



Sustainability
Workshop

Moorebank Precinct East – Stage 2 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 sensitive urban design elements of Moorebank Precinct East (MPE) Stage 2 which currently includes Warehouses 1,3,4, 5,6,7 and IMEX.

Moorebank Precinct East (MPE) Stage 2 was approved under State Significant Development (SSD) 7628. This audit was carried out pursuant to SSD 7628, condition of consent (CoC) C51 which 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. Following the meeting, clarification was requested and obtained on some minor issues.

The audit finds that:

- 1) The Moorebank Avenue Deviation construction is underway and impacting the eastern part of the site but not the operation of the water quality management systems. Warehouse East 2A and 2B have not yet been constructed and the original warehouses remain. A check of Bureau of Meteorology data reveals there were no days with greater than 100mm of rainfall within the audit period.
- 2) In general, the WSUD infrastructure continues to be diligently maintained in accordance with CoC51.
- 3) The condition of the systems including GPTs and combined water quality and OSD basins (OCD1, OSD10, OSD2) are generally good. Refer to Attachment 1 for the locations of these devices.
- 4) Despite some water quality indicators suggesting poor performance, 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. I had previously recommend a change in water quality sampling protocols as I do not consider dry weather sampling provides an indication of system performance.
- 5) The systems are being cleaned and maintained so they remain functional, and the maintainer has a good and evolving understanding of the systems.

- 6) 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 East (MPE) Stage 2 Water Sensitive urban Design. Approval for works was issued under State Significant Development (SSD) 7628.

Completed works include Area 1 and 2 (warehouses 1,3,4,5,6 and 7) and IMEX

Warehouse 2 remains as a series of 5 smaller warehouses referred to as Warehouses 50-54.

The project is a large transport and industrial land development located east of the Georges River. The Moorebank Avenue road realignment works are currently in construction.

This audit report focuses only on stormwater quality infrastructure and the operation and maintenance thereof. There are four OSD basins, including OSD 1 (a combined OSD and bioretention basin), OSD 2 which is currently used as a construction phase sediment basin now with lower operating water level to facilitate the Moorebank Avenue construction, OSD 9 which is purely for OSD purposes and OSD 10 which is linear bioretention system parallel to the old Moorebank Ave alignment. In addition, there are 5 GPTs and rainwater tanks on each warehouse. Litter baskets are also used to treat stormwater around Warehouse 5.

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.

In the absence of specific detailed water quality monitoring to verify the performance of the WSUD assets, 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. This is a fairly typical approach with stormwater audits.

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 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 CDS 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

SSD 7628 condition of consent (CoC) C51 requires an annual independent audit.

1.3. Audit Team

The audit of the water quality elements of the MPE 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 C51

1.5. Audit Scope

Moorebank Precinct East (MPE) Stage 2 was approved under State Significant Development (SSD)7628. Sustainability Workshop was engaged to carry out an audit of the Area 1, 2 and IMEX operations.

The scope of this report therefore includes Moorebank Precinct East (MPE) Stage 2 (Area 1 and 2) works. This includes the four warehouses (WH 1, 3, 4, 5, 6 and 7) and IMEX.

Condition C51 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.

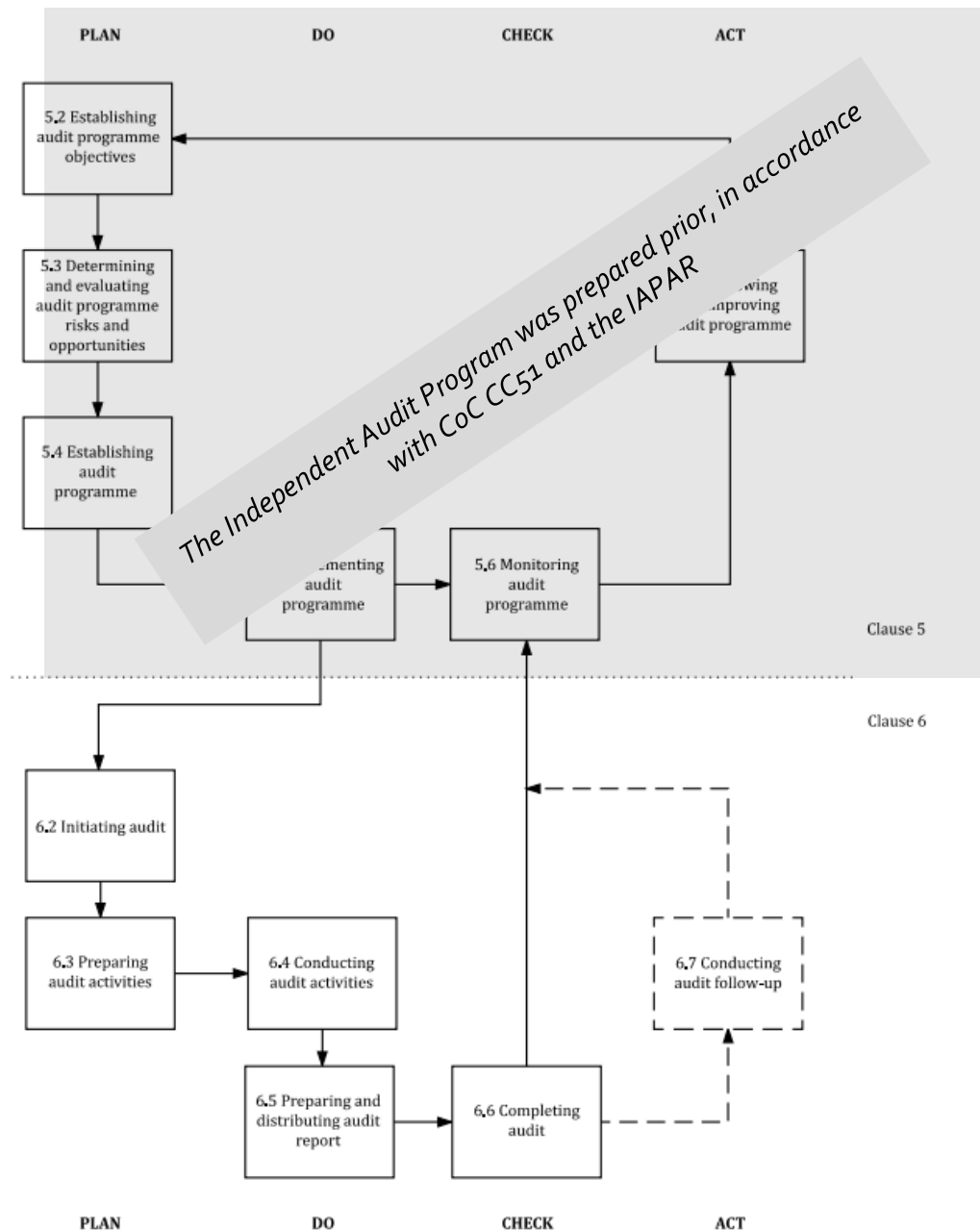


Figure 1 Audit activities overview (modified from AS/NZS ISO 19011). Subclause numbering refers to the relevant subclauses in the Standard.

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 Logistics Park – East Precinct, Moorebank Intermodal Terminal Alliance, 13/12/24 – Rev 9.*

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
- Baz Richards – Landscape Architect - Sustainability Workshop
- Mark Howley – Senior Project Manager – Tactical
- Matthew Kim – Project Manager – Tactical
- Mark Cugola – Director – MID Plumbing
- Daniel Anderson – Director and Ecologist from Apical

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 Howley, Matthew Kim, Mark Cugola from MID Plumbing and Daniel Anderson from Apical. Numerous questions and discussions 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 CDS locations
- 2) Viewing OSD 9
- 3) Viewing OSD Basin 1 which is a combined OSD and bioretention system.
- 4) Viewing OSD 10 (Near Map aerial inspection only as access unavailable)
- 5) Inspecting Swales 1 to 4.

2.2.7. Document Review

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

- *Moorebank Precinct West - Stage 2 Proposal Environmental Impact Statement – (SSD16-7628), Arcadis, October 2016 (the EIS) – notably Appendix P.*
- *Stormwater Infrastructure Operation and Maintenance Plan, Moorebank Logistics Park – East Precinct, Moorebank Intermodal Terminal Alliance, 13/12/24 – Rev 9.*
- *SSD7628 Consolidated Consent included in the above document.*
- *Stormwater Management Plan SSD 7628 by Costin Roe, Rev A, dated 12 Sept 2018.*
- *Various Work as Executed Drawing Sheets including but not limited PIWE – ARC – CV – DWG – 11202 – H, DWG 11527.*
- *Basis of Design Report -Precinct Infrastructure Works East (PIWE) Package 1A, 19 July 2018.*
- *Maintenance log books and photographic evidence prepared by MID Plumbing dated:*
 - *July 2024 – Maintenance logbook report (annual), quotation for maintenance works and photographic evidence*
 - *September 2024 – Stormwater pit cleaning 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*
 - *April 2025 – Maintenance logbook report (quarterly) quotation for maintenance works and photographic evidence and stormwater water quality monitoring data and reporting*
- *Various Safe Work Method Statements for pit cleaning.*

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.

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 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 basin including quotes for rectification works.
- 5) Visual inspections undertaken during the site – notably OSD Basin 1 which is the combined bioretention and OSD basin, OSD 9, Swales 1 to 4 and OSD2 at the south of the site.

At no time were any confined spaces entered. It is noted the CDS units are defined as confined spaces. The lids of the CDS 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 by TDK using eductor/combi trucks.

3.1. Compliance with Audit Objectives

CoC C51 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 1 Combined bioretention and OSD Basin	The condition of OSD 1 was found to be very good. Plants are now well established. 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. Minimal sediment was present on the surface of the basin. The inlet/level spreading trench appears stable. One thing to note was the observation of a hare sited during the audit. Continue to monitor and repair any damage if required. Fill in holes with suitable filter sand. If it begins breeding or becomes problematic, engage an ecologist or pest controller for advice.
CDS units	Condition 51 requires the condition of the water quality management infrastructure assets to be determined. In order for this to be determined inspection of open CDS units needs to be undertaken. We note there was not an opportunity for the independent auditor to assess the condition of the CDS units. It has been reported that 25.56 tonnes of waste was removed and disposed from all GPTs. It has been observed that the GPTs have been maintained twice during the audit period – this is in accordance with best practice. The CDS unit which serves OSD 2 adjacent WH7 was previously known to be drowned by the basin and could not be maintained or the condition verified without draining the water quality pond it was connected to. OSD 2 is now being pumped out into a tributary that heads east and goes under the new Moorebank Avenue Road realignment (currently under construction). Cleaning of the CDS unit is now possible because it is no longer drowned. It contains estimated 18 tonnes of waste. A quote to remove was provided to KF for approval in late October 25. Evidence of cleaning should be sighted in next year's audit.
Grass Swales including OSD10	The condition of the grass swales observed was good. There was the presence of a large amount of reeds within the swale on the eastern boundary which will improve water quality outcomes. OSD10 is in good condition with vegetation well established. Confirmed via Near Map aerial photography as we were unable to view OSD 10.
Litter baskets	Evidence from the log books shows that litter baskets are being actively maintained and from the volume of material removed performing very well.
Rainwater Tanks	Not scheduled – every 2 years.
First flush devices and filters	Evidence of the condition of first flush filters being maintained was provided. Those that were maintained appear to be in good order.

Table 2 Verify and Document the System is Working as intended

Asset Type	Details of item
OSD Basin 1	The basin is well vegetated and maintained (no evidence of ponding, scouring or litter). It is therefore very likely to be working as intended.

Combined bioretention and OSD Basin	
CDS Units	A total of 25.56 tonnes of material was removed from the units and they are working as intended. GPT 5 is working though has had a drowned weir in the past but will now be functioning as intended due to the water level in OSD 2 being lowered.
Grass Swales including OSD10	The grass swales are not technically part of the water quality management system on the site however they are included in the SIOMP and they will influence water quality. OSD10 is likely to be working well as it is well vegetated on both banks. Swale on eastern boundary was well vegetated with dense reeds. This is likely to be delivering good water quality outcomes.

Table 3 Verification the Systems have been cleaned adequately

Asset Type	Details of item
OSD Basin 1	We verify OSD Basin 1 to have been thoroughly cleaned.
Combined bioretention and OSD Basin	
CDS Units & Litter baskets	Based on the maintenance log books together with additional evidence that the CDS units have been cleaned adequately as required by the SIOMP. Litter baskets were maintained during the audit period as required. Cleaning of the GPTs twice per annum, as is occurring, is best practice. 25.56 tonnes of material was collected from the GPTs. GPT 5 needs to have an estimated 18 tonnes of material removed.
Grass Swales including OSD10	We verify the swales were generally free from litter, debris and sediment and had been cleaned adequately. From an analysis of aerial images – OSD10 is well maintained and clean.

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

Asset Type	Details of item
OSD Basin 1	We verify that there is no excessive build up of material within the system.
Combined bioretention and OSD Basin	
CDS Units	We verify that there is no excessive build up of material within the systems except for GPT 5. GPT 5 has been subjected to inundation due to the intentionally raised water levels in OSD 2. Now that OSD 2 water levels are lower, GPT 5 can be cleaned out. A quote has been submitted to KF for approval.
GrassSwales including OSD10	We verify that there is no excessive build up of material within the swales. OSD10 was not inspected though from analysis of aerial imagery as well as logbook photos, it appears to be free from excessive build up of materials.

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 C51 Audit findings and actions

Type	Details of item	Proposed or completed action	By whom and by when	Status
Observation	Good maintenance practices	continue	Maintenance Contractor	
Observation	There is an opportunity to now vegetate the batters of OSD 1 as it appears to be a permanent basin (with reference to Masterplan)	MID Plumbing to provide a quote, to top soil and plant out batters of OSD 1.	Maintenance Contractor	

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 including removal of about 18 tonnes of material deposited in GPT 5.

3.3.1. Bioretention basin (OSD 1)

Based on the latest masterplan, it appears that OSD 1 remains unchanged in the masterplan, Assuming this to be correct, it is recommended then that the batters of OSD 1 be vegetated in accordance with the original design drawings.

In the absence of these drawings, the planting list (for batters) included in the following Blacktown City Council WSUD design drawings (also adopted by Liverpool City Council) and found here:

https://www.blacktown.nsw.gov.au/files/assets/public/wsud/standard-drawings/wsud_standard_drawing_2022.pdf

Sheet 12 lists appropriate species and densities for the batters. It is recommended that prior to planting that a quality topsoil, compliant with AS4419 be placed to a minimum depth of 150mm on the batters.

3.3.2. GPTs and Litter baskets

GPT 5 have its accumulated sludge removed now that it can be emptied.

A quote has been provided to replace degraded litter baskets around Warehouse 5. The baskets should be replaced.

3.3.3. OSD10 and Swales

Continue to monitor bank the stability of grass embankments due to average grass coverage. Grassed areas adjacent to swales should also be monitored for erosion and this stopped as soon as practicable.

CONCLUSIONS

We conclude that the development is, in all probability, complying with COC C51 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.

Three minor observations have been made during this audit though we find no evidence of non compliance with COC C51.

A couple of 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 (Apical) and Knight Frank for their on-going work in establishing the site in accordance with stormwater quality best practice management.

The vegetative coverage in OSD 1 continues to be one of the best examples in western Sydney and we commend MID Plumbing and Apical for their care and work. It appears that OSD1 has a confirmed future and there is an opportunity to plant out the batters of the basin in accordance with the original design drawings or using species shown on the Blacktown Council WSUD Standard drawings which were hyperlinked in this report.

Appendix A

Site Inspection Photos

Photo	Description
	OSD 1 bioretention basin showing plant growth throughout the whole basin, denuded batters – batters recommended for planting pursuant to masterplan finalisation.
	Swale adjacent to the OSD 1 in good condition – Previous bank stabilisation works successful and under guard rail shade cloth placement is preventing litter blowing in.



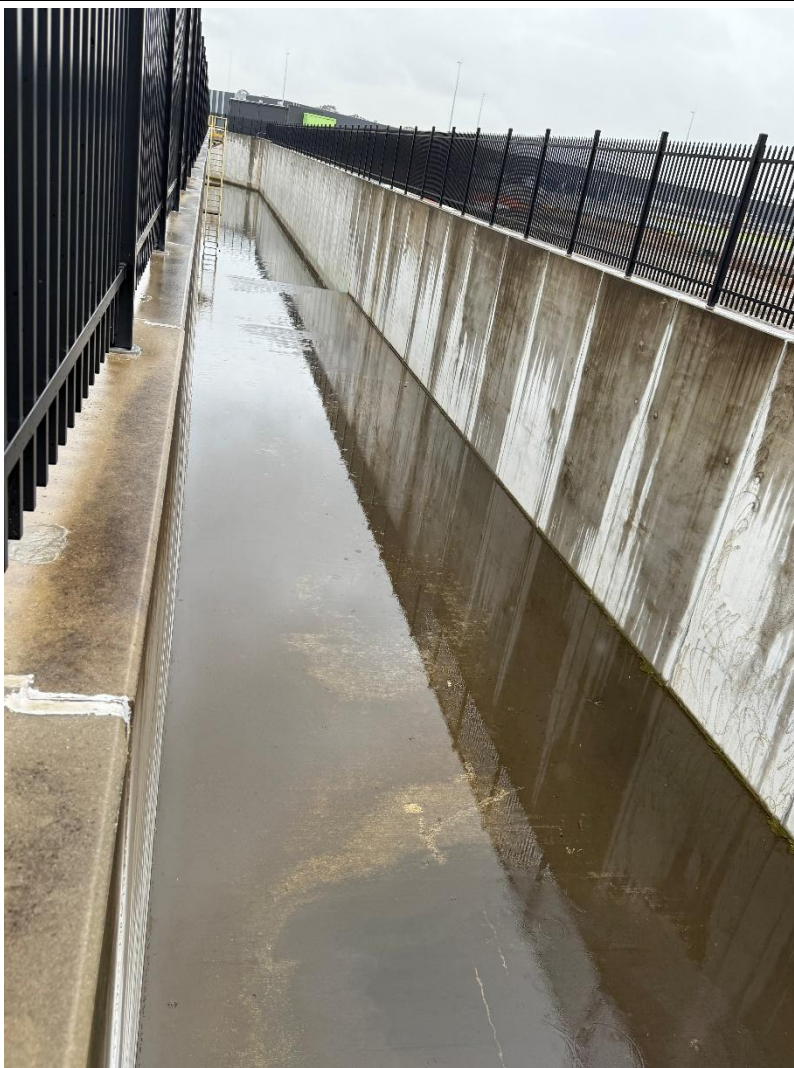
Swale adjacent to the OSD 1 in good condition – (limited access associated with Moorebank Avenue realignment construction works).



Near OSD2 (Moorebank Avenue deviation under construction in background) Red pipe is conveying inflows from OSD 2 pump station.



Pump to drain
OSD2 which
continues to
operate as a
pump out basin.



OSD 9 cleaned
and well
maintained.

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.

