Stormwater management

1. Scope

This document details the requirements associated with the management of stormwater and sediment control at Wilmar BioEthanol; inclusive of Oonooie Fertiliser Facility, Sarina Distillery and Mackay Harbour Storage Facility. Site specific storm-water management plans are outlined in this document.

Upon commencement of any environmental relevant activities occurring on the site, that are not covered by this plan, an additional storm water and sediment control management plan must be submitted to Department of Science and Environment (DES) within 14 days.

2. Objectives

The objective of this procedure is to provide personnel with direction on how to manage storm water at the Oonooie Fertiliser Facility, Sarina Distillery and the Mackay Harbour Storage Facility. The purpose of the storm water management plan is to:

- Provide a framework for the ongoing management of storm water and sediment.
- Comply with the Environmental Authority conditions pertaining to the release of storm water.
- Minimise the possibility of uncontrolled release of contaminated storm water from any facility.

3. Background

Sarina Distillery

The ethanol production facility is located in Sarina on land adjoining Plane Creek. There are 12 storm water collection areas at the Sarina facility:

- Alcohol Tank Farm Bund
- Fermenter Roadway Bund
- Distillation West End Bund
- Distillation East End Bund
- Molasses Bund under QR line
- Spirit Store
- Caustic Bund
- EP30
- Chemical Store Bund – internal release point to Fermenter Bund
- MT12 Molasses Bladder
- OrganicFlo Tank (TT14) Bund
- Fermenter Tanks Bund

Oonooie Fertiliser Facility

The Oonooie fertiliser facility is located approximately 12km south of Sarina. The storm water management area is limited to the parcels of land as illustrated in **Appendix C** - and bordered by:

- QR rail line to the West
- Elizabeth creek to the North
- No Name Creek to the South, and
- Mangrove mud flats to the East.

Mackay Harbour Storage Facility

Ethanol produced at the Sarina Distillery can be stored in tanks at the Mackay Harbour Storage Facility prior to

transfer via ship or road to their final destinations. There are two concrete bunds (installed 2011 and 2016) surrounding the storage tanks at Mackay Harbour.

4. Responsibilities

The following roles should assume the major responsibility for the activities covered by this procedure:

Position	Responsibility
Site Management	The Site Management is responsible for the implementation and ensuring overall compliance to the Storm water Management plan.
Managers and Supervisors	All Managers and Supervisors are to ensure compliance with the requirements of this management plan.
Employees / Team Members	All employees have an obligation to carry out their work in a manner consistent with the requirements of this Storm water Management Plan.

5. Sarina Distillery Stormwater Overview

5.1 Facility Description & Storm Water Management Philosophy

The purpose of the Sarina Distillery is the production of ethanol (~60 ML per annum). During the ethanol production process a number of materials are produced and required onsite, such as:

- BioDunder (i.e. co-product after ethanol production) is pumped to the Oonooie facility via the distillery effluent pipeline transfer system (WA24-WA26).
- Ethanol storage tanks (TT01, TT02, TT03, TT04, TT05, WT13)
- Molasses storage tank (~ 5000 tonne tanks i.e. MT01, MT02, MT03, MT04, MT05, MT07, MT08, MT09, MT10)
- Dunder temporary emergency storage (MT09)
- Out of service molasses storage (MT10)
- Molasses storage bladder - 90,000 tonne molasses bladder on opposite side of Plane Creek (MT12)
- Caustic storage tank
- Chemical store
- Production areas (fermentation and distillation) containing WIP materials

There are 12 stormwater collection areas at the Sarina facility (**Table 1**) that are strategically located to capture rainfall and act as a barrier to prevent any potential release of contaminants resulting from the ethanol production process. Production areas (fermentation and distillation) have separate bunding to contain storm water that has the potential to have had contact with contaminants.

5.2 Sarina Distillery Storm Water Management

Storm water that collects in the 12 bunds located at Sarina Distillery are tested (see DMSID-116-53-Stormwater Release Procedure) to determine if free from contamination before release to Plane Creek. If contamination is detected then the water may be pumped to the Wastewater Pit or transferred by truck to Oonooie dam ET05.

A summary of the storm water bund functions for the Sarina Distillery site, are listed in **Table 1** and **Appendix A -** .

Table 1: Sarina Bund Functions

Sarina Storm Water	Bund Function
Alcohol Tank Farm	Collection of storm water from around alcohol tanks into a central bund. Bund capacity is 1177m^3
Fermenter Roadway	Collection of storm water from roadway surrounding fermentation. Also from chemical store bund (if released). Segregated from fermentation area by bunding in order to prevent any potential process contamination.

Distillation West End	Collection of storm water from area surrounding distillation. Segregated from distillation area by bunding in order to prevent any potential contamination.
Distillation East End	Collection of storm water from area surrounding distillation. Segregated from distillation area by bunding in order to prevent any potential contamination.
EP30 Molasses Bund	Collection of storm water from around MT03, 04 & 05.
Molasses Bund Under QR Line	Collection of storm water from area surrounding site entrance and molasses tanks.
Caustic Tank	Collection of storm water within caustic tank bunded area.
Molasses Bladder	Collection of storm water on top of the cover of the molasses bladder (MT12).
Chemical Store	Collection of storm water that may ingress into the chemical store. This bund can be tested then released to the fermenter roadway bund.
OrganicFlo Storage Tank (TT14)	Collection of storm water within TT14 tank bunded area. Water can be discharged to process area/fermenter bund and then directed to XT71. Alternatively water can be directed to fermenter roadway bund then released if within specification.
Fermenter Tanks Bund	Collection of storm water within fermenter tanks bunded area. Water can be directed to XT71. Alternatively, water can be directed to fermenter roadway bund then released if within specification.
Molasses Truck Unloading Bay	Collection of stormwater in molasses unloading bay area. The molasses bund can be drained in 3 ways: Pumped to MP24 / MP24 molasses shed and then pumped to Biostil drain via MP24 / MP25 sump pump and then drains to wastewater pit; Pumped to drain beside sugar silo; Gravity fed to Molasses trough pad (north of MP23).

There is one licensed discharge point at the Sarina Distillery site (W1) which enables release of cooling tower wastewater to Plane Creek. This release point is rarely used as the cooling tower blow-down is recycled to process mashing water whenever possible. Details of the conditions surrounding release of water from this licensed discharge point are listed in the DMSID-116-52-Environmental Monitoring Program.

5.2.1 Wastewater

Wastewater is considered a beneficial resource and can be managed in accordance with the conditions of the End of Waste Code Dunder ENEW07503118. Also see DMSID-116-216 Waste Management.

- When transported for direct application from site to the user offsite, there is no requirement to manage in accordance with ERA57. Transport must meet *Section 7 Conditions of Use* of ENEW07503118.
- When transported for storage or non-direct application, the wastewater remains a waste and must be managed in accordance with the conditions of EPPR00475513. Transportation, other than transportation via the approved pipeline, must be undertaken in accordance with ERA 57 requirements.
- Wastewater that does not meet *Condition 6 Registered Resource Producer Requirements* of ENEW07503118, is considered a waste and must be managed in accordance with the conditions of EPPR00475513. In this case, compliance with condition L2 must be maintained. If compliance with L2 is not met, notification must be made to DES *(Condition G2)* and a management plan developed to aid transition into compliance.

5.3 Environmental Monitoring

Plane Creek water quality and Sarina Distillery groundwater quality is monitored on a quarterly basis as per the DMSID-116-52-Environmental Monitoring Program to ensure site operations are not impacting the surrounding waterways.

6. Oonooie Stormwater Overview

6.1 Site Climate and Rainfall

Monthly and annual rainfall distribution data for the Oonooie Fertiliser Facility is presented in **Appendix E -** . Based

on this historical data the following key assumptions have been made and used for analysis and determining management strategies associated with storm water.

- The expected yearly average rainfall at Wilmar Sites is between 1500mm to 2000mm.
- The major rainfall events are generally in the months of January, February and March. However extension of the timing of these events from August to May is not uncommon.
- Major rainfall events generally occur during the period of time that the fertiliser business has slowed (spreading BioDunder onto farms has ceased).
- During an average season, evaporation from the uncovered dams on site is insufficient to clear all rainfall which is captured by the dams.

The storm water plan is designed around a 1 in 20 year, 3.3m rainfall event.

6.2 Facility Description

The Oonooie Fertiliser Facility stores the by-product generated from ethanol production process at the Sarina Distillery for subsequent reprocessing for sale and distribution onto farms as a fertiliser. The facility consists of:

- Batching plant and storage hoppers
- 4 truck Loading bays
- 3 covered BioDunder storage dams (ET02, ET23)
- 2 temporary covered BioDunder storage dams (ET01, ET04)
- 1 uncovered BioDunder storage dam (ET03)
- 3 clear water dams (ET26, ET28, ET29)
- 1 uncovered wastewater dam (ET05)
- 4 environmental dams and (ET06, ET24, ET27, ET30)
- 1 central catchment release dam (ET25)
- Approximately 30 hectares of bunded irrigation area

6.3 Storm Water Management Philosophy

The handling of large quantities of stormwater, if not managed correctly, has the potential to significantly impact operations or result in uncontrolled release of contaminated water from site. Therefore, a number of key control strategies have been developed and implemented at Oonooie to minimise the volume of contaminated storm water requiring on site containment and release. These strategies can be summarised as follows:

- Process areas are bunded or concrete lined, and stormwater treated as potentially contaminated and therefore contained on site.
- The clean water dams (ET26, ET28, and ET29) are located on site to capture and store storm water that does not come into contact with waste product. These dams overflow into natural waterways.
- Four environmental dams (ET06, ET24, ET27 and ET30) are located on the site. ET06 is strategically located to capture product in the event of an uncontrolled release from product dams and the process plant. ET24 is a raised earth dam that is maintained at low level to be available for contaminated stormwater and/or wastewater in an emergency situation such as a high rainfall event. ET27 is a small dam that is generally clean, but has the potential to receive contaminated water in the event that ET05 wastewater dam overflows. All environmental dams overflow through stormwater drains to the ET25 licensed release point.
- Approximately 30 hectares of pasture is allocated to irrigation on Oonooie property. Irrigation must be carried out in accordance with the Irrigation Management Plan.
- ET25 is a central catchment dam located at the eastern end of the irrigation site to capture storm water runoff from the irrigation area and overflow from the environmental and wastewater dams.
- There is only one licenced release point on site; it is located on the northern side of the central dam.

An overview of storm water, clean water and trade water flows within the storm water management area is contained in **Appendix F - Oonooie Water Flows**.

6.4 Storm water Management Strategies

6.4.1 Batching Plant and Loading Bays

The immediate areas surrounding the batching plant and loading bays are concrete lined with all storm water directed to ET03 for addition to BioDunder product, or to ET05 for collection and later use as irrigation water. All storm water collected from concrete hardstands around the batching plant and loading bays is classified as potentially contaminated. Mechanisms are available to divert water from these areas to ET06 if water has been classified as non-contaminated.

Storm water collected from the grassed areas surrounding the batching plant and loading bays is classified as uncontaminated and is naturally drained to ET06.

6.4.2 Transfer Points

All fixed product storage and transfer pumps on site are bunded. Stormwater collected in these bunds are classified as contaminated and are pumped back into any one of the product storage dams or to ET05. Product transfer stations include:

- Dunder loading pump station EP01 and EP02 bund with storm water catchment directed to ET03. If the storm water is tested and found to be free of contaminants (as per Environmental Monitoring Plan) this water may also be directed to ET06.
- Transfer station pumps, EP03, EP04 and EP23 bund with storm water catchment directed to any of the BioDunder dams.

6.4.3 Product and Waste Dams

BioDunder Dams

The Oonooie facility BioDunder storage consists of two covered (floating membrane), two temporary covers and one uncovered dam. **Table 2** outlines dam storage capacity, catchment and evaporation areas.

Table 2: BioDunder Dams Summary

Dam	Covered/ Uncovered	Full Capacity- Mega litres (ML)	Rain Catchment Area m^2	Evaporation Area m^2
ET01	Temporary Cover	88	19,000	N/A
ET02	Covered	59	14,000	N/A
ET03	Uncovered	10	4,000	2,500
ET04	Temporary Cover	101	26,000	N/A
ET23	Covered	76	19,000	N/A
Total		334	82,000	2,500

The covered ET01, ET02, ET04 and ET23 BioDunder dams have a rainfall collection area of 7.8 ha with a purpose built storm water/rainfall removal systems.

Stormwater collected on the covers, if uncontaminated (see DMSID-116-53-Stormwater Release Procedure), is pumped to clean water/environmental dams:

- ET01 goes to ET06
- ET02, ET04 and ET23 go to ET24.

Contaminated storm water is pumped to a BioDunder dam.

All four covered dams have spillways to allow water to overflow from the dam covers. The spillways have been designed to accommodate flows from a 1 in 1000 year ARI rainfall event for 12-hour duration. All spillways are located along the North Eastern walls of the dams and in the event of an overflow go to ET06 or ET24.

BioDunder dams ET02 and ET03 have a storm water combined catchment area of 1.8 ha and are interconnected via an 8" overflow pipe located in the top of the common dividing wall of the dams. A spillway located in the Western wall of ET02 has an overflow height of 0.6 meters below the dam crest and is designed to overflow as a safety precaution only when the capacity (of both dams) exceeds 69ML. Overflow from the dams are currently directed to ET24 which overflows to ET25.

6.4.4 Wastewater Dam (ET05)

Wastewater Dam (ET05) is utilised to hold contaminated storm water (e.g. from dam covers and distillery stillage). The volume of contaminated stormwater inputted to the wastewater dam is minimized by:

- Testing of stormwater so contaminated water is captured and directed to the appropriate site (e.g. product dams)
- Recycling of potentially contaminated storm water into mashing/WC10 (when possible) at the Sarina site to reduce the volume transferred to ET05.
- Processing through the activated sludge treatment plant at the Plane Creek Mill site. When quality data allows, wastewater from the pit is transferred to the mill lagoons.

The wastewater dam is an uncovered raised earthen dam and has an open area of 9,400 square metres. The dam collects no storm water runoff. Water contained in the dam is used as irrigation water as per the irrigation management plan. Alternatively, the contents of this dam can be pumped back to the BioDunder dams when required.

In the event of an uncontrolled overflow from the wastewater dam, flows are directed to ET24 or ET25 via stormwater drains.

Details of this dam are as follows:

Table 3: Wastewater Dam Summary

Dam	Full Capacity (ML)	Rain Catchment Area (m^2)	Approx. Evaporation Area (m^2)
ET05 uncovered	20	9,400	7,000

6.4.5 Biodunder & Wastewater Dam Safe Fill Levels

Safe fill levels of all BioDunder dams and the wastewater dam are modelled with respect to:

- production forecasts
- BioDunder storage dam stock level (determined from stock takes)
- actual production volumes
- sales volumes
- rainfall data
- freeboard not less than 0.5 meters (including any rainwater on top of the cover)

Dam levels are measured physically weekly to allow verification of physical stocks. BioDunder dam levels are forecast 12 months ahead using average rainfall and evaporation data. These forecasts are used to predict if dam levels are likely to approach or exceed safe fill levels therefore allowing suitable mitigation strategies to be developed and implemented to ensure no unlicensed release of product to the environment.

The maximum fill levels of these dams is managed to maintain sufficient capacity for storm water containment generated from a 1 in 1000 year ARI rainfall event for a 12 hour duration.

6.4.6 Environmental Dams (ET06, ET24, ET26, ET30)

The purpose of the four environmental dams ET06, ET24, ET26 and ET30 is to:

- maintain sufficient storage capacity to cater for storm water runoff
- act as a buffer to enable sediment to settle
- prevent any potentially contaminated storm water flowing directly to central dam/off site

Environmental dam ET06 captures storm water runoff from the western areas of the site as well as any overflow

form BioDunder dams ET01 and ET04, and Environmental dam ET24 captures storm water runoff from ET02, ET03 and ET23. All runoff into these dams is used as irrigation water on neighbouring properties or overflows to central dam during rainfall events. The spill way of this dam is located on the south eastern corner of the dam.

Environmental dam ET26 has the potential to receive contaminated water from ET05 in the very unlikely event of an overflow, and then overflows into ET24 and down to ET25. ET24 dam is also used as an emergency contaminated storm water dam in times of high rainfall and is maintained at low levels for the wet season.

6.4.7 Clean Water Dams (ET27, ET28, ET29)

The purpose of the four clean water dams (ET27, ET28, and ET29) is to provide water storage and natural overflow into surrounds.

6.4.8 Central Dam (ET25) – Oonooie licensed release point (W2)

The purpose of central dam is to capture all storm water runoff from the irrigation area/dam overflows and provide residence time and buffer capacity for water flowing from these areas to allow solids to settle. Central Dam is the only licensed trade waste release point (W2) from the site and flows into Llewellyn Bay (tidal inlet). The requirements for release of trade water are described in the DMSID-116-52-Environmental Monitoring Program Whilst this dam remains near full, relatively low rainfall (after an allowance for soakage) will result in overflow.

Releases are authorised during all months of the year. This makes it possible to empty the dam outside the wet season and enables the lowering of dam levels in preparation for the wet season as well as the performance of maintenance on the dam (e.g. valves; silt removal, weir placement, weed removal). This is done using DMSID-116-742-ET25 Controlled Water Release and is not expected to interfere with the receiving waters as they are tidal.

Details of Central dam are as follows:

Table 4: Central Dam Summary

Dam	Full Capacity (ML)	Rain Catchment Area m^2	Evaporation Area m^2 (approx.)
ET25 uncovered	25	400,000	15,000

6.4.9 Waterways (Creeks & Streams)

Storm water runoff flows over the large pasture paddocks (Southern Paddocks) towards the natural catchments to the east and southeast of the site. Overland flow patterns, general site features and observations indicate storm water run-off is directed into a number of small gullies, creeks and catchment dams located across the property.

6.4.10 Environmental Monitoring of Dams/Waterways

Oonooie dams and groundwater are routinely monitored on a quarterly basis and after rainfall events to evaluate the condition of in flow and out flows of the water on site (see DMSID-116-52-Environmental Monitoring Program). The creeks and streams are also monitored during rain events (**Appendix D -**).

7. Mackay Harbour Stormwater Overview

7.1 Facility Description & Storm Water Management Philosophy

The purpose of the Mackay Harbour facility is to provide a large storage location for the ethanol products produced at Sarina Distillery. Ethanol stored at Mackay Harbour may be transported to customers via road or ship.

Storm water is collected in the bunds surrounding the ethanol tanks. There are two concrete bunds at the Mackay Harbour, installed in 2011 and 2016 (**Appendix G -**).

7.2 Mackay Harbour Storm Water Management

Storm water that collects in the tank farm bunds located at Mackay Harbour is tested (see DMSID-116-53-Stormwater Release Procedure) to determine if free from contamination before release to neighbouring storm water guttering. If contamination is detected then the water will be pumped into a tanker and transferred to a suitable Oonooie Dam (e.g. ET05) or to the Sarina site for re-processing.

There is one licensed release point at the harbour W3 (shipping pipeline). Details of the conditions surrounding release of water from this licensed discharge point are listed in the DMSID-116-52-Environmental Monitoring Program.

7.3 Environmental Monitoring

Monitoring of the release of water from the shipping pipeline is to be carried out as per DMSID-116-52-Environmental Monitoring Program.

8. Definitions

BioDunder	A liquid by-product of the ethanol manufacturing process. BioDunder contains 30-40% solids and comprise yeast biomass, potassium, sodium, nitrogen, calcium, magnesium, phosphorous and sulphur. There is a beneficial re-use license for this product (Permit ENBU00824808)
Stillage	A liquid by-product of the distillation process. Unlike BioDunder contains no yeast biomass but may contain other elements in trace amounts e.g. potassium.
Clean Water Dam	Dam designed to contain and receive stormwater run-off from that does not have the potential to contain process contaminates.
Environmental Dam	Dam designed to contain and receive stormwater run-off for areas that have the potential to contain process contaminates.
Wastewater Dam	Dam designed to contain Stillage and wastewater from factory, with no stormwater catchment.
Trade water	Water that is potentially contaminated i.e. has come into contact with site wastes.
Wastewater	Water that is potentially contaminated i.e. has come into contact with site wastes (Sarina Distillery origin).
Storm water	Rain water that has not come into contact with any contaminates at the site.
Farm water	Water that has come into contact with site nutrient sources but is dilute in nature (<2 Brix).
Sediment	Soil particles that have been mobilised by the movement of water on site.

9. Supporting Documents

Policy

WSA.SHE.PO.001-Safety, Health & Environment Policy

Environmental Policy

Compliance

DES Environmental Authority Permit EPPR00745513

DES Environmental Authority Registration Certificate EPSX00677313

DES End of Waste Code Dunder ENEW07503118

Environmental Management System

DMSID-116-251-Site Based Management Plan

DMSID-116-52-Environmental Monitoring Program

DMSID-116-54-Water Testing Procedure

DMSID-116-53-Stormwater Release Procedure

DMSID-116-742-ET25 Controlled Water Release

DMSID-116-40-Irrigation Management

DMSID-116-460 Stillage Transfer to Mill Effluent System

DMSID-116-598 Low Spec Transfer to Pasture

DMSID-116-216 Waste Management

Forms

DMSID-116-57-Environmental Inspection

DMSID-185-792-Event Report and Initial Investigation

Records

Environmental Management - Records

Manuals

DEHP Monitoring and Sampling Manual 2009

DEHP Queensland Water Quality Guidelines 2009

Groundwater Sampling and Analysis - A Field Guide 2009

10. Document Review

Date	Review Details	Reviewed by	Approved by
July 2017	Update visual to show addition of stormwater drain at Oonooie.	Sarah Humphrys	Carl Morton
October 2018	Addition of appendices detailing site stormwater system. Update stormwater release site information.	Sarah Humphrys	Carl Morton
September 2019	Major review of procedure. Update references and links. Added in *Visual Check on Environmental Valves* appendix from another obsolete document.	Sarah Humphrys	Aldert Portwig
May 2020	Update of Oonooie dam statuses and storage of products on Sarina site. Update Supporting Documents. Update of wastewater management as per ENEW07503118 (replaces ENBU00824808). Update Appendix F.	Sarah Humphrys	Aldert Portwig

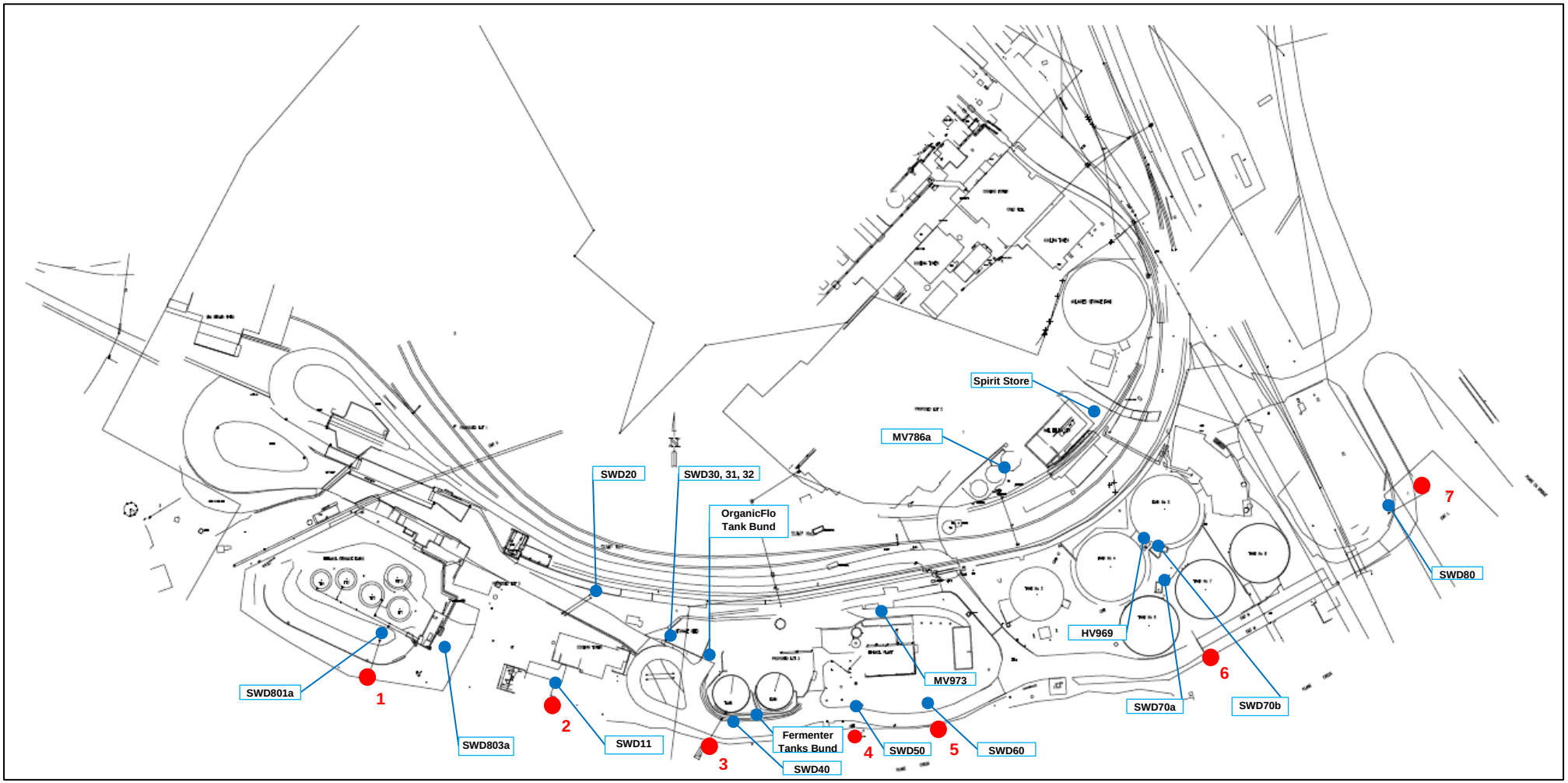
Appendix A - Sarina Stormwater Capture Summary

Valve	Location	Stormwater Release Site	Releases
SWD801a	**Alcohol Tank Farm Bund**	**Site 1**	**Creek Outlet 1**
SWD803a	Tank Farm		Pumped into Alcohol Tank Bund or XT71
SWD11	Wastewater Loading pad		**Creek Outlet 2, <u>but</u> ALWAYS** closed and pumped to XT71
SWD20	MP23 Bund		
SWD40	**Fermenter Roadway**	**Site 2**	**Creek Outlet 3**
MV973	XT30, Distillation		Valve closed – goes to XT71, or open valve will drain to Distillation Bund West or East
SWD50	**Distillation Bund West**	**Site 3**	**Creek Outlet 4**
SWD60	**Distillation Bund East**	**Site 4**	**Creek Outlet 5**
SWD80	**Molasses Bund (under rail line)**	**Site 5**	**Creek Outlet 7**
HV969	**EP30 Pit**	**Site 6**	Valve opens to **Creek Outlet 6** or use **EP30** pump to XT71
SWD70a	MP06 Bund		Drains to MP07 bund.
SWD70b	MP07 Bund		Pumped to EP30 Pit or XT71
MV786a	**Bulk Caustic Bund**	**Site 7**	Pumps out sump to XT71 or drains to EP30 pit
	MT12 Molasses Bladder	**Site 8**	Dewatering off top of bladder, pumped to causeway through pipe to creek
SWD30, 31, 32	**Chemical Store Bund**	**Site 9**	Internal release to Fermenter Roadway bund or XT71
	OrganicFlo Tank (TT14) Bund	**Site 10**	Directed to Fermenter Roadway bund or XT71
HV990	**Fermenter Tanks Bund**	**Site 11**	Directed to Fermenter Roadway bund or XT71

Note: XT71 is Wastewater/Stillage Pit

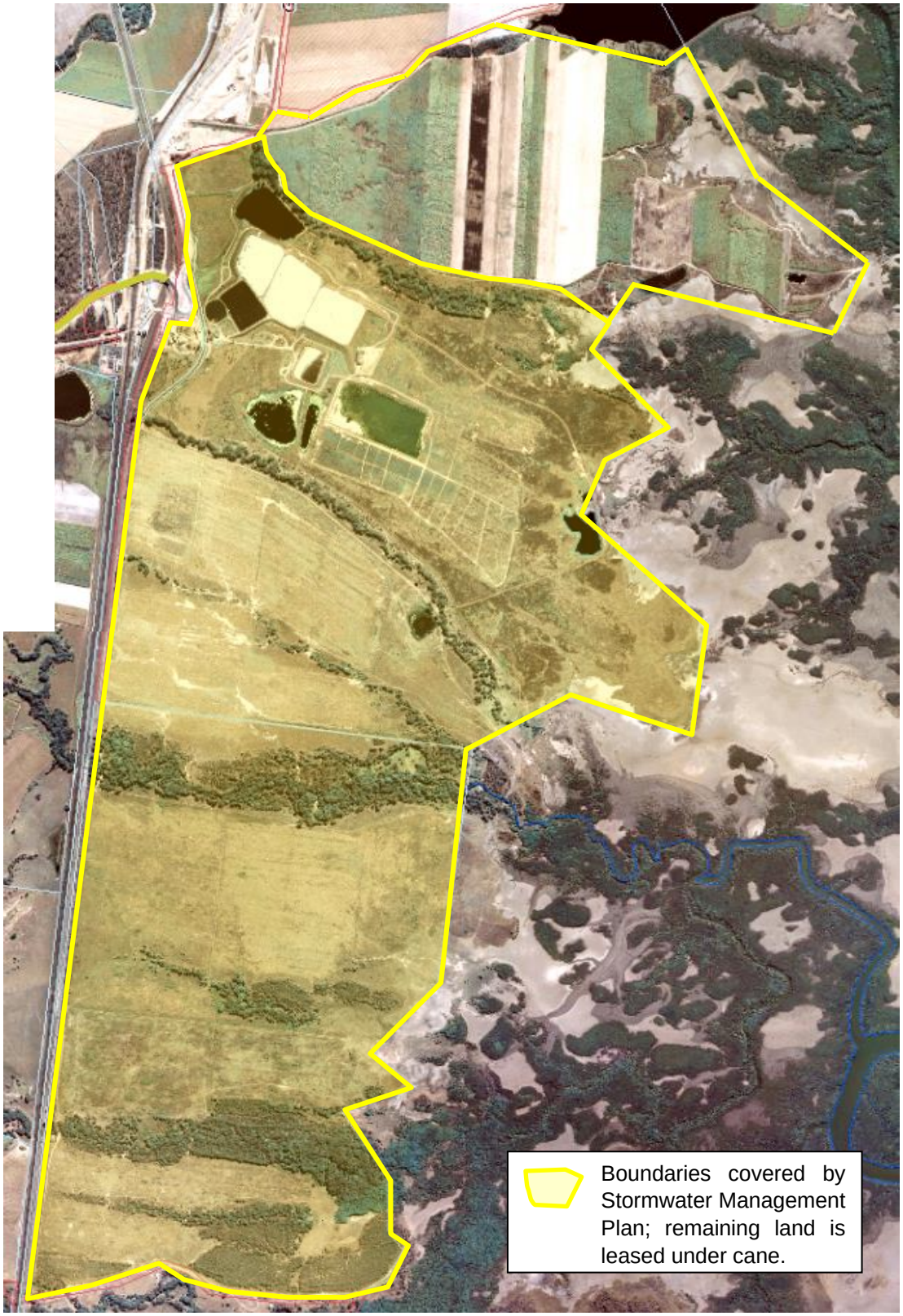
Creek Outlet	Location
1	Near Tank Farm
2	Near XT71
3	Near Molasses Bridge
4	Near Molasses Bridge
5	Opposite Distillery
6	Near XP01/02 Pump House
7	Near Railway Bridge

Appendix B - Sarina Stormwater Bunds and Release Valves



*When updating this, also update Appendix C in DMSID-116-52-Environmental Monitoring Program.

Appendix C - Oonooie Property Boundaries



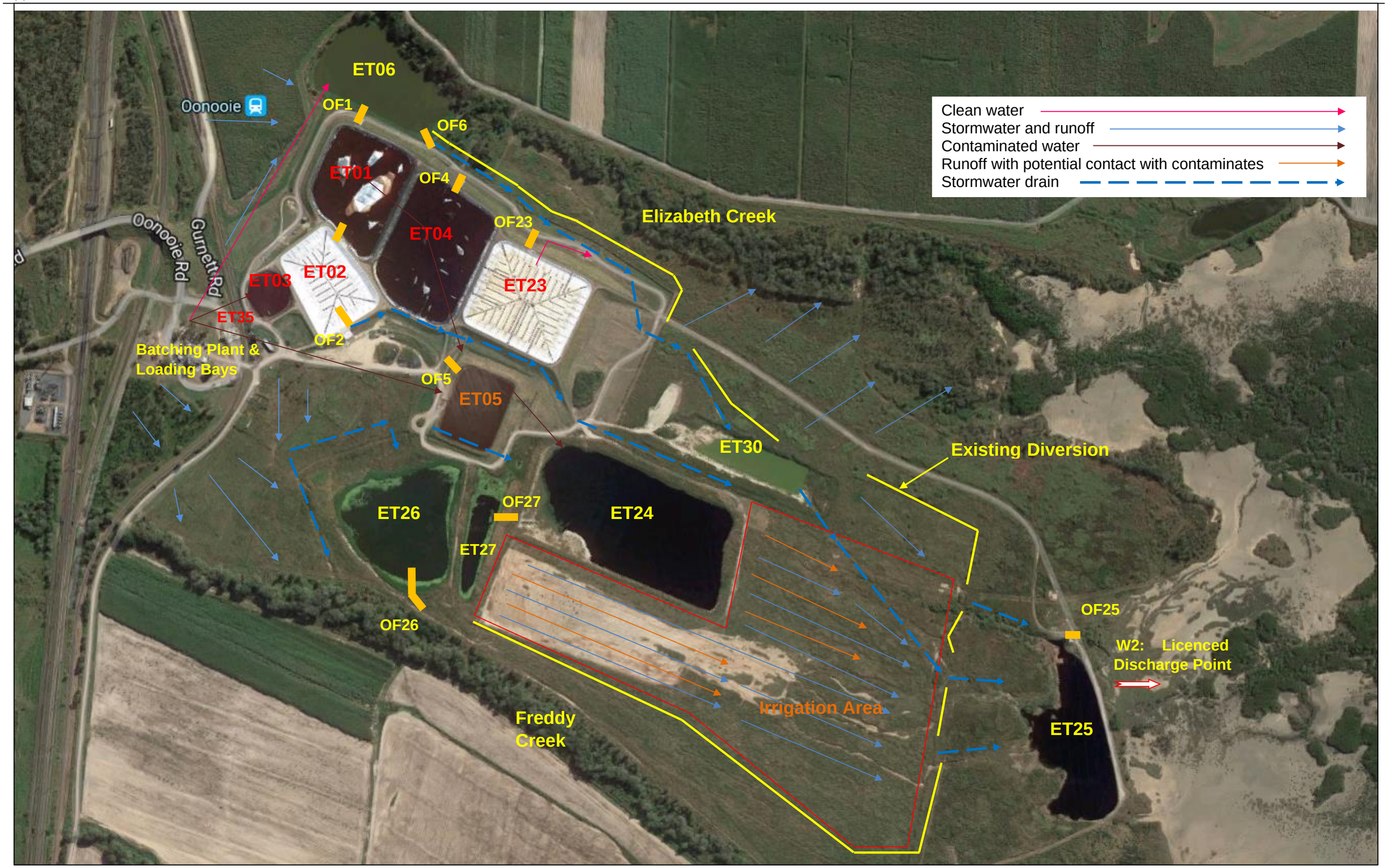
Appendix D - Oonooie Creek Sampling Locations

Sample Point	Description	Latitude	Longitude
ECI	Elizabeth Creek Inflow	21.46305	149.23793
ECD	Elizabeth Creek Downstream	21.46543	149.24028
FCI	Freddy Creek Inflow	21.47056	149.23492
FCD	Freddy Creek Downstream	21.47232	149.23917
PCI	Paddock Creek Inflow	21.47457	149.23422
PCD	Paddock Creek Downstream	21.47639	149.23839
TCI	Tommy Creek Inflow	21.48091	149.23375
TCD	Tommy Creek Downstream	21.48114	149.24460
JCI	Jacky Creek Inflow	21.48715	149.23285
JCD	Jacky Creek Downstream	21.48846	149.23993
NCI	No Name Creek Inflow	21.49153	149.23270
NCD	No Name Creek Downstream	21.49064	149.24050

Appendix E - Oonooie Site Rainfall History

Month	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-Year Average
January	347	405	496	280	416	305	371	373	280	392	156	557	107	381	334
February	105	451	850	672	755	221	374	385	260	85	312	117	309	330	315
March	200	149	44	131	418	1033	643	280	237	114	428	1352	172	250	493
April	245	51	9	154	19	198	24	142	184	94	76	26	128	151	104
May	105	75	44	5	36	19	86	130	77	14	13	104	14	52	54
June	63	185	27	37	9	37	42	7	65	27	153	4	18	11	37
July	21	0	123	0	15	7	156	28	2	23	192	7	0	52	48
August	0	2	0	0	100	57	17	1	85	19	29	3	6	10	33
September	31	42	13	8	193	3	0	3	73	7	45	0	11	5	34
October	6	39	19	11	39	80	37	2	5	40	34	105	29	83	45
November	35	124	29	159	409	29	10	136	33	274	54	81	23	2	105
December	135	219	142	149	634	222	153	33	119	61	311	101	231	188	205
Total	**1291**	**1740**	**1793**	**1604**	**3042**	**2208**	**1911**	**1518**	**1418**	**1148**	**1800**	**2454**	**1046**	**1513**	**1806**
Jun-Aug Total	83	187	149	37	124	101	215	35	152	69	373	13	24	73	118
Dec-Mar Total	652	1139	1608	1224	1738	2192	1609	1191	810	709	956	2336	689	1191	1346

Appendix F - Oonooie Water Flows



Appendix G - Harbour Stormwater Bunds