



Safety First

Drainage System



Introduction

Water Management Plan

- ❑ The oily water and stormwater management plan was developed to ensure that all stormwater consistently meet the requirements outlined in the Water Use General Authorisation issued in terms of the National Water Act 1998, Section 21(f) for stormwater discharge and Section 21 (g) for stormwater storage by the Department of Water and Sanitation (DWS).
- ❑ The plan creates a better operational and functional understanding of managing oily and storm water within the Tank farm and Refinery processing plant that ultimately reduce/ eliminate environmental incidents and constantly meet the water monitoring protocol as specified by the Department of Water and Sanitation (DWS) and Refinery Operational requirements.
- ❑ International best practice requires the provision of stormwater surge volume capacity to be equivalent to, or greater than, 15 minutes of stormwater at maximum rain recorded rainfall. The maximum rainfall over 15 minutes from Cape Town International Airport (1956 – 1996) and total paved surface area of refinery (103 048 m²) including roof drains from tanks, is 16 mm. The surge capacity required is therefore 1650 m². Surge volume provided = 1700 m³ (28S8) + 200m³ (28S5) = 1900m³.

SYSTEM OVERVIEW

- ❑ The stormwater system routes stormwater from the non-process paved areas at the refinery to the three impounding basins situated in the North-West corner of the refinery.
- ❑ The impounding basins were built as part of the rapid drainage system in 1980 and fulfill the following purposes:
 1. Collect and store uncontaminated stormwater for onsite reuse, such as for firefighting activities.
 2. Provide a buffer between stormwater and the Diep River in the event of stormwater contamination.
- ❑ The stormwater channels enter the first impounding basin through three inlet weirs, designed to capture surface oil in the event of contamination.
- ❑ The volumes of water available in the three compartments are sufficient for firefighting purposes.
 1. The Impounding basin is 66000m³ (3 basins x 22000 m³) during normal level, 94000m³ during full (Top) level and 15000m³ during overflow.
 2. Our worst-case demand for an incident in the refinery is based at 31000 l/min Tank fire x 6 hours which is 11160000 litres (11 160 m³) or 28000 L/min process fire x 6 hours which is 10080000 litres (10 080 m³).
- ❑ The weir valves must be open to allow the levels to equalize and to ensure that there is sufficient head at the fire pump intakes. The water underflows into the first basin and then passes sequentially through the three basins, each separated by underflow weirs which can be isolated, if necessary. The 3rd impounding basin provides suction for the emergency firewater pumps on the NE corner and overflows through a channel to the Diep River on the Western side. The valve on the overflow to the Diep River is kept closed except for controlled draining of stormwater outlined below.

SYSTEM OVERVIEW

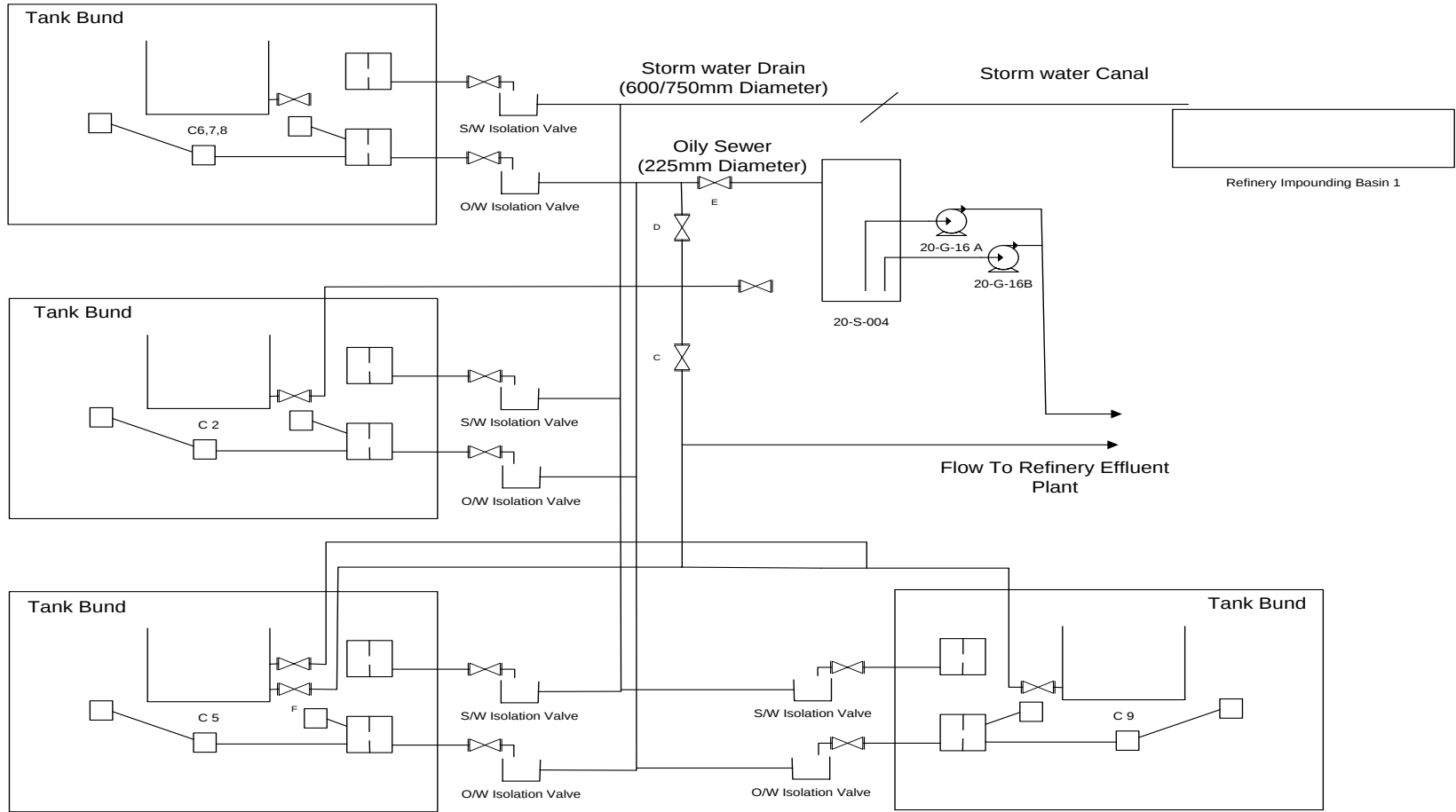
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Bund Oily water system

- ☐ In each bund there are five interconnected oily water drainage sumps located at the outlet of each of the four water drain valves and the tank roof drain valve. The water from the oily water sumps located in the bunds are drained to the main oily water collection sump.
- ☐ This valve is to be kept in the closed position at all times, (unless a draining operation is in progress).
- ☐ The water from the oily water sump in tank farm, is transferred to the effluent plant main diverter by an automated pump system.

Bund Stormwater system

- ☐ Each bund has a stormwater collection sump with two compartments, separated by a sluice gate. The outlet pipe of the storm water collection sump passes under the bund wall and into the storm water drain via a hand - operated butterfly valve. This valve is to be kept in the closed position at all times, (unless a storm water draining operation is in progress)..

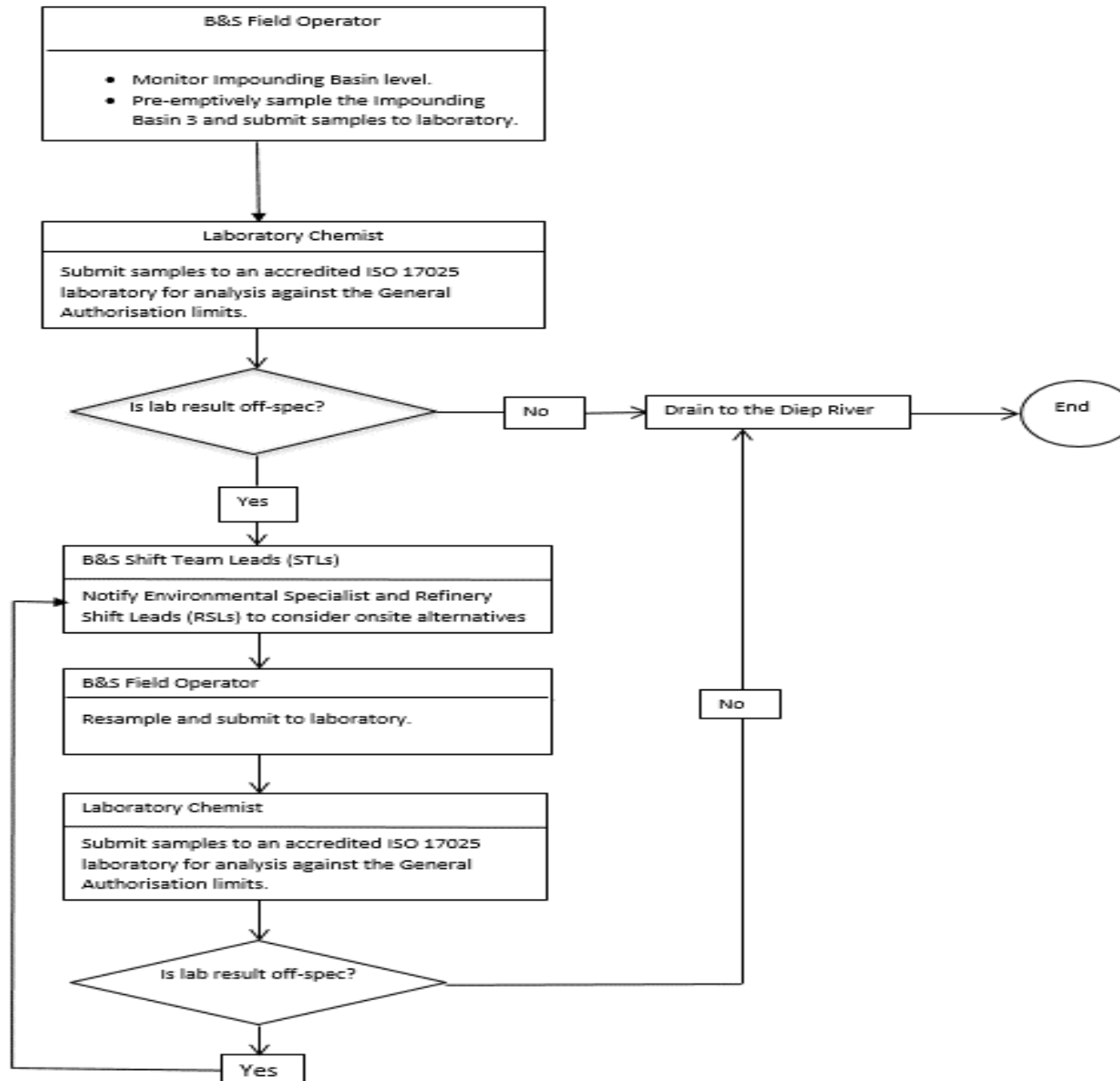


General operating philosophy

- ❑ The stormwater overflow valve to the Diep River will be kept in a closed position. At no time, must the level be allowed to approach the top of the inlet weirs.
- ❑ The manual valve on the discharge pipeline to the Diep River controls the levels in the impounding basin to a minimum level of 6.25m. The underflow weirs between the basins will be kept open under normal conditions, allowing the levels in the 3 ponds to equalize.
- ❑ Discharge to the Diep River should only be done once the water quality has been tested by an accredited ISO 17025 laboratory and meets the quality requirements as outlined in the General Authorisation for stormwater discharge, issued by DWS. A slow release of on spec excess stormwater must be ensured. The release time must be known to the DWS when submitting quarterly reports.
- ❑ During low rainfall months when discharge of excess stormwater is not required, the stormwater quality must be tested at month end to verify quality. During high rainfall months, more frequent sampling and testing would be required prior to the discharge of excess stormwater. Increased Impounding Basin level monitoring and vigilance would be required during rainfall conditions to ensure that excess stormwater quality and quantity criteria is maintained, as outlined in the General Authorisation.
- ❑ If the stormwater quality criteria are not met, it will not be discharged until on-spec results are obtained.
- ❑ Alternatively, there are onsite alternatives available to reprocess the water through the refining process

Management of a Rapid drainage event

- ☐ In the event of a tank failure or rapid drainage event, the tank contents will be routed to Impounding basin 1, displacing the water to the 2nd & 3rd ponds.
- ☐ or in the event of hydrocarbon being detected on the surface of/ in the impounding basin 3, immediate action should be taken to confirm that the discharge valve is shut.
- ☐ Depending on the volumes and product involved, the underflow weirs between the ponds can be closed to isolate the product in the 1st and/or 2nd basin.
- ☐ The Diep River valve can then be opened to allow on-spec stormwater in impounding basin 3 to drain away.
- ☐ If the water quality criteria are not met, the water will not be discharged until on-spec results are obtained. The off-spec water can be reprocessed through the refinery processes.



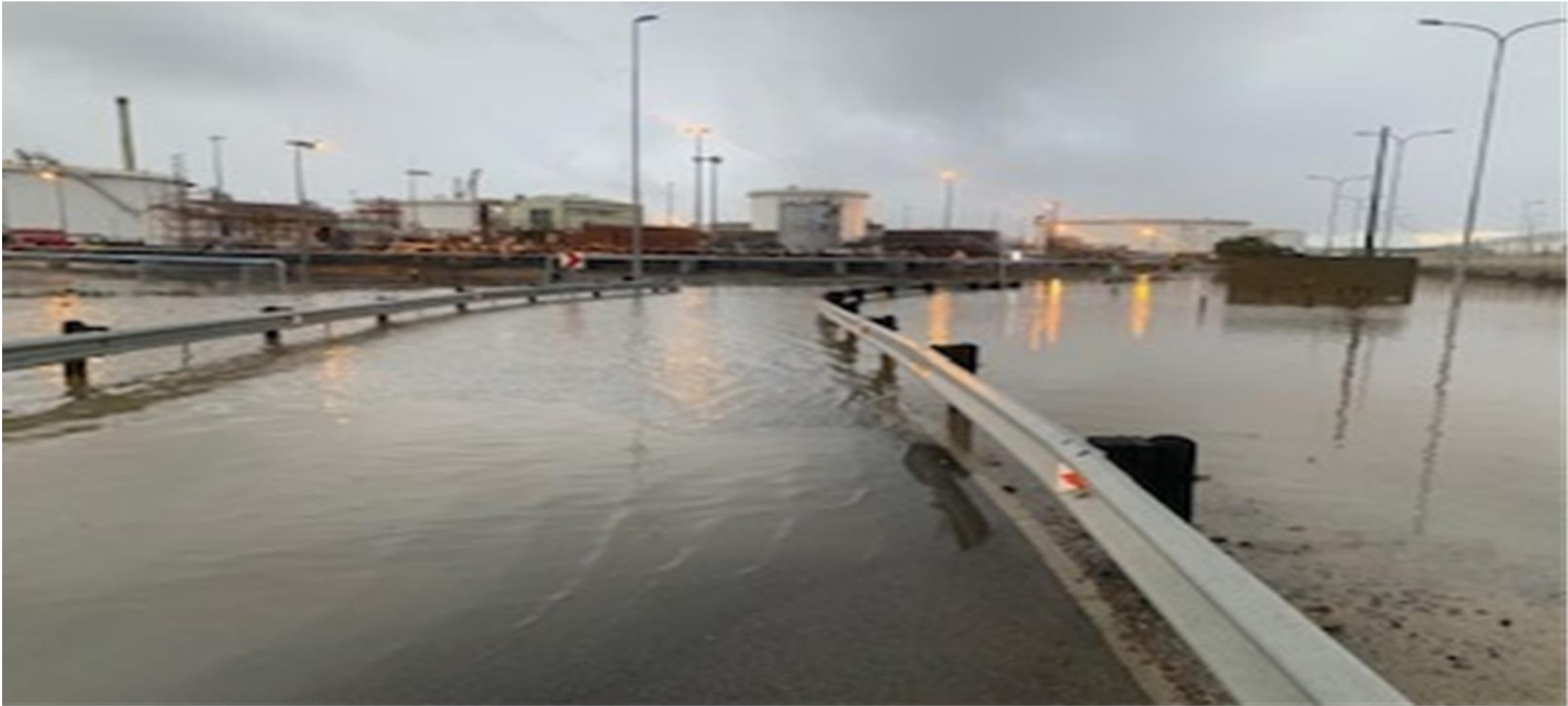
Plot Plan – Flooded area 14 June 2022



West Fence line Parameter Rd. IMB 1/2/3 flooded



West Fence line Parameter Rd near White House (left) towards TTLR



IMB 1 – Booms containing oil south-eastern corner



Effluent Treatment Plant Retention Basin South of White House



Road C East of Effluent Treatment Plant



West Fence line Parameter Rd opposite Tank 102 (right)



West Fence line Parameter Rd opposite Tank 102 (right) – product visible



Koeberg Rd opposite Effluent Treatment Plant



Lowlights

- ☐ Proactive monitoring by the operator –
 - IMB levels not monitored
 - No level indicators or instruments for IMB
 - weather forecast

- ☐ Aging/ compromised infrastructure
 - Collapsed sewers

- ☐ No/ lack of Preventative Maintenance for oily water sewers and storm water channels
 - Blocked sewers

- ☐ Loss of experience/ transfer of knowledge

Questions?

Thank you.