed from the device until suitable surface conditions have been achieved within the basin's catchment area.
- Immediately following the construction of the biofiltration/bioretention systems an appropriate sediment forebay, filter or straw-bale system will be installed in a manner to prevent sediment intrusion into the device.
- Plant establishment within the permanent stormwater treatment device will be delayed until sediment intrusion into the device is suitably under control.
- Upon stabilisation of the contributing catchment being achieved, the operational features of the permanent stormwater treatment system will be made fully operational (i.e. maintenance and/or reconstruction as required).

3.2.1.2. Stormwater quantity

Rainwater harvesting will occur at each warehouse through the provision of rainwater tanks to reduce the main water demand and the amount of stormwater runoff, MUSIC was applied to design the rainwater tanks to balance the supply and demand based on the calculated base water demands and proposed roof catchment areas.

Figure 3-2 summarised the MUSIC model results, and it was predicted that targeted demand reduction (50% reduction in non-portable water demand) will be met for the Development. Final configuration and sizing of the rainwater tanks is subject to detail design consideration and optimum site utilisation.

Figure 3-2 Rainwater reuse requirements (Source: SDDR, April 2020)

Building	Roof Catchment (m^2)	Highflow Bypass (l/s)	Tank Size in MUSIC (kL)	Predicted Demand Reduction (%)	Estimated Tank (kL)
1A	5,270	100	110	50.00	110
1B	5,170	100	40	53.23	40
2A	10,110	100	110	51.20	110
2B	7,680	100	140	50.68	140
3A	10,020	100	50	67.37	50
3B	7,970	100	60	51.05	60

OSDs have been provided for the Development to control the rate of discharge during operation. As outlined in section 3.1.2, DRAINS software has been used to generate rainfall runoff models and enable a comparison of discharges and quantify OSD performance.

A summary of the performance of the OSD is provided in the MPW Stage 2 EIS and Section 4 of the SDDR. Results indicated that the detention storages should adequately mitigate potential flow increases leaving the Development. Also, requirements of condition CoC B12 will be met that requires post-development runoff to meet pre-development runoff for the 1 in 1-year ARI storm and the 1 in 100-year ARI storm events.

Figure 3-3 shows a summary of the post development discharge volumes, detention volumes and depths for the different open basin detention systems.

Figure 3-3 Detention systems flow and storage volume (Source: SDDR, April 2020)

ARI	Duration (mins)	Peak Flow (m^3/s)					Depth (mm)	Storage (m^3)
		No Attenuation	With Attenuation					
			Orifice	Weir	Emergency	Total		
1	2 Hr	4.940	1.130	0	0	1.130	0.90	5,500
20	3 Hr	8.405	1.334	0.253	0	1.587	2.01	18,500
100	9 Hr	6.290	1.374	1.90	0	3.274	2.33	22,900

Table 4.6. Detention System 5 Flow and Storage Volumes

ARI	Duration (mins)	Peak Flow (m^3/s)					Depth (mm)	Storage (m^3)
		No Attenuation	With Attenuation					
			Orifice	Weir	Emergency	Total		
1	2 Hr	7.240	1.172	0	0	1.172	1.0	10,600
20	9 Hr	7.745	1.382	1.11	0	2.492	2.23	32,900
100	9 Hr	9.437	1.414	4.25	0	5.664	2.56	39,800

Table 4.7. Detention System 6 Flow and Storage Volumes

ARI	Duration (mins)	Peak Flow (m^3/s)						Depth (mm)	Storage (m^3)
		No Attenuation	With Attenuation						
			Q2 Orifice	Q20 Orifice	Weir	Emergency	Total		
1	2 Hr	3.376	0.499	0.004	0	0	0.503	0.91	4,900
20	9 Hr	3.513	0.576	0.437	0	0	1.013	1.88	14,400
100	9 Hr	4.287	0.613	0.533	0	0	1.146	2.39	20,400

Table 4.8. Detention System 8 Flow and Storage Volumes

3.2.1.3. Stormwater Quality

Water sensitive urban design (WSUD) principles and a treatment train approach have been applied to address potential impacts on stormwater quality. Two key treatment measures implemented at the Development to meet the performance targets outlined in Table 1-1 are as follows:

- Gross Pollutant Traps (GPTs)
- Biofiltration/bioretention systems.

In addition, where possible all warehouses would be fitted with an oil separator system to separate, capture and store oily wastes so that they do not enter the stormwater system.

GPTs

GPTs are primary stormwater treatment measures, typically applied as the first measure in a stormwater treatment train. GPTs come in varying forms from simple trash racks through to more complex devices with continuous deflection screens and hydrodynamic separation.

The performance of GPTs varies according to the type of device selected. In this case, a device has been selected with continuous deflection screens and hydrodynamic separation to target the removal of a significant proportion of the TSS load. Removal of TSS is important for protecting and minimising maintenance of downstream treatment devices such as biofiltration/bioretention systems which are sensitive to high TSS loads.

Biofiltration/Bioretention Systems

Biofiltration/bioretention systems comprise a combination of vegetation and filter substrate. They provide treatment of stormwater through the processes of settling, filtration and biological uptake and are very effective in the removal of fine sediments and nutrients. Biofiltration/bioretention systems are proposed in the base of the stormwater basins (design drawings).

In general, biofiltration/bioretention systems are lined to protect adjacent structures or if there are known salinity hazards. The Development is located in an area of ‘moderate salinity potential’ as defined by the ‘Salinity Potential in Western Sydney 2002’ map distributed by the Office of Environment and Heritage. This salinity classification in itself does not mean the Biofiltration/bioretention systems need to be lined. However, the Development’s soils are predominantly clays and sandy clays which are associated with shrinkage and differential settlement. Lining of the biofiltration/bioretention systems will therefore be required when located adjacent to footings of structures such as retaining walls and buildings.

MUSIC Modelling

The MUSIC model was used to model water quality and confirm water quality reduction is achieved to assess the effectiveness of the selected treatment trains and ensure that the pollutant retention requirements have been met. By simulating the

performance of stormwater management systems, MUSIC can be used to predict if these proposed systems and changes to land use are appropriate for their catchments and are capable of meeting specified water quality objectives (CRC 2002).

The water quality constituents modelled in MUSIC and of relevance to this report include Total TSS, TP and TN. The models were set up using the latest Liverpool City Council MUSICLINK parameters, and in accordance with the NSW MUSIC Modelling Guide.

Figure 3-4 shows the results of the MUSIC analysis for the development. The reduction rate is expressed as a percentage and compares the post-development pollutant loads without treatment versus post-development loads with treatment over the modelled catchment.

Figure 3-4 MUSIC analysis results for water quality (Source: SDDR, April 2020)

	Source	Residual Load	% Reduction	Target Met
Basin 3				
Flow (ML/yr)	68	65.6	3.6	NA
Total Suspended Solids (kg/yr)	20000	16.90	94.5	Y
Total Phosphorus (kg/yr)	35	8.27	76.4	Y
Total Nitrogen (kg/yr)	161	79.20	50.9	Y
Gross Pollutants (kg/yr)	1760	0	100	Y
Basin 4				
Flow (ML/yr)	17.8	16.9	5.3	NA
Total Suspended Solids (kg/yr)	5280	260	95.1	Y
Total Phosphorus (kg/yr)	9.26	1.68	81.8	Y
Total Nitrogen (kg/yr)	40.7	17.1	58	Y
Gross Pollutants (kg/yr)	377	0	100	Y
Basin 5				
Flow (ML/yr)	251	242	3.7	NA
Total Suspended Solids (kg/yr)	57600	6960	87.9	Y
Total Phosphorus (kg/yr)	107	29	72.8	Y
Total Nitrogen (kg/yr)	577	277	51.9	Y
Gross Pollutants (kg/yr)	6330	0	100	Y
Basin 6				
Flow (ML/yr)	387	374	3.5	NA
Total Suspended Solids (kg/yr)	61700	7570	87.7	Y
Total Phosphorus (kg/yr)	128	38.5	70	Y
Total Nitrogen (kg/yr)	877	408	53.5	Y
Gross Pollutants (kg/yr)	9850	0	100	Y
Basin 8				
Flow (ML/yr)	182	175	3.4	NA
Total Suspended Solids (kg/yr)	31700	3890	87.7	Y
Total Phosphorus (kg/yr)	63.2	19	69.9	Y
Total Nitrogen (kg/yr)	413	202	51	Y
Gross Pollutants (kg/yr)	4710	0	100	Y

The model results in Figure 3-4 indicate that, through the use of the Stormwater Treatment Measures in the treatment train, pollutant load reductions for TSS, TP, TN and GP will meet the requirements of consent.

The proposed treatment train achieves reductions greater than the required pollutant reduction objectives. This will ensure any variance in assumed arrangements in the final building layouts will not affect the overall outcomes of the solution, and also to ensure overall reduction values are met. Hydrocarbon reduction values, although not modelled, are expected to achieve 90% reduction in the interim and ultimate conditions, based on the expected operations of the treatment train combining Rocla CDS treatment and bio-retention treatment systems.

3.2.2. Operational Activities

The following operational activities have the potential to impact on the stormwater quality within the Development.

- Spillage and leaks of hazardous materials from shipping containers
- Spillage and leak of oils, fuel, lubricants and other chemical substances from the operation of light and heavy vehicles, plant and machinery
- Leaks from the diesel locomotives
- Leaks from diesel storage tanks.

In addition, operational activities have the potential to impact hydrology, water quality and quantity impacts on adjacent facilities including:

- ABB site
- Moorebank Precinct East
- Moorebank Avenue (north of MAAI).

3.3. Management and Maintenance Measures

This section describes the overall approach to managing and maintaining stormwater infrastructure during operation of the Development. It is important that each component of the stormwater infrastructure is properly operated and maintained to enable proper management of stormwater related risks.

Section 3.3.2 outlines the management and maintenance schedule for the stormwater system of the Development based on the SDDR and LOGOS requirements and standards detailed in the Work Health and Safety (WHS) Management Plan.

A record of all maintenance activities undertaken will be recorded in a Maintenance Logbook and detailed in the quarterly maintenance report (Section 4.3).

3.3.1. Maintenance Types

Stormwater infrastructure assets require both proactive and reactive maintenance to safeguard the long-term performance of the system. Proactive maintenance refers to regular scheduled maintenance tasks, whereas reactive maintenance is required to address unscheduled maintenance issues. If the asset is not functioning as intended, then rectification may be required to restore the asset back to its intended functionality. Proactive maintenance will be the preferred approach applied at the Development.

3.3.1.1. Proactive Maintenance

The proactive maintenance program will involve a set of scheduled tasks to guarantee that the stormwater infrastructure asset is operating as designed. Proactive maintenance will involve:

- Regular inspections of the stormwater infrastructure asset
- Scheduled maintenance tasks for issues that are known to require regular attention (e.g. litter removal and weed control)
- Responsive maintenance tasks following inspections for issues which require irregular attention (e.g. sediment removal, mulching and scour management).

Proactive maintenance in the first two years after the establishment period (construction and planting phases for the biofiltration/bioretention systems) will be the most intensive and important to the long-term success of the treatment asset. It will also be the most cost-effective means of reducing the long-term costs associated with operating stormwater treatment assets.

The proposed maintenance activities specific to each stormwater infrastructure asset type are detailed in Table 3-4. The frequency of maintenance depends on the asset type and the issue being managed. As a general guide, scheduled maintenance will be completed on a three to four-month cycle. The checklists provided will be used as a minimum guide to scheduled maintenance tasks and will be amended to suit conditions of the Development and maintenance requirements. Water treatment assets will also be inspected at least once a year, during or immediately after, a heavy rainfall event. This is important to confirm that the treatment system is functioning correctly under wet conditions.

A higher level of scheduled maintenance may be arranged for some treatment assets such as the bioretention system, swales and inlet and junction pits. This is often the case for treatment assets which are located in high profile locations (e.g. streetscapes and parklands), and where public amenity is considered to be a high priority. In these cases, a more frequent maintenance regime may be required to remove litter and weeds and to ensure vegetation health and cover is maintained to a high level.

3.3.1.2. Reactive Maintenance

Reactive maintenance will be undertaken when a problem or fault is identified that is beyond the scope of project maintenance program. Reactive maintenance may occur following a complaint about a stormwater infrastructure asset (e.g. excessive odours, litter or damage) and will be addressed with a swift response which may involve specialist equipment or skills.

3.3.1.3. Rectification

Rectification of a stormwater infrastructure asset is undertaken when the system is not functioning as intended, and proactive and reactive maintenance activities are unable to return the asset to functional condition.

The lack of functional performance and therefore failure of a stormwater treatment asset may be related to many factors including inappropriate design, poor construction, and lack of regular maintenance or end of life cycle.

Regular asset condition assessments of stormwater infrastructure will be undertaken to monitor the system condition and to inform where an asset is in terms of its expected lifecycle. Renewal of a system refers to replacing the main elements of the system including:

- Stormwater Infrastructure
- Removing deposited sediment, removing and replacing the topsoil (or filter media in the case of a biofiltration/bioretention system) and profiling the topsoil level back to the design levels
- Replanting.

A specialist may be required to assess whether a biofiltration/bioretention system has reached the end of its life cycle and to provide advice on the renewal works.

Asset condition assessments will identify assets that need to be rectified. The decision to continue with an increased maintenance regime or to rectify an asset, and over what timeframe, will be decided by the Asset Manager/ Development Manager in accordance with the SIOMP. These rectification works will be prioritised because certain maintenance items are more important to overall system function than others. For example, extended ponding on the surface of a bioretention system or persistent scouring of a swale will be addressed more rapidly than recurrent weed problems.

3.3.2. Routine Inspection and Maintenance Schedule

Routine inspections will be carried out to assess the need for maintenance and will be primarily concerned with checking the functionality of the stormwater drainage facilities; items such as drains, drainage pits, box culverts, detention tanks, drainage outlets, rainwater reuse tank systems and biofiltration/bioretention systems. In addition, the safety measures incorporated into the design of the stormwater infrastructure e.g. step ladders, hazard signage and fencing will be inspected.

Maintenance of these items is vitally important for the ongoing drainage and treatment of stormwater. In addition to the maintenance requirements outlined in Table 3-3 and Table 3-4, all stormwater infrastructure will be maintained in line with the requirements and recommendations of designers and manufacturers.

Table 3-3 Summary of stormwater infrastructure inspection program

Focus	Area/ Location	Responsibility
Monthly check of clogging and blockage of the first flush device	Rainwater tanks around the entire Development	Site HSE Manager Maintenance contractor
Quarterly inspection	The entire Facility	Site HSE Manager Maintenance contractor
Following a major rainfall or storm event (i.e. greater than 100 mm over 40 hours)	The entire Development	Site HSE Manager Maintenance contractor

Should inspections outlined in Table 3-3 and Table 3-4 reveal that maintenance of any item is required, this will be reported to the relevant Area Manager for action. Items that are to be subject to routine inspections for maintenance may comprise, but not be limited to those listed in Table 3-4. This table is to be read in conjunction with the Stormwater design drawings.

It is important that each component of the stormwater system is properly operated and maintained. In order to achieve the modelled and design treatment outcomes, a maintenance schedule has been prepared (Table 3-4) to assist in the effective operation and maintenance of the various drainage and water quality components. Note that inspection frequency may vary depending on current site operations and rainfall intensity and frequency.

In addition to the normal inspection frequency, nominated inspections should also be carried out following heavy rain events. Heavy rain event inspections should be carried out as soon as practicable following an intense period of rainfall, (i.e. greater than 100mm over 40 hours).

Table 3-4 Stormwater infrastructure maintenance schedule (source: SDDR, April 2020)

ID	Inspection Activity	Maintenance Action	Timing	Responsibility
Swales and Landscape Areas				
SW-01	Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications	Six-monthly	Maintenance Contractor
SW-02	Inspect for excessive litter and sediment build up	Remove sediment build-up from planter beds & turf and dispose in accordance with local authorities' requirements	Six monthly	Maintenance Contractor
SW-03	Check for any evidence of channelization of erosion	Reinstate eroded areas so that original, designed profile is maintained	Six-monthly/ after major storm	Maintenance Contractor
SW-04	Check for weed infestation	Remove any weed infestation ensuring all root ball of weed is removed Replace with vegetation where required	Quarterly	Maintenance Contractor
SW-05	Inspect swale surface for erosion	Replace topsoil in eroded area and cover and secure with biodegradable fabric Cut hole in fabric and revegetate	Six-monthly	Maintenance Contractor
Rainwater Tanks				
SW-06	Check for any clogging and blockage of the first flush device	First flush device to be cleaned out	Monthly	Maintenance Contractor
SW-07	Check for any clogging and blockage of the tank inlet – leaf/litter screen	Leaves and debris to be removed from the inlet leaf/ litter screen	Six-monthly	Maintenance Contractor

ID	Inspection Activity	Maintenance Action	Timing	Responsibility
SW-08	Check the level of sediment within the tank	Sediment and debris to be removed from rainwater tank floor if sediment level is greater than the maximum allowable depth as specified by the hydraulic consultant	Every two years	Maintenance Contractor
Inlet and Junction Pits				
SW-09	Inside pit	Remove grate and inspect internal walls and base, repair where required Remove any collected sediment, debris, litter	Six-monthly	Maintenance Contractor
SW-10	Outside of pit	Clean grate of collected sediment, debris, litter and vegetation	Four-monthly/ after major storm	Maintenance Contractor
Stormwater System				
SW-11	General inspection of complete stormwater drainage system	Inspect all drainage structures noting any dilapidation in structures and carry out required repairs	Bi-annually	Maintenance Contractor
OSD System				
SW-12	Inspect and remove any blockage from orifice	Remove grate and screen to inspect orifice	Six-monthly	Maintenance Contractor/ Owner
SW-13	Inspect trash screen and clean	Remove grate and screen if required to clean it	Six-monthly	Maintenance Contractor/ Owner
SW-14	Inspect flap valve and remove any blockage	Remove grate Check flap valve moves freely and remove any blockages or debris	Six-monthly	Maintenance Contractor/ Owner

ID	Inspection Activity	Maintenance Action	Timing	Responsibility
SW-15	Inspect pit sump for damage or blockage	Remove grate and screen Remove sediment/ sludge build up and check orifice and flap valve are clear	Six-monthly	Maintenance Contractor/ Owner
SW-16	Inspect storage areas and remove debris/ mulch/ litter etc likely to block screens/ grates	Remove debris and floatable materials	Six-monthly	Maintenance Contractor/ Owner
SW-17	Check attachment of orifice plate and screen to wall of pit	Remove grate and screen Check plate or screen mounted securely, tighten fixings if required Seal gaps if required	Annually	Maintenance Contractor
SW-18	Check orifice diameter is correct and retains sharp edge	Compare diameter to design (see Work-as-Executed) and check edge is not pitted or damaged	Five yearly	Maintenance Contractor
SW-19	Check screen for corrosion	Remove grate and screen and examine for rust or corrosion, especially at corners or welds	Annually	Maintenance Contractor
SW-20	Inspect overflow weir and remove any blockage	Check weir is free of blockage	Six-monthly	Maintenance Contractor/ Owner
SW-21	Inspect walls for cracks or spalling	Remove grate to inspect internal walls, repair as necessary	Annually	Maintenance Contractor
SW-22	Check step irons	Check fixings are secure and irons are free from corrosion	Annually	Maintenance Contractor

ID	Inspection Activity	Maintenance Action	Timing	Responsibility
Bioretention Basin / Swales				
SW-23	Check all items nominated for Swales and Landscape Areas above	Refer to Swales and Landscape Areas section above	Refer to Swales and Landscape Areas section above	Refer to Swales and Landscape Areas section above
SW-24	Check for sediment accumulation at inflow points	Remove sediment and dispose in accordance with local authorities' requirements	Six-monthly/ After major storm	Maintenance Contractor
SW-25	Check for erosion at inlet or other key structures	Reinstate eroded areas so that original, designed profile is maintained	Six-monthly/ After major storm	Maintenance Contractor
SW-26	Check for evidence of dumping (litter, building waste or other)	Remove waste and litter and dispose in accordance with local authorities' requirements	Six-monthly	Maintenance Contractor
SW-27	Check condition of vegetation is satisfactory (density, weeds, watering, replating, mowing/ slashing etc)	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications	Six-monthly	Maintenance Contractor
SW-28	Check for evidence of prolonged ponding, surface clogging or clogging of drainage structures	Remove sediment and dispose in accordance with local authorities' requirements Replace filter media and planting – refer to appropriately qualified engineer or stormwater specialist	Six-monthly/ After major storm 5-10 years	Maintenance Contractor
SW-29	Check stormwater pipes and pits	Refer to Inlet and Junction Pits	Six-monthly/ After major storm	Maintenance Contractor

ID	Inspection Activity	Maintenance Action	Timing	Responsibility
Gross Pollutant Traps/ ROCLA CDS				
SW-30	Refer manufacturers Operation and Maintenance Manual – refer Appendix of SDDR	Refer manufacturers Operation and Maintenance Manual – refer Appendix of SDDR	Refer manufacturers Operation and Maintenance Manual – refer Appendix of SDDR	Maintenance Contractor

4. Monitoring and Review

4.1. Monitoring Requirements

Stormwater infrastructure (including the biofiltration/bioretention systems), water quality and watercourse crossings inspection and operational monitoring is undertaken as required by this SIOMP and the CoC. Monitoring criteria are detailed in Table 4-1.

Table 4-1 Water quality monitoring criteria

Pollutant	Trigger level
Water Sample (wet sites)	
TSS	50 mg/L
TP	50 µg/L
TN	500 µg/L
Dissolved metals (standard 19 metals relevant to aquatic assessment)	Variable: see ANZECC 95% freshwater guidelines
Total petroleum hydrocarbons, BTEX (benzene, toluene, ethylbenzene, trimethylbenzenes and three xylene isomers)	Variable: see ANZECC 95% freshwater guidelines

Note: Trigger levels for phosphorous and nitrogen are based on the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018). As there are no trigger levels for TSS in the ANZECC Guidelines (only turbidity), the trigger level for TSS has been based on the Managing Urban Stormwater: Soils and Construction (Landcom 2004).

The stormwater infrastructure monitoring requirements relevant to the SIOMP are summarised in Table 4-2. In the event that any of the monitoring criteria identified in Table 4-1 is exceeded at the monitoring locations identified in Table 4-2 and Figure 4-1, an investigation into the source of the pollution will be undertaken to determine whether the source of pollution is related to operation of the Development. Activities include, but are not limited to the following:

- If there is an exceedance in the downstream criteria, a review against the upstream monitoring results will be undertaken to assess whether the impact has resulted from further upstream in Georges River, or as a result of the discharges from the Development discharge point
- A review of weather conditions preceding the exceedance of the critical parameter to be undertaken i.e. excessive rainfall events
- Visual inspection of OSD basins and outlet points to assess if there are any visible pollutants (e.g. grease, oil sheens)
- Undertake additional sampling for all exceeded criteria offsite at the monitoring locations to assess the validity of the samples
- Review the incidents register to determine whether there have been any incidents which could lead to on offsite discharge

- Maintenance contractor to inspect any onsite infrastructure to determine whether there have been any failures in the system.

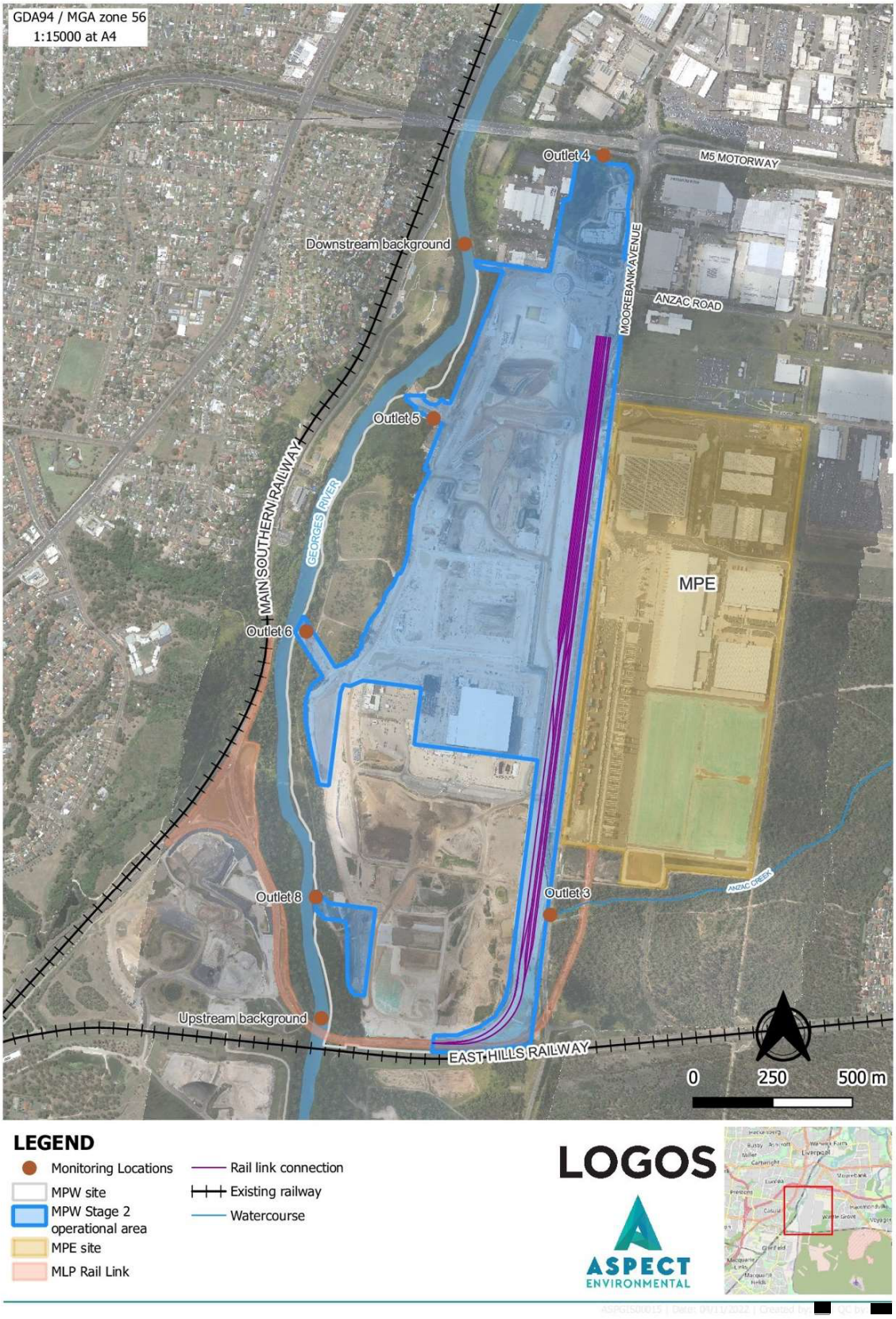
If the exceedance is related to any activities from the Development the incident will be reported and managed in accordance with LOGOS Incident Reporting and Management Procedure (WHSMS-LOGOS-007) and will be managed and reported according to Section 4.6 of the OEMP.

Table 4-2 Monitoring requirements for stormwater infrastructure

Monitoring Focus	Area/Location	Trigger	Responsibility	Frequency	Reference
Monitoring sites in Anzac Creek and the Georges River (upstream and downstream of the Development site)	Sample locations - Background sample - • upstream of basin OSD 8 just downstream of RALP bridge • Downstream sample 50m downstream from OSD 5 Outlet	As outlined in Table 1-1	Site HSE Manager	Six-monthly	B38(d)
Monitoring of water quality OSDs Bioretention basin outlet channels Piped outlets discharging to the Georges River	• Outlet 3 or OSD 3 Outlet (Anzac Creek, suggest a discussion about utilising MPE results for Anzac Creek downstream) • Outlet 4 or OSD 4 Outlet • Outlet 5 or OSD 5 Outlet (note this location needs to separate out outlet 5 from East west channel, suggest another sample for east west channel) • Outlet 6 or OSD 6 outlet • Outlet 8 or OSD 8 outlet Sample locations should be at the head wall Note this needs to be progressive - upstream, downstream samples and OSD 6 At the start of operations, OSD 6 will be the only sub-catchment that is online	As outlined in Table 1-1	Site HSE Manager	Six-monthly	B38(e)

Monitoring Focus	Area/Location	Trigger	Responsibility	Frequency	Reference
Water quality and quantity performance ongoing stormwater discharges from the development to ensure protection of the desired ecological values of Anzac Creek	OSD 3 outlet	As outlined in Table 1-1	Site HSE Manager	Six-monthly	B38(h)
Inspection	Scour/ bank protection structures	Regular inspection, and Major rainfall	Site HSE Manager	Quarterly/ after major rainfall events	B36(b)
Cleaning and servicing	All water quality devices	Manufacturer's and/ or designer's recommendations	Site HSE Manager	Schedule for routine checking (at least quarterly)	B36(c)

Figure 4-1 Monitoring locations



4.2. Environmental Auditing

The auditing requirements that are applicable to this SIOMP are summarised in Table 4-3.

Table 4-3 Environmental auditing requirements

CoC	Requirement	Area/ Location	Responsibility	Frequency
B36(h)	Stormwater Quality System	MPW Stage 2 development	Independent auditor	Annually

The annual Independent Audit will be undertaken by a suitably qualified professional with demonstrable experience in WSUD.

As required by the CoC, the annual Independent Audit will:

- Verify the condition of the treatment system(s)
- Verify and document the system(s) is working as intended
- Verify the system(s) has been adequately cleaned
- Verify there is no excessive build-up of material in the system(s)
- Identify any issues with the treatment system(s) which require rectification for the system(s) to adequately perform its intended function.

Additional regular auditing may be undertaken in accordance with the WHS Management Plan and as outlined within the overarching OEMP.

4.3. Reporting

Reporting requirements applicable to this SIOMP are summarised in Table 4-4. Reports will be provided to DPE for information.

Table 4-4 Environmental auditing requirements

CoC	Requirement	Area/ Location	Responsibility	Frequency
B36(e)	Maintenance Reports	MPW Stage 2 development	Site HSE Manager Maintenance Contractor	Quarterly
B36(h)	Independent Audit Report	MPW Stage 2 development	Independent auditor	Annually

The quarterly maintenance reports will detail the results of:

- quarterly inspections
- inspections undertaken following a major rainfall event
- water quality monitoring
- maintenance activities undertaken during the reporting period
- any incidents and non-conformances identified during the reporting period
- environmental monitoring outcomes.

4.4. Review and Improvement

Review and improvement of this plan will be undertaken in accordance with the CoCs and Section 6.2 of the OEMP. Continuous improvement will be achieved by the ongoing evaluation of stormwater infrastructure management performance and effectiveness of this plan against the OMEP, CoCs and LOGOS's environmental policies, objectives and targets.

A copy of the updated plan and changes will be distributed to all relevant stakeholders and third-party landowners in accordance with the approved document control procedure, as outlined in OEMP. Reporting requirements applicable to this SIOMP are summarised in Table 4-4.

4.5. Incidents

All stormwater infrastructure and maintenance related incidents are to be reported and managed in accordance with LOGOS Incident Reporting and Management Procedure (WHSMS-LOGOS-007).

Incidents will be classified based on the incident's severity as shown in Section 4.6 of the OEMP. All incidents will be managed and reported according to Section 4.6 of the OEMP.

4.6. Complaints

All stormwater infrastructure and maintenance related complaints are to be managed in accordance with Section 4.5.1 of the OEMP and the Community Communication Strategy.

4.7. Non-Compliance, Non-Conformances and Corrective Actions

All stormwater infrastructure and maintenance-compliance non-conformances and resulting corrective actions are to be managed in accordance with Section 6.4 of the OEMP.

Appendix A Compliance Table

Table A-1 SIOMP conditions from EPBC 2011/6086 Condition of Approvals

Condition	Requirement	SIOMP section
9	Sections of the CEMP and OEMP relating to water must be prepared by a suitably qualified expert and must: a) be consistent with the Water Quality, Stormwater and Flooding Provisional Environmental Management Framework (2 July 2014), provided at Appendix O to the finalised EIS b) incorporate all measures 9A to 9AG from Table 7.1 of the finalised EIS that are described as 'mandatory' c) explain how all measures 9A to 9AG from Table 7.1 of the finalised EIS that are described as 'subject to review' have been addressed d) be approved by the Minister or a relevant New South Wales regulator.	This plan

Table A-2 MPW Stage 2 (SSD 7709) CoC

Condition	Requirement	SIOMP section
Primary Conditions		
B36	Prior to commencement of operation, the Applicant must prepare a Stormwater Infrastructure Operation and Maintenance Plan to manage the operation and maintenance of stormwater infrastructure on-site and off-site, to the satisfaction of the Planning Secretary. The plan must form part of the OEMP required under Condition C5 and must be implemented for the life of the assets and must include provision for:	This plan Appendix B Costin Roe Consulting Endorsement Letter
B36(a)	the management and maintenance of the assets, including evidence that a maintenance contract is in place with a reputable and experienced maintenance contractor;	Section 3.3 Maintenance contract to be included as Appendix when awarded Appendix B Costin Roe Consulting Endorsement Letter
B36(b)	quarterly inspections, and inspections after major rainfall events including scour/ bank protection structures;	Section 4 Appendix B Costin Roe Consulting Endorsement Letter
B36(c)	schedule for routine checking (at least quarterly), cleaning and servicing of all water quality devices/ systems in accordance with the manufacturer's and/ or designer's recommendations;	Section 4.1 Appendix B Costin Roe Consulting Endorsement Letter
B36(d)	maintenance of records of all maintenance activities undertaken;	Section 4

Condition	Requirement	SIOMP section
B36(e)	preparing quarterly maintenance reports, detailing the results of quarterly inspections, inspections after major rainfall events, and maintenance activities;	Section 4.3 Appendix B Costin Roe Consulting Endorsement Letter
B36(f)	recording results of water quality monitoring required under Condition B38;	Section 4 Appendix B Costin Roe Consulting Endorsement Letter
B36(g)	investigation, management and mitigation of water quality target exceedances;	Section 3.3 Appendix B Costin Roe Consulting Endorsement Letter
B36(h)	requiring annual independent auditing; and	Section 4.2 Appendix B Costin Roe Consulting Endorsement Letter
B36(i)	procedures for submission of the quarterly maintenance reports and annual independent audit reports to the Planning Secretary, including the results of inspections, management and maintenance actions and water quality monitoring.	Section 4.3 Appendix B Costin Roe Consulting Endorsement Letter
B37	In addition to the requirements for independent environmental audits under Conditions C16 to C18, the annual audit of the stormwater quality system must be undertaken by a suitably qualified professional with demonstrable experience in WSUD. The audit is to verify the condition of the treatment system(s), verify and document that the system(s) is working as intended, verify the system(s) has been cleaned adequately, verify there is no excessive build-up of material in the system(s) and identify any issues with the treatment system(s) which require rectification for the system(s) to adequately perform its intended function.	Section 4.2
C6(c)(ii)	As part of the OEMP required under Condition C5 of this consent, the Applicant must include the following: Stormwater Infrastructure Operation and Maintenance Plan (see Condition B36);	This plan

Condition	Requirement	SIOMP section
Secondary Conditions		
A42 (c)	Unless stated otherwise in this consent, the Applicant with the approval of the Planning Secretary may update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development). Note: Documents that cannot be staged include Development Layout Drawings required under Condition B2, and Stormwater Design Development Report and Revised Stormwater System Design Drawings and supporting documentation required under Condition B4, and Site Audit Statement required under Condition B169.	Not staged
A45	Prior to the commencement of operation of each warehousing sub-stage, evidence must be provided to the satisfaction of the Planning Secretary that all estate infrastructure, including internal estate roads, bushfire protection infrastructure, utilities, drainage and stormwater quality infrastructure, has been constructed to the extent required to service the sub-stage.	Noted, to be provided when triggered
A56	Before the issue of the final Occupation Certificate, works-as-executed drawings signed by a registered surveyor confirming that the stormwater drainage (water quality and detention infrastructure), road ways, parking and finished ground levels have been constructed as approved, must be submitted to the Certifying Authority	Noted, to be provided when triggered.
B9	The revised stormwater system design, to be detailed in the Stormwater Design Development Report and Revised Stormwater System Design Drawings and supporting documentation, must be consistent with the objectives and principles set out in the NSW Office of Water's Guidelines for Controlled Activities and incorporate water sensitive urban design principles outlined in relevant Council policies, plans, guidelines and specifications and RMS's Water Sensitive Urban Design Guideline 2017, including: (a) treating stormwater as a resource; (b) mimicking natural processes in the control of stormwater; (c) integrating drainage infrastructure and landscaping; (d) managing water in a sustainable manner through considering the complete water cycle; and (e) considered design, construction and maintenance to minimise impacts on the natural water cycle.	Stormwater Development Design Report (SDDR)
B11	The stormwater system must be designed to: (a) convey flows up to and including the 10% AEP event within the formal piped drainage system, with flows from the 10% AEP to the 1% AEP event conveyed in controlled overland flow paths; and (b) provide adequate overland flow paths in the event of stormwater system blockages and flows in excess of the 1% ARI rainfall event.	SDDR

Condition	Requirement	SIOMP section
B12	On-site detention (OSD) must attenuate peak flows from the development such that both the: (a) 1 in 1 year ARI event post development peak discharge rate is equivalent to the pre-development (undeveloped catchment) 1 in 1 year ARI event; and (b) 1 in 100 year ARI event post development peak discharge rate is equivalent to the pre-development (undeveloped catchment) 1 in 100 year ARI event.	SSDR Section 3
B13	OSD basins must: (a) be visually unobtrusive and sit within the final landform and landscaping; (b) ensure public safety by incorporation of 'safer by design' principles; and (c) have all sides with a maximum batter slope of 1V:4H, except at the OSD outlets.	SDDR
B14	All stormwater quality elements are to be modelled in MUSIC as per the NSW MUSIC Modelling Guide	Section 3
B15	The stormwater quality infrastructure must comprise rainwater tanks, gross pollutant traps and biofiltration/ bioretention systems designed to meet the following criteria compared to a base case if there were no treatment systems in place: (a) reduce the average annual load of total nitrogen by 45%; (b) reduce the average annual load of total phosphorus by 65%; and (c) reduce the average annual load of total suspended solids by 85%.	Section 3
B16	All stormwater quality elements must be installed upstream of OSD basins, unless it can be demonstrated to the satisfaction of the Secretary that biofiltration/ bioretention systems within the OSD basins: (a) will not suffer damage from design flows; (b) can be maintained to achieve the water quality criteria; and (c) will have adequate solar access ensuring that all bioretention systems are exposed to sunlight at midday on the winter solstice. This assessment is to include surrounding features of OSD basins, including but not limited to actual building heights and full mature height and size of proposed trees, as per the landscape plans.	Section 3
B17	The area of biofiltration/ bioretention systems is to be at least 1% of the catchment draining to the system, to ensure there is no short-circuiting of the system.	Section 3
B18	Bioretention systems which are greater than 1,000 m2 in area, are to be divided into cells with no individual cell greater than1,000 m^2.	Section 3

Condition	Requirement	SIOMP section
B19	All filter media used in stormwater treatment measures must: (a) be loamy sand with an appropriately high permeability under compaction and must be free of rubbish, deleterious material, toxicants, declared plants and local weeds, and must not be hydrophobic; (b) have an hydraulic conductivity = 100-300 mm/hr, as measured using the ASTM F1815-06 method; (c) have an organic matter content less than 5% (w/w); and (d) be provided adequate solar access, considering the design and orientation of OSD basins.	Section 3
B20	Discharge of stormwater from the development must not cause scour/ erosion of the banks or bed, or pollution of the Georges River or Anzac Creek.	SDDR
B33	All temporary construction stage erosion and sediment control infrastructure that is intended to be converted to permanent stormwater quality or on-site detention infrastructure must be constructed in accordance with the revised stormwater design drawings approved by the Planning Secretary under Condition B4.	Section 3.1 SDDR
B34	Conversion of construction stage erosion and sediment control infrastructure into permanent stormwater quality or on-site detention infrastructure must only occur once the civil works (roads and drainage) have been completed for the associated site subcatchment.	Section 3.1 SDDR
B38	Prior to commencement of operation, the Applicant must prepare a Stormwater Quality Monitoring Program in consultation with Council and the EPA. The program must form part of the OEMP required under Condition C5, be implemented for the life of the development and include the following: (a) base line water quality data; (b) monitoring parameters; (c) water quality assessment criteria; (d) receiving water quality monitoring sites in Anzac Creek and upstream and downstream of the site in the Georges River; (e) monitoring of water quality at sediment basin/ on-site detention/ bioretention basin outlet channels and piped outlets discharging to the Georges River; (f) frequency of sampling, including wet weather sampling; (g) method of sampling and analysis; (h) assess water quality and quantity performance for construction discharges and ongoing stormwater discharges from the development to ensure protection of the desired ecological values of Anzac Creek; and (i) include sampling locations and the frequency of sampling including wet weather sampling.	Stormwater Quality Monitoring Program Appendix B Costin Roe Consulting Endorsement Letter

Condition	Requirement	SIOMP section
B91	The Applicant must: (a) consult with the owners/occupiers of the ABB site throughout construction and operation; (b) provide details of construction works adjacent to the ABB site prior those works occurring; and (c) ensure the proposal does not adversely impact overland flow paths or existing stormwater infrastructure on the ABB site	Community Communication Strategy (CCS) Section 3.2

Table A-3 MPW Stage 2 FCMMs Requirements

FCMM	Requirement	SIOMP section
5F	Stormwater quality improvement devices would be designed to meet the performance targets identified in the Stormwater and Flooding Environmental Assessment (Appendix R of the EIS), and civil design drawings. Maintenance of the bio-retention structures would be in accordance with the maintenance requirements set out in Gold Coast City Council's Water Sensitive Urban Design Guidelines 2007 and would be included in the OEMP.	Section 3

Appendix B Costin Roe Consulting Endorsement Letter

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CRC COSTIN ROE CONSULTING
CIVIL & STRUCTURAL ENGINEERS

6 April 2023
Aspect Environmental
Attention: [redacted]
Suite 117, 25 Solent Circuit, Norwest Business Park
Baulkham Hills NSW 2153

Re: Moorebank Precinct West Stage 2
Stormwater Quality Monitoring Program (SQMP) and
Stormwater Infrastructure Operation and Maintenance Plan (SIOMP) Review

Further to your request, Costin Roe Consulting are pleased to provide this review of the *Stormwater Quality Monitoring Program* (SQMP) and *Stormwater Infrastructure Operation and Maintenance Plan* (SIOMP) compiled by your office. Costin Roe have been engaged by Aspect Environmental to complete an assessment of the aforementioned documents to ensure consistency with the approved *Construction Soil & Water Management Plan* (CSWMP – ref *Co13455.07-03.rpt*) and *Stormwater Design Development Report* (SDDR – Ref Co13455.07-02.rpt) compiled by our office.

Conditions B36 & B38 of the *SSD-7709 Consent* (dated: 11 November 2019), require the *SQMP* and *SIOMP* to be submitted as part the *Operational Environmental Management Plan* (OEMP) to the Planning Secretary prior to the commencement of site operations. For the review process, Aspect Environmental provided the following documentation:

- Stormwater Quality Monitoring Program (SQMP), **Ref: SSS2-QPMS-EN-APP-00035**
- Stormwater Infrastructure Operation and Maintenance Plan (SIOMP), **Ref: SSS2-QPMS-EN-APP-00035**

The following relevant Consent Conditions have been reviewed as part of this assessment. Costin Roe Consulting's comments on how these have been addressed in the documents are shown in **red** below each condition:

B36: Prior to commencement of operation, the Applicant must prepare a Stormwater Infrastructure Operation and Maintenance Plan to manage the operation and maintenance of stormwater infrastructure on-site and off-site, to the satisfaction of the Planning Secretary. The plan must form part of the OEMP required under Condition C5 and must be implemented for the life of the assets and must include provision for:

a) the management and maintenance of the assets, including evidence that a maintenance contract is in place with a reputable and experienced maintenance contractor;

CRC Response: the SIOMP provided by Aspect Environmental includes provision for the management and maintenance of assets.

b) quarterly inspections, and inspections after major rainfall events including scour/ bank protection structures;

CRC Response: the SIOMP provided by Aspect Environmental provisions for quarterly inspections, and inspections following major rainfall events as required by this condition.

c) schedule for routine checking (at least quarterly), cleaning and servicing of all water quality devices/ systems in accordance with the manufacturer's and/ or designer's recommendations;

CRC Response: the SIOMP provided by Aspect Environmental includes a routine inspection and maintenance schedule for stormwater elements and adequately addresses this condition.

d) maintenance of records of all maintenance activities undertaken;

CRC Response: the SIOMP provided by Aspect Environmental includes for maintenance of records of all maintenance activities and adequately addresses this condition.

e) preparing quarterly maintenance reports, detailing the results of quarterly inspections, inspections after major rainfall events, and maintenance activities;

CRC Response: the SIOMP provided by Aspect Environmental includes the requirements of quarterly maintenance reports as required by this condition

f) recording results of water quality monitoring required under Condition B38;

CRC Response: the SIOMP provided by Aspect Environmental includes requirements of recording water quality monitoring results and adequately addresses this condition

g) investigation, management and mitigation of water quality target exceedances;

CRC Response: the SIOMP provided by Aspect Environmental adequately addresses this condition

h) requiring annual independent auditing; and

CRC Response: the SIOMP provided by Aspect Environmental adequately addresses this condition

i) procedures for submission of the quarterly maintenance reports and annual independent audit reports to the Planning Secretary, including the results of inspections, management and maintenance actions and water quality monitoring.

CRC Response: the SIOMP provided by Aspect Environmental adequately addresses this condition

B38: Prior to commencement of operation, the Applicant must prepare a **Stormwater Quality Monitoring Program** in consultation with Council and the EPA. The program must form part of the OEMP required under **Condition C5**, be implemented for the life of the development and include the following:

a) base line water quality data;

CRC Response: the SQMP provided by Aspect Environmental provides baseline water quality data as required by this condition and is therefore satisfied.

b) monitoring parameters;

CRC Response: the SQMP provided by Aspect Environmental adequately addresses this condition.

c) water quality assessment criteria;

CRC Response: the SQMP provided by Aspect Environmental includes a description of the water quality assessment criteria as required by this condition.

d) receiving water quality monitoring sites in Anzac Creek and upstream and downstream of the site in the Georges River;

CRC Response: the SQMP provided by Aspect Environmental includes 5 aquatic monitoring locations located upstream of, adjacent to and downstream from the site as required by this condition

e) monitoring of water quality at sediment basin/ on-site detention/ bioretention basin outlet channels and piped outlets discharging to the Georges River;

CRC Response: the SQMP provided by Aspect Environmental adequately addresses this condition

f) frequency of sampling, including wet weather sampling;

CRC Response: the SQMP provided by Aspect Environmental provides frequency of sampling, including wet weather sampling as required by this condition

g) method of sampling and analysis;

CRC Response: the SQMP provided by Aspect Environmental provides a method of sampling and analysis as required by this condition

h) assess water quality and quantity performance for construction discharges and ongoing stormwater discharges from the development to ensure protection of the desired ecological values of Anzac Creek; and

CRC Response: the SQMP provided by Aspect Environmental adequately addresses this condition

i) include sampling locations and the frequency of sampling including wet weather sampling.

CRC Response: the SQMP provided by Aspect Environmental adequately addresses this condition

This letter is based on the information supplied by the reporting author at the time of compiling. Reference should be made to the reports on which this letter is based. This letter is provided by Costin Roe Consulting Pty Ltd. Please contact the undersigned if clarification of any of the above items are required

Yours faithfully,
COSTIN ROE CONSULTING PTY LTD