



Sustainability
Workshop

Moorebank Precinct West – WSUD Independent Audit

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EXECUTIVE SUMMARY

Sustainability Workshop Ltd was engaged to carry out an independent audit of the operation of the water quality management elements of Moorebank Precinct West (MPW) Stage 2 which currently includes the following constructed warehouses:

- Warehouse N1 Maersk Logistics & Services Australia Pty Ltd
- Warehouse N2 Sydney Tools Pty Ltd
- Warehouse N3 TBA (not yet operational)
- Warehouse N4 TBA (not yet operational) Warehouse 5 Primary Connect – Moorebank Regional Distribution Centre (MoRDC)
- Warehouse 6 Primary Connect – Moorebank National Distribution Centre (MoNDC).

All other warehouses are not yet constructed, for example the southern warehouses. Refer to Attachment 1 which shows the latest map of the site.

Moorebank Precinct West (MPW) Stage 2 was approved under State Significant Development (SSD) 7709. The 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 audit was carried out to satisfy consent (CoC) B37, which requires an annual audit of the stormwater quality system to be undertaken by a suitably qualified professional and requires the independent auditor to:

- 1) Verify the condition of the treatment systems
- 2) Verify and document that the systems are working as intended
- 3) Verify the systems have been cleaned adequately
- 4) Verify there is no excessive build up of material
- 5) Identify any rectification issues required for the systems to adequately perform its intended function.

A site meeting followed by an inspection of the stormwater assets included in the scope of the audit was undertaken on the 10th September, 2025.

Prior to the site meeting a link to applicable maintenance records was provided.

The audit finds that:

- 1) In general, the WSUD infrastructure is being maintained in accordance with CoC B36.
- 2) At the time of the audit, OSD 5,6 and 8 were in a stage 2 (sacrificial) state and operational. These are serviced by gross pollutant traps (GPTs).

- 3) Only one of these GPTs is directly accessible by an eductor (sucker) truck and this makes maintenance more difficult and more expensive due to the extra time it takes to carry and connect additional 150mm (heavy) suction hose. It appears it is too late to rectify this.
- 4) We note the condition of the systems are currently in a sacrificial/temporary state. This means the OSD/bioretention basins are not in their final state (by design) due to the on-going construction and higher sediment loads being produced.
- 5) The batters of the OSD basins are not vegetated and therefore suffering erosion. If this is not rectified it will get worse over time. It is suggested that grass at the base of the batters is left longer to provide some vegetative buffering until vegetation is established on the batter slopes. There is evidence that significant sediment has been deposited within the basin and then removed.
- 6) There is a sacrificial layer of turf in the basins. Although there was good grass coverage across the floor of the basins, only the perimeter of this appears to be mown while the grass over the bio-cells is left longer. This appears to be having the effect of preventing water from being distributed across the bio-cells where it can infiltrate down through the media. A more consistent mowing approach would help to improve the distribution of water across the surface and arguably would result in better water quality outcomes.
- 7) I find that it is in fact very likely that the constructed elements of the system are working as intended to deliver best practice WSUD.
- 8) The systems are being cleaned and maintained so they remain functional, and the maintainer has a good understanding of the systems.
- 9) A check of Bureau of Meteorology data reveals there were no days with greater than 100mm of rainfall within the audit period.
- 10) No excessive build-up of material is evident and I have seen evidence of good cleaning practice to remove deposited material.

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1.0 INTRODUCTION

1.1. Project Overview

Sustainability Workshop was engaged to carry out an independent audit of Moorebank Precinct West (MPW) Stage 2 Water Sensitive urban Design. Approval for works was issued under State Significant Development (SSD) 7709.

The project is a large transport and industrial land development located east of the Georges River. Moorebank Precinct West (MPW) Stage 2 currently includes Warehouses :

- Warehouse N1 Maersk Logistics & Services Australia Pty Ltd
- Warehouse N2 Sydney Tools Pty Ltd
- Warehouse N3 TBA (not yet operational) Warehouse N4 TBA (not yet operational)
- Warehouse 5 Primary Connect – Moorebank Regional Distribution Centre (MoRDC)
- Warehouse 6 Primary Connect – Moorebank National Distribution Centre (MoNDC).

All other Warehouses in Precinct West are under construction or in the planning phase.

This Audit report focuses only on stormwater quality infrastructure and the operation and maintenance thereof.

From a stormwater quality perspective, large industrial areas shed high volumes of stormwater. The stormwater can be contaminated with various pollutants in both particulate and dissolved forms, notably zinc from roofs.

The design development process responded to several consent conditions which required that the proponent comply with what is commonly termed “best practice” stormwater management. That is, assuming that stormwater treatment assets were designed and constructed to best practice then it would be reasonable to expect a best practice outcome.

That outcome is defined in terms of pollutant removal fractions for total suspended solids, total phosphorus and total nitrogen. An approved stormwater system was modelled using MUSIC which is a widely adopted water quality model, design drawings prepared and approved and construction of various elements serving the warehouses undertaken.

It is deemed appropriate to rely on the condition assessment of the stormwater treatment assets, together with other evidence, such as maintenance log books and defects works to form an opinion of the performance of the system. In summary, we are relying on the best practice nature of stormwater management systems to indicate best practice performance.

On practical completion, built assets are handed over to the site manager which is Knight Frank. Knight Frank has engaged a contractor, MID Plumbing to both help identify defects during a defects liability period (and to carry out rectification works where approved) as well as to undertake routine maintenance of the stormwater assets.

A stormwater infrastructure operation and maintenance plan (SIOMP), was required and approved by DPIE and prepared by the proponent, SIMTA. The SIOMP identified the routine and non-routine maintenance activities required for the various stormwater assets including water quality assets such as GPT gross pollutant traps and bioretention basins.

We note that maintenance log books have been prepared to align with the specific actions included in the SIOMP.

1.2. Approval Requirements

MPW STAGE 2 SSD 7709 condition of consent (CoC) B37 requires an annual independent audit.

1.3. Audit Team

The audit of the water quality elements of the MPW Stage 2 site was undertaken by Mark Liebman, CPEng, MIEAust. Mark has over 25 years water quality management experience. He co-authored the design guides, notably the Blacktown City Council Water Sensitive Urban Design Standard Drawings which were used as reference guides for the design of the MPE Stage 2 site.

Mark is also an independent evaluator used by Stormwater Australia to assess the water quality performance of stormwater treatment devices against the newly released stormwater quality improvement device evaluation protocol (SQIDEP). Mark has also undertaken numerous evaluations of stormwater quality improvement devices for Blacktown Council which are relied on by numerous other Council's including Liverpool City Council.

Mark is suitably qualified and has demonstrable experience in WSUD.

1.4. Audit Objectives

The audit objective is to satisfy State Significant Development, condition of consent B37.

1.5. Audit Scope

Moorebank Precinct West (MPW) Stage 2 was approved under State Significant Development (SSD) 7709 .

The scope of this report includes Moorebank Precinct West (MPW) Stage 2. This includes review of OSD basins 5, 6 and 8.

Condition B37 specifically requires the independent auditor to:

- 1) Verify the condition of the treatment systems
- 2) Verify and document that the systems are working as intended
- 3) Verify the systems have been cleaned adequately
- 4) Verify there is no excessive build up of material
- 5) Identify any rectification issues required for the systems to adequately perform its intended function.

2.0 AUDIT METHODOLOGY

2.1. Audit Process

The Independent Audit was conducted in a manner consistent with AS/NZS ISO 19011.2019 – Guidelines for Auditing Management Systems and the methodology set out in the Department's IAPAR. An overview of the audit activities, as specified in AS/NZS ISO 19011, is presented in Figure 1.

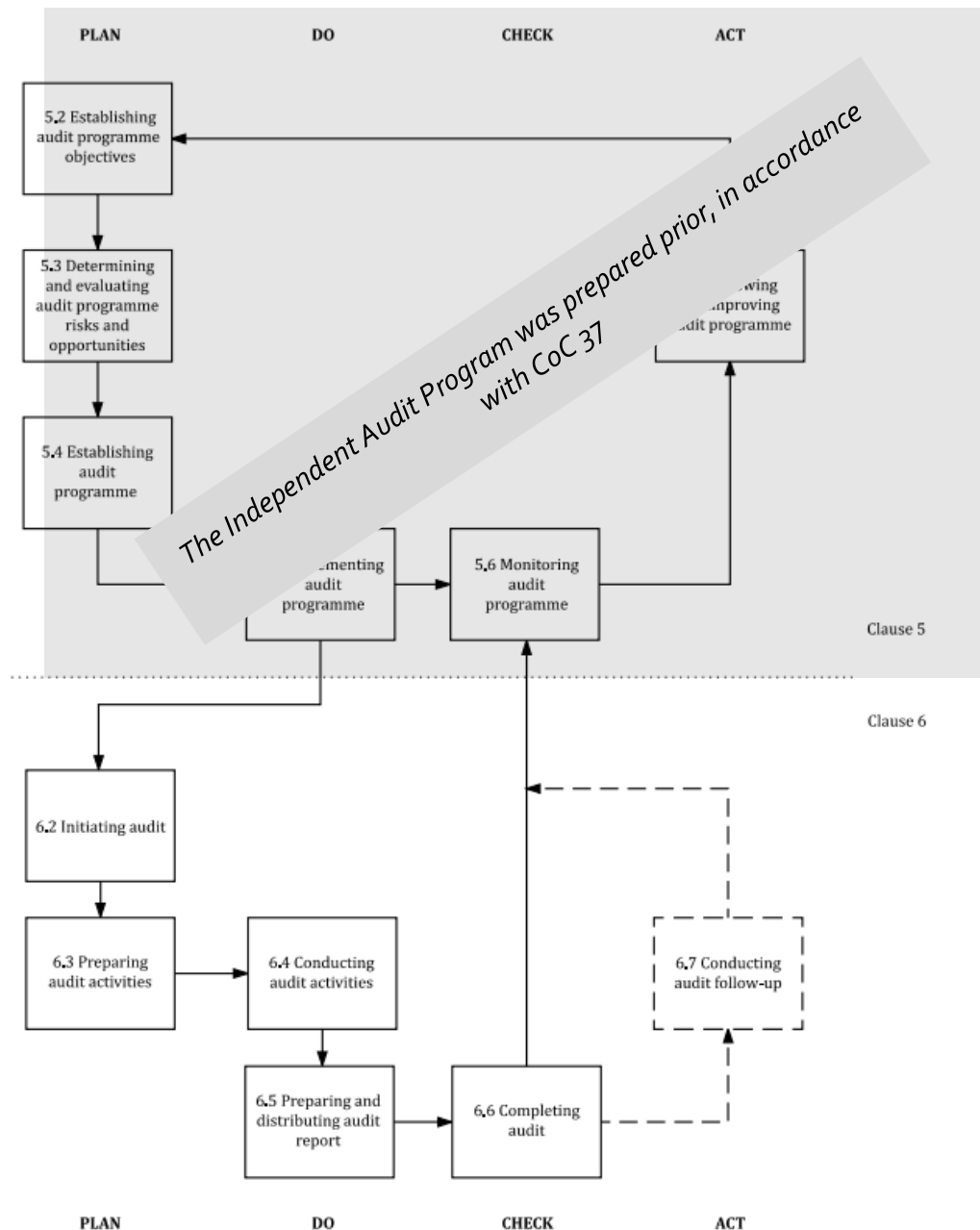


Figure 1 Audit activities overview (modified from AS/NZS ISO 19011). Subclause numbering refers to the relevant subclauses in the Standard.

2.2. Audit Process Detail

2.2.1. Initiation and Scope Development

Prior to the audit we confirmed the scope of the audit and inspected the site to gauge the level of complexity of the audit.

2.2.2. Preparation

Prior to the audit a number of documents were reviewed including:

- *Stormwater Infrastructure Operation and Maintenance Plan, Moorebank Intermodal Precinct – West Precinct Stage 2, November 2024, Rev 04.*

2.2.3. Site Personnel involvement

The on-site audit activities took place on 10th September, 2025. The following personnel took part in the audit:

- Mark Liebman – WSUD Auditor – Sustainability Workshop
- Mark Cugola – Director – MID Plumbing with an ecologist from Apical (Daniel Anderson)
- Baz Richards – Landscape Architect - Sustainability Workshop
- Mark Howley – Senior Project Manager – Tactical
- Matthew Kim – Project Manager - Tactical

2.2.4. Meetings

The on-site audit activities took place on 10th September, 2025.

2.2.5. Interviews

A brief formal interview was undertaken on the 10th September, 2025 with Mark Cugola from MID Plumbing and this occurred throughout the site inspection.

2.2.6. Site Inspection

A site inspection was undertaken on the 10th September, 2025 following the audit meeting. The site inspection involved:

- 1) Viewing GPT locations upstream of each basin
- 2) Viewing OSD 5
- 3) Viewing OSD 6
- 4) Viewing OSD 8 and its outlet to George's River

2.2.7. Document Review

Following the site inspection, a number of documents have been reviewed including:

- *Stormwater Infrastructure Operation and Maintenance Plan, Moorebank Intermodal Precinct – West Precinct Stage 2, November 2024, Rev 04.*
- *SSD7709 Consolidated Consent on the NSW Major Projects Planning Portal.*
- *Maintenance logbooks and photographic evidence prepared by MID Plumbing dated:*
 - *July 2024 – Maintenance logbook report (annual) and photographic evidence*
 - *October 2024 – Maintenance logbook report (quarterly) and photographic evidence and stormwater water quality monitoring data and reporting*
 - *January 2025 – Maintenance logbook (6 monthly service) and photographic evidence*
 - *February 2025 - Maintenance logbook (quarterly) report and photographic evidence*
 - *April 2025 – Maintenance logbook report (quarterly) quotation for maintenance works and photographic evidence and stormwater water quality monitoring data and reporting*
 - *May 2025 – monthly photo record*
 - *August 2025 – Maintenance logbook report (annual) including GPT service log sheets, photographic evidence*

2.2.8. General Audit Findings

Independent Audit findings were based on verifiable evidence. The evidence included:

- relevant records, documents and reports
- interviews of relevant site personnel
- photographs
- figures and plans; and
- site inspections of relevant locations, activities and processes.
- Discussion with the Maintenance Contractor.

2.2.9. Compliance Evaluation

The Auditor determined the compliance status of each compliance requirement in the Audit Table, using the descriptors from Table 2 of the IAPAR, being:

- **Compliant** – The Auditor has collected sufficient verifiable evidence to demonstrate that all elements of the requirement have been complied with within the scope of the audit.
- **Non-compliant** – The Auditor has determined that one or more specific elements of the conditions or requirements have not been complied with within the scope of the audit.

- **Not triggered** – A requirement has an activation or timing trigger that has not been met at the time when the audit is undertaken, therefore an assessment of compliance is not relevant.

Observations and notes may also be made to provide context, identify opportunities for improvement or highlight positive initiatives.

2.2.10. Completing the Audit

The Independent Audit Report was distributed to the proponent to check factual matters and for input into actions in response to findings (where relevant). The Auditor retained the right to make findings or recommendations based on the facts presented.

3.0 FINDINGS

3.1. Documents Audited

The SIOMP (Rev 3, 31/05/23) defines various maintenance actions and their associated frequencies. These have been documented in various tables in the SIOMP.

Each of these actions has been copied into a corresponding maintenance action within the maintenance logbooks which are completed and submitted quarterly by MID Plumbing in accordance with the quarterly reporting requirements of the SIOMP.

The maintenance log books have been audited for completeness by both verifying that all activities noted in the SIOMP have been correctly translated into the maintenance log books and then by verifying that all activities scheduled have been completed according to the log book.

3.2. Evidence Sighted

Difference sources of evidence have been sighted including:

- 1) Completed maintenance log books.
- 2) Evidence of contractor engagement viewed within the log books from photos included within them – generally the photos were within separate documents but locations and images readily identifiable.
- 3) Evidence of contractor engagement to carry out GPT maintenance from photos included in the log books and also separately via evidence of a contractor receipt.
- 4) Evidence of contractor maintenance reported within the log books for the bioretention basins including quotes for rectification works.
- 5) Visual inspections undertaken during the site – notably OSD Basin 5, OSD basin 6 and OSD basin 8.

At no time were any confined spaces entered. It is noted the GPT units are defined as confined spaces. The lids of the GPT units was not lifted and so the internal condition of the units could not be determined during this audit. However clear photographic evidence was provided of the units under maintenance.

3.1. Compliance with Audit Objectives

CoC B37 requires the independent auditor to:

- 1) Verify the condition of the treatment systems within the scope
- 2) Verify and document that the systems are working as intended
- 3) Verify the systems have been cleaned adequately
- 4) Verify there is no excessive build up of material

Table 1 to 4 summarise the audit findings with respect to each of these requirements.

Table 1 Verification of the condition of the treatment systems within the scope

Asset Type	Details of item
OSD Basin 5	The condition of OSD Basin 5 was found to be in a sacrificial/ temporary state. Vegetation cover within the base of the basin is good. Weed removal had taken place. There was no litter debris within the basin. Jute mesh had been placed around batter slopes which have not been planted and there was evidence of embankment erosion, which is concerning as these are large basins. Minimal sediment was present on the surface of the basin. We have viewed photos of maintenance activities.
OSD Basin 6	The condition of OSD Basin 6 was found to be in a sacrificial/ temporary state. Vegetation cover within the base of the basin is good. Weed removal had taken place. There was no litter debris within the basin. Minimal sediment was present on the surface of the basin.
OSD Basin 8	The condition of OSD Basin 8 was found to be in a sacrificial/temporary state. Vegetation cover within the base of the basin is good. Weed removal had taken place. There was no litter debris within the basin. Minimal sediment was present on the surface of the basin.
GPT units	Condition 37 requires the condition of the water quality management infrastructure assets to be determined. In order for this to be determined inspection of open GPT units needs to be undertaken. We note there was not an opportunity for the independent auditor to assess the condition of the GPT units. It has been observed that the GPTs have been maintained twice during the audit period (July 2024 and January 2025) – this is in accordance with best practice. It has been reported that 100.44 tonnes of wet weight material was removed and disposed from all GPTs including: ODD 5 – 21.98 tonnes OSD 6 – 43 tonnes OSD 8 – 35.46 tonnes We have viewed before and after photos of the GPTs maintenance.

Table 2 Verify and Document the System is Working as intended

Asset Type	Details of item
OSD Basin 5	It appears that OSD Basin 5 is working as intended. The discharge point from the basin appears clear and in good condition which indicates the basins are working as intended.
OSD Basin 6	It appears that OSD Basin 6 is working as intended. The discharge point from the basin appears clear and in good condition which indicates the basins are working as intended.
OSD Basin 8	It appears that OSD Basin 8 is working as intended. The discharge point from the basin appears clear and in good condition which indicates the basins are working as intended.
GPT units	A total of 100.44 tonnes of wet weight material was removed from the units and they are working as intended.

Table 3 Verification the Systems have been cleaned adequately

Asset Type	Details of item
OSD Basin 5	We verify OSD Basin 5 to have been thoroughly cleaned. Surrounding roads were clean and well managed. Building sites had sediment and erosion control in place.
OSD Basin 6	We verify OSD Basin 6 to have been thoroughly cleaned. Surrounding roads were clean and well managed. Building sites had sediment and erosion control in place.
OSD Basin 8	We verify OSD Basin 8 to have been thoroughly cleaned. Surrounding roads were clean and well managed. Building sites had sediment and erosion control in place.
GPT Units	Based on the maintenance log books together with additional evidence that the GPT units have been cleaned adequately as required by the SIOMP. Cleaning of the GPTs twice per annum, as is occurring, is best practice. 100.44 tonnes of material was collected from the GPTs.

Table 4 Verification there is no excessive build up of material within the systems

Asset Type	Details of item
OSD Basin 5	We verify that there is no excessive build up of material within the system.
OSD Basin 6	We verify that there is no excessive build up of material within the system.
OSD Basin 8	We verify that there is no excessive build up of material within the system.
GPT units	We verify that there is no excessive build up of material within the units (based on the evidence presented and not based on a visual inspection of the GPTs as one was not undertaken due to confined spaces entry requirements).

3.2. Non-compliance, Observations and Actions

No non-compliances were detected.

This section including Table 5, presents observations from the Independent Audit. Actions are also presented in the table.

Table 5 Condition of consent B37 Audit findings and actions

Type	Details of item	Proposed or completed action	By whom and by when	Status
Observation	Grass cutting at OSD 5 has resulted in the borders being mown while the centre is unmown. This may be restricting the entry of water into the centre of the cells and reducing the volume of storage of the bioretention basin. It is noted we were unable to walk into the centre of the basin on the day of the site inspection due to wet weather. It may be that the longer grass in the centre is not at all precluding flows from entering the centre of the basin.	Grass cutting in centre of basin could further improve distribution of water across the basin. It is appreciated that longer grass would typically result in better water quality, in this context it may be resulting in reduced filtration prior to overflow occurring.	Maintenance Contractor	

	Distribution system at OSD 5 could be improved.			
Observation	Lack of vegetation on the sides of OSD Basin 5 will lead to ongoing erosion and deposition of silts and sands on the floor of the basin, especially in the distribution channel. This poses a risk of clogging the underlying transition drainage layer.	Ongoing monitoring and repairs during the sacrificial stage with work to establish a vegetated cover of the batter in accordance with design drawings. It is appreciated this batter could be disturbed during the final stage 3 phase where the sacrificial grass is removed and replaced with permanent vegetation.	Maintenance Contractor	
Observation	It is unknown what strength subsoil drainage pipes have been installed in the basins. This should be investigated prior to the final stage 3 conversion when it is almost certain due to the size of these basins that larger machinery will be working on the basins. There is therefore a risk of the subsoil pipes being crushed during construction.	A load limit for machines operating on the basins when they go through their final conversion should be investigated and managed to ensure subsoil pipes are not damaged.	Tactical or relevant PM or design manager.	

3.3. Rectification Measures

Appendix A includes a number of site photos.

We note we were unable to observe GPT units and so can't recommend any rectification measures beyond those already identified by MID Plumbing.

3.3.1. Bioretention basins (OSD 5,6 and 8)

The following rectification measures are recommended for the bioretention basin within OSD 5, OSD6 and 8:

- 1) Basin batters be topsoiled and vegetated in accordance with landscaping plans.
- 2) Basin 5 – more consistent mowing would allow for better distribution of the water across the grass cells in this large basin. There mowing more than the edges is recommended.

3.3.2. Water Quality Sampling

Technically, according to the SIOMP, only the outlets of the OSD basin need to be sampled. Refer to Section 4.1. Currently both inlet and outlet appear to be sampled. This is beneficial and would provide an opportunity to demonstrate some improvement in water quality between inlet and outlet if comparison tables were included in the water quality report.

I have reviewed water quality sample results and make the following observations:

- 1) Apical have sampled up and downstream of each basin. The SIOMP require sampling of the OSD basin outlets as well as upstream of the whole site and downstream of the site on the Georges River.
- 2) PFAS has been detected in basin outflows at levels exceeding default trigger values. This is surprising and could be an indication of previous undetected contamination of the site. It is beyond the scope of this audit to recommend further action except to recommend that professional advice is obtained to determine if this triggers a requirement for a site investigation in accordance with SIOMP (refer to Section 4.1 in the SIOMP) which requires a comparison of the analyte upstream and downstream of the site. This information may not have been presented in the Apical Report (it may not have been in their scope of works).
- 3) All other water quality indicators generally appeared to be good. Minor exceedances of default trigger values is not unexpected and as above, it is recommended that a comparison of the upstream (upstream of the site on the Georges River) and downstream water quality analytes on the Georges River is undertaken. It is quite possible that upstream water quality is worse than basin discharges.
- 4) The SIOMP requires 19 standard metals to be tested – only 8 are reported by Apical.
- 5) Apical is using DTVs for lowland rivers rather than the trigger values stipulated in the SIOMP.
- 6) It would be very helpful if the water quality reports could include a table of results comparing inlet and outlet results (for each OSD) so it can be seen if the basins are removing pollution.
- 7) There is no merit in obtaining dry weather grab samples. All sampling of basin inlet and outlet should be during wet weather. Dry weather samples are not representative of basin outflow.

CONCLUSIONS

We conclude that the development is, in all probability, complying with COC B36 and that the constructed stormwater systems are working as intended and are being maintained and cleaned. They are free from excessive build-up of material. Based on site observations of the outlets, we found no visual evidence of sediment build up, and the water quality at the Georges River discharge point, we did observe, did not appear to be impacted at all despite it being substantially wet on the day of the site inspection.

Two observations have been made during this audit though we find no evidence of non compliance with COC B36.

Two rectification measures have been included in this report and Sustainability Workshop would be happy to discuss these further. The recommendations are largely based on the assumption that a reduced life cycle cost is an operational objective

We commend ESR, Tactical, MID Plumbing (including Apical) and Knight Frank for their on-going work in establishing the site in accordance with stormwater quality best practice management.

Appendix A

Site Inspection Photos

Photo	Description
	OSD 5 showing signs of erosion on basin sides due to lack of vegetation and a well vegetated basin floor. The photo also shows how the mowing regime may prevent water from flowing into the centre of the cells. Rather it is distributed around the basin perimeter which is likely to be getting a higher hydraulic loading.



OSD 5 Poor vegetation coverage in places. Some sediment in the distribution pipeline most likely from erosion of the batter.



OSD 5 Basin outlet structure with rock armouring.



OSD 8 No
topsoil or
vegetation
on the
batters of
the basins.



OSD 8
Water
quality at
outlet does
not appear
to be
impacting
the
George's
River.



OSD 6
showing
batters
without
topsoil or
vegetation.



OSD 8
Sacrificial
state with
HDPE lined
batters and
pump out
operation
from the
adjacent
sediment
basin into
the biocells.
This basin
also
perimeter
mowing
with an
appearance
of
diminished
flow
directed to
centre of
basin.

Attachment 1

SIOMP Features Map



AC 2 located between 2
Culgoa Court Wattle Grove
and 20 Sandover Court
Wattle Grove

Legend

Water_Monitoring_Sites

OSD

Rivers_and_Drains

Discharge_Point

GR 1 located near Cambridge
Ave river crossing.

