

# Management of SWQTS Assets at MW

16 April 2024

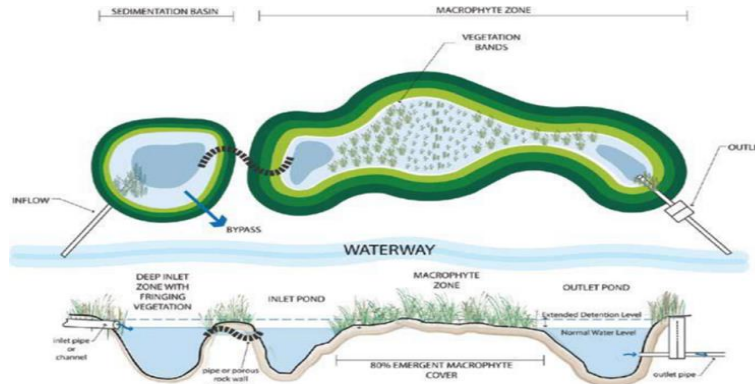
# Stormwater Quality Treatment System function

## Treatment of stormwater delivered via 3 mechanisms:

- Physical (sedimentation and filtration)
- Biological uptake
- Chemical (adsorption and reaction)

## Removal of pollutants to BPEM standard:

- Nitrogen (45%)\*
- Phosphorus (45%)
- Sediment (80%)
- Gross pollutants (litter) (70%)



**Asset base:**

**Number of Constructed Wetland systems:** ~215

**Wetland cells:** 459 (approx. area 400-500 ha)

**Sediment ponds:** 542 INSERVICE (approx. 64 ha)

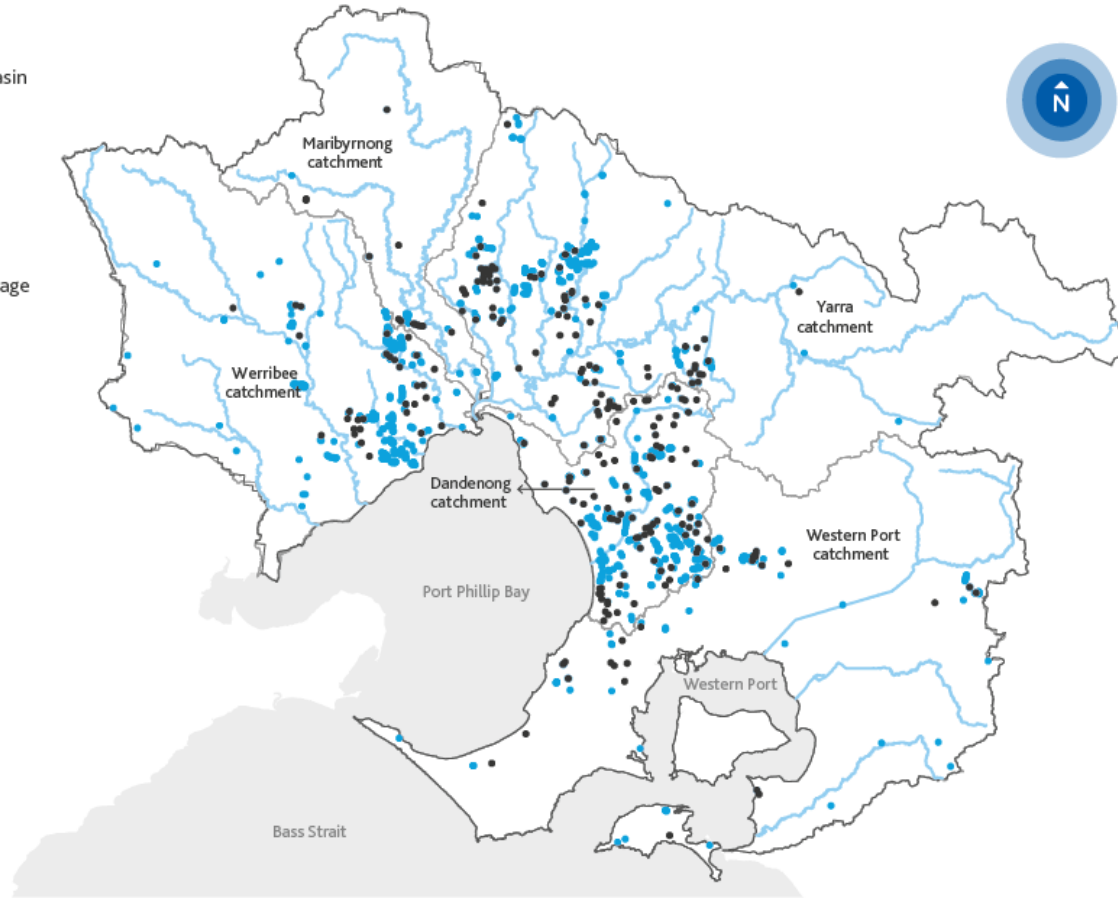
**Bio-retention systems:** 30

**Urban Lakes:** 171

\*Nitrogen is the currency of the Stormwater Offset Program, as it is typically the limiting pollutant e.g., if nitrogen targets are achieved, then phosphorus and suspended solids targets are also achieved.

# Melbourne Water's waterways and drainage system

- Drainage retarding basin
- Wetland
- Natural waterway
- Primary river basin catchment boundary
- Waterways and drainage boundary



# Melbourne Water's asset base

## Assets

Number of SWQTS: >400

Number of Constructed Wetland systems: ~215

Wetland cells: 459 (approx. area 400-500 ha)

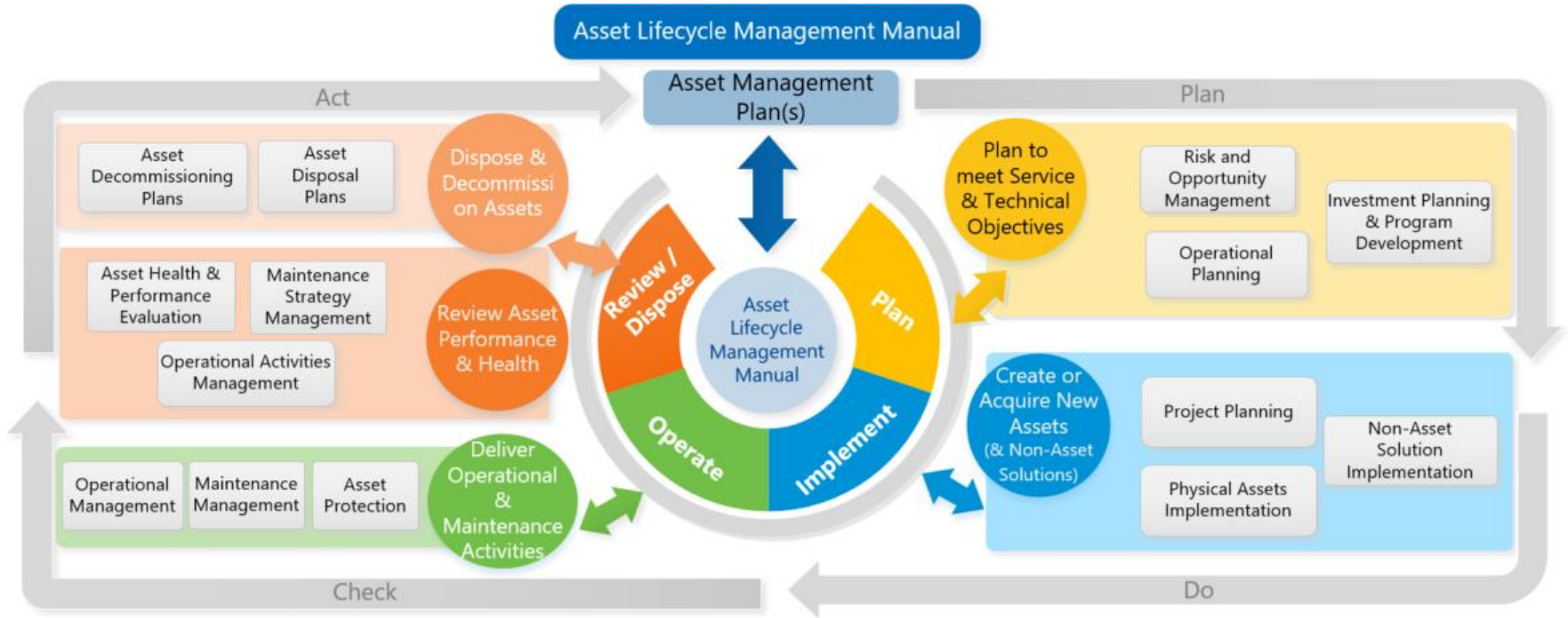
Sediment ponds: 525 (approx. 64 ha)

Bio-retention systems: 30

Urban Lakes: 171

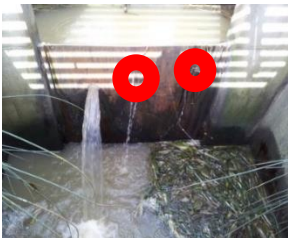



# Asset Lifecycle Management Framework



# Whole of lifecycle asset management

## Pricing Determination/WDIP

Monitoring	SWQTS Maintenance	Sediment management program	Wetland renewal or rectification										
<p><b>Asset Condition and assessment</b></p> <ol style="list-style-type: none"> <li>1) Initial risk assessment</li> <li>2) Annual condition assessment</li> <li>3) Veg assessment - Triennial assessment of vegetation extent and density of all waterbodies using IR satellite imagery.</li> <li>4) Data captured during regular maintenance (meters)</li> <li>5) Pre/Post rectification hydrologic monitoring</li> </ol>	<p><b>Asset Maintenance</b></p> <ul style="list-style-type: none"> <li>• Maintain hydrology                             <ul style="list-style-type: none"> <li>• Inlet/outlet inspect and clean</li> <li>• Maintain civil structures</li> </ul> </li> <li>• Maintain aquatic and riparian vegetation</li> <li>• Maintain litter traps, grilles and grates</li> <li>• Maintain amenity</li> </ul>	<p><b>Sediment management program</b> Corrective Maintenance Program</p> 	<ul style="list-style-type: none"> <li>• Re-set at end of life</li> <li>• Rectify failed assets</li> </ul>										
		<table border="1" style="width: 100%; border-collapse: collapse; background-color: #D9E1F2;"> <thead> <tr> <th style="padding: 5px;">Minor capital</th> <th style="padding: 5px;">Major capital</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Low Risk</td> <td style="padding: 5px;">High Risk</td> </tr> <tr> <td style="padding: 5px;">Minimal design</td> <td style="padding: 5px;">Complex design</td> </tr> <tr> <td style="padding: 5px;">Low cost</td> <td style="padding: 5px;">High cost</td> </tr> <tr> <td style="padding: 5px;">Low complexity</td> <td style="padding: 5px;">High complexity</td> </tr> </tbody> </table>		Minor capital	Major capital	Low Risk	High Risk	Minimal design	Complex design	Low cost	High cost	Low complexity	High complexity
Minor capital	Major capital												
Low Risk	High Risk												
Minimal design	Complex design												
Low cost	High cost												
Low complexity	High complexity												
													

# Initial assessment & maintenance strategy determination

Consequence of failure				
Water Quality	Level of Service Nitrogen Reduction	< 0.3 Tonne Nitrogen Reduction	0	0
	Cost to Replace Vegetation	Cost \$ < 100 K	0	
			Tot Consequence of Failure WQ:	0
Community	Safety	Paths or Boardwalks <20m from Waterbody	2	2
	Community amenity	Residential and Interactive	2	
Consequence Overall	0.324		Tot Consequence of Failure Community	0.324
Probability of failure				
Water Quality	Online/offline	Online	2	2
	Design - inlet	No Bypass	2	
	Design - outlet	Pit with Orifice	2	
			Tot Probability of Failure WQ	1.666
Community	Community safety	Paths or Boardwalks <20m from Waterbody	2	2
	Level of Community access	High	2	
Probability Overall	2		Tot Probability of Failure Community	0.334
Risk = Consequence of failure X Probability of failure				
	Risk	Score	Level of Risk	
WQ Risk - WQ Consequence X WQ Prob of Failure	Water Quality Risk Combined	0.0000	Low Risk	
Com Risk - Com Consequence X Com Prob of Failure	Community Risk Combined	4.0000	High Risk	
Tot Risk - Tot Consequence X Tot Prob of Failure	Overall Risk Combined	0.6480	Medium Risk	

# Maintenance: What, where, when

Location ID	DWQS636	Location Description	SOMERFIELD ESTATE RB WETLAND WQS	Assessed Level of Risk	Medium Risk	Region	North West	GL Account: Service Contact:	539 WLID-WC01
Assets with in DWQS	Asset ID (GIS Files)	Council Identification for Amenity/CM	Number of Structures						
Wetland Cells	6	Council Maintenance Agreement Veg Management frequency (include per annum)	5	Number of Inlet Controls	2	Inlet Location ID	0	Outlet Location ID	1106/out001
Litter Traps	1	Litter and Debris Removal for amenity as specified by Council	2	Number of Outlet Structure	8	If no structural inlet to link the PM to, please put the waterbody Location ID e.g. DWL234			
Number of Grilles And Grates (does not include Inlet & outlet structures)	1	Litter Trap Frequency Defined by CM	1	Litter Trap use DwQS Location ID	DLT100				

Location type that PM will be created on	Location ID	PM Activity	Maximo Activity	Frequency/An num	Monthly Frequency	Crew NRM/Civil	Budget Number	Template Job Plan (listed as INACTIVE)	PM Description
DWQS System	DWQS636	Condition Inspection	INSPECT	1	12 Months	NRM	100519	JP101579	DWQS636 - Condition Inspection - SOMERFIELD ESTATE RB WETLAND WQS - Every 12 Months
Inlet	0	Inlet Inspect and Clean	DEBRIS/LIT	2	6 Months	CIV	100519	JP101582	PM Not Required CM as Needed
Outlet	1106/out001	Outlet Inspect and Clean	DEBRIS/LIT	12	1 Months	CIV	100519	JP101582	DWQS636 - Outlet Inspect and Clean - SOMERFIELD ESTATE RB WETLAND WQS (1106/out001) - Every 1 Months
DWQS	DWQS636	Vegetation Management - Civil Structure	WEEDCONTROL	0	0 Months	NRM	100519	JP101584	PM Not Required CM as needed
DWQS	DWQS636	Vegetation Management - (inc CALP weeds)- Safety	WEEDCONTROL	4	3 Months	NRM	100519	JP101585	DWQS636 - Vegetation Management - (inc CALP weeds)- Safety - SOMERFIELD ESTATE RB WETLAND WQS - Every 3 Months
DWQS	DWQS636	Veg Management - (Inc CALP weeds)- Amenity	WEEDCONTROL	1	12 Months	NRM	100520	JP101585	DWQS636 - Veg Management - (Inc CALP weeds)- Amenity - SOMERFIELD ESTATE RB WETLAND WQS - Every 12 Months
DWQS	DWQS636	Grilles and Grates - Debris/Litter Collection	DEBRIS/LIT	4	3 Months	CIV	100519	JP101583	DWQS636 - Grilles and Grates - Debris/Litter Collection - SOMERFIELD ESTATE RB WETLAND WQS - Every 3 Months
DLT	DLT100	Litter Trap - Litter and Debris Removal	DEBRIS/LIT	1	12 Months	NRM	100519	JP101580	DWQS636 - Litter Trap - Litter and Debris Removal - SOMERFIELD ESTATE RB WETLAND WQS (DLT100) - Every 12 Months
DWQS	DWQS636	Litter and Debris Removal - Amenity	DEBRIS/LIT	2	6 Months	CIV	100520	JP101581	DWQS636 - Litter and Debris Removal - Amenity - SOMERFIELD ESTATE RB WETLAND WQS - Every 6 Months



# Wetland condition assessment

## Sediment pond audit checklist

v1.3

Inspection Date

Total rainfall for last 21 days (mm)

Date of last rainfall

WSUD Type

Inspected By

Site address

Asset ID

Form adapted from Stormwater Victoria's WSUD Audit Guidelines.

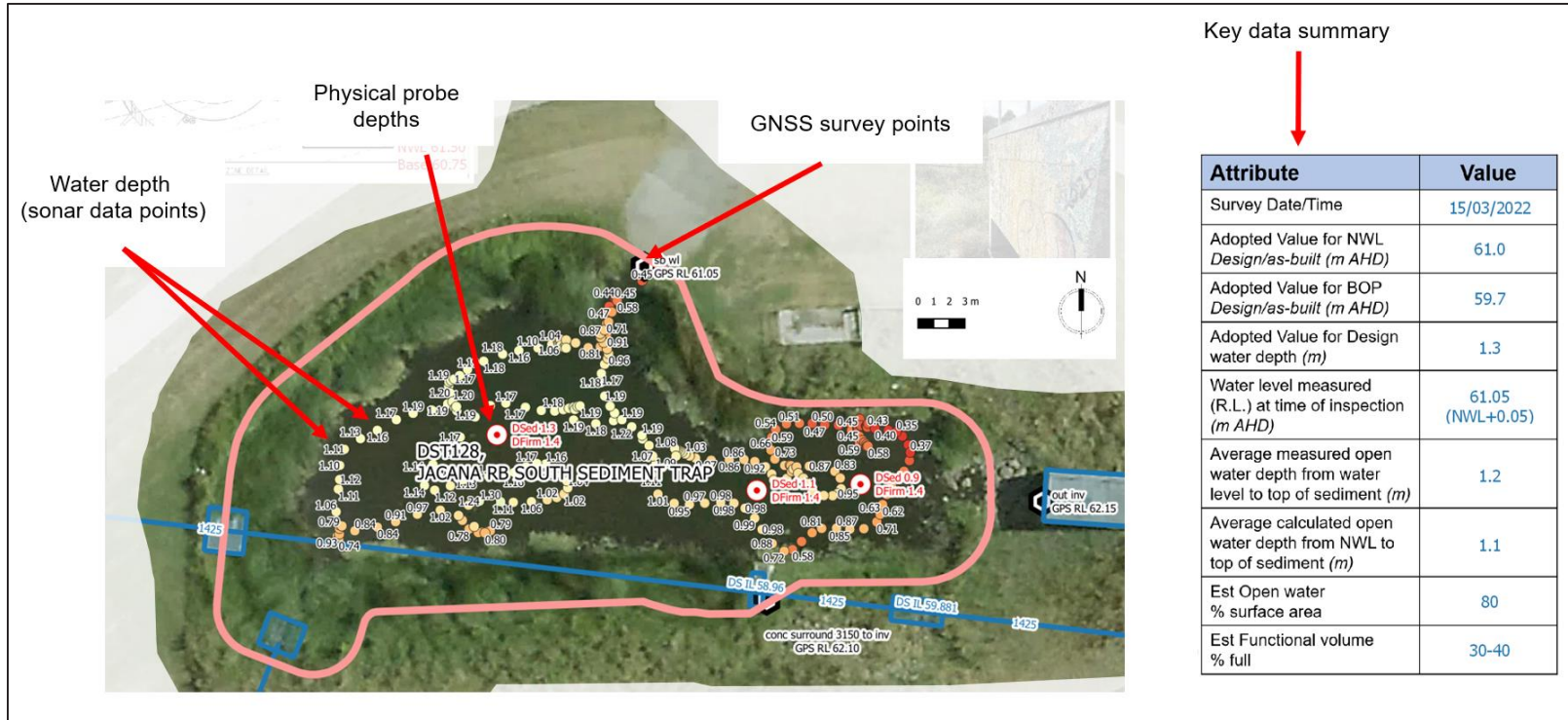
Browne, D., Godfrey, M., Markwell, K., Boer, S., 2017.

note 1: Date is based on the preceding 24hrs to 9am on that day

Task Item					Notes	
	SVWAG	(1 point)	(2 points)	(3 points)	SCORE	
<b>Surrounds and other infrastructure</b>						
Civil	Damage or removal of structures	No damage, erosion or issues / removal of structures	Stable structures No vandalism impacting amenity No safety risks	Minor damage Does not pose risk to structural integrity or asset function	Major damage Poses risk to structural integrity, public safety or asset function	1
Landscape	Rubbish	No litter present	No litter present	Some litter present <del>Diminished aesthetics and/or causing some visible blockage</del>	Large amount of litter present <b>Yellow if needs urgent attention (needles, large objects etc.)</b>	
<b>Inlet</b>						
Civil	Erosion	Minor erosion that doesn't pose public safety risk and would not worsen if left unattended	No erosion	Minor erosion Does not pose risk to structural integrity, public safety or asset function (e.g. limited short circuiting of flows)	Major erosion Posing risk to structural integrity, public safety or asset function (e.g. short circuiting of the majority of flows)	
Civil	Blockage	No blockage	No blockage	Partial blockage of inlet causing some bypass of flows or restricted inflows	Blockage of inlet causing significant bypass or restriction of inflows	
Civil	Damage or removal of structures	No damage, erosion or issues / removal of structures	Stable structures No vandalism impacting amenity No safety risks	Minor damage Does not pose risk to structural integrity or asset function No safety risks	Major damage, poses risk to structural integrity, public safety or asset function	
<b>Batters</b>						
Civil	Erosion	Minor erosion that doesn't pose public safety risk and would not worsen if left unattended	No erosion	Minor erosion Does not pose risk to structural integrity, public safety or asset function (limited short circuiting of flows)	Major erosion Posing risk to structural integrity, public safety or asset function (e.g. short circuiting of the majority of flows)	
Civil	Vehicle or pedestrian damage	No compaction, plant loss, vandalism impacting system function	No compaction, plant loss, vandalism impacting system function	Minor compaction, plant loss Does not pose risk to structural integrity or asset function	Significant compaction, plant loss Poses risk to structural integrity, public safety or asset function	
Landscape	Rubbish	No litter present	No litter present	Some litter present <del>Diminished aesthetics and/or causing some visible blockage</del>	Large amount of litter present <b>Yellow if needs urgent attention (needles, large objects etc.)</b>	



# Sediment pond assessment



## Key data summary

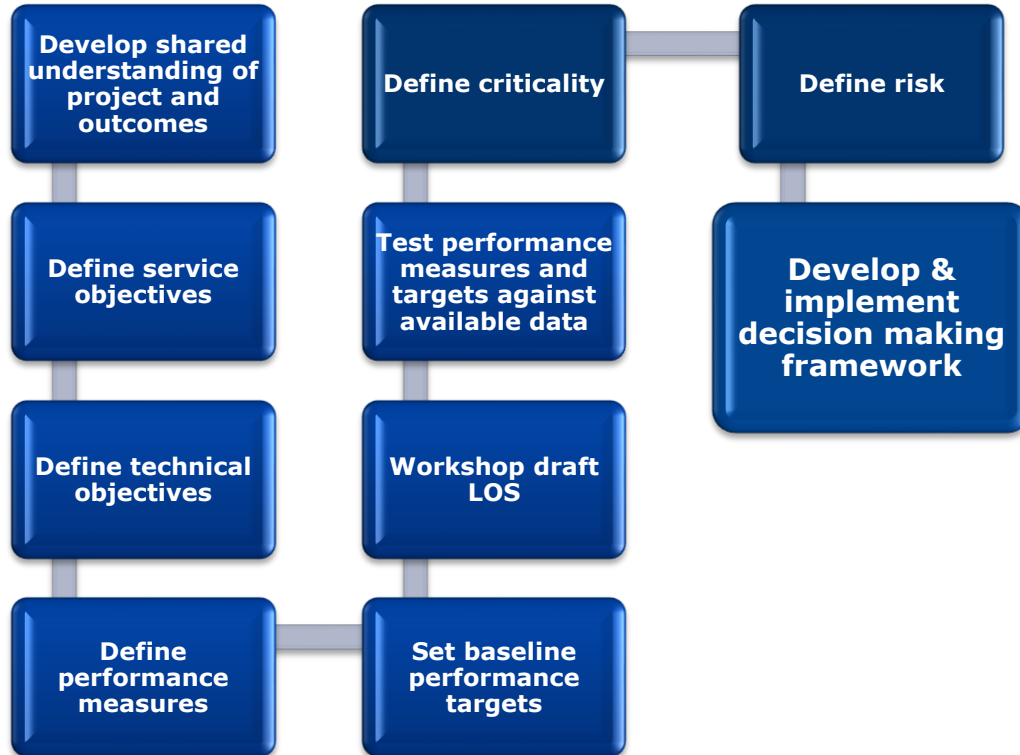
Attribute	Value
Survey Date/Time	15/03/2022
Adopted Value for NWL Design/as-built (m AHD)	61.0
Adopted Value for BOP Design/as-built (m AHD)	59.7
Adopted Value for Design water depth (m)	1.3
Water level measured (R.L.) at time of inspection (m AHD)	61.05 (NWL+0.05)
Average measured open water depth from water level to top of sediment (m)	1.2
Average calculated open water depth from NWL to top of sediment (m)	1.1
Est Open water % surface area	80
Est Functional volume % full	30-40

# Sediment pond network capacity - percentage full vs asset size

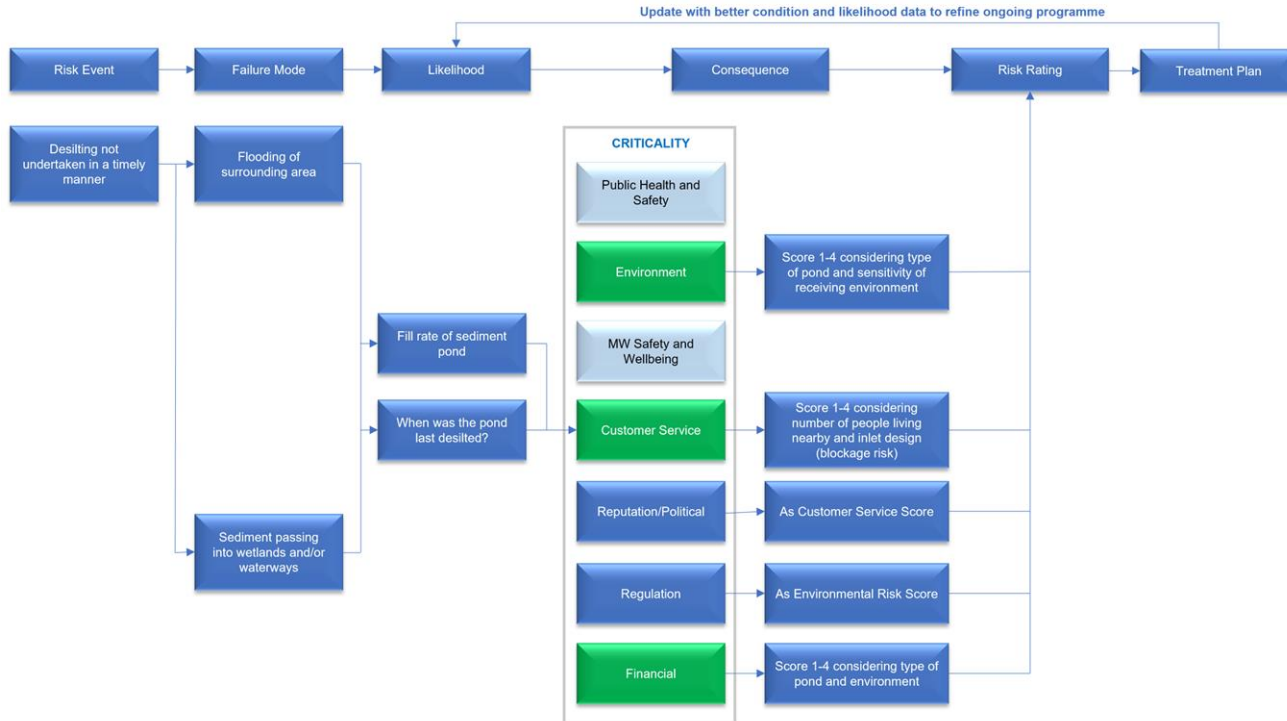
OFFICIAL

DST Area (m <sup>2</sup> )	Percent Full						Total
	NA	<5%	5 to 25%	26 to 50%	51 to 80%	>80%	
0-1,000	5	32	59	64	83	162	405
1,001-2,500		11	38	23	37	17	126
2,501-5,000		1	14	15	7	4	41
5,001-12,000			3	1		2	6
12,001-35,000			1	1			2
<b>Total</b>	5	44	115	104	127	185	580

# Applying the MW Asset Management Framework



# Criticality and Risk Driving Maintenance Decision-making







# Outputs

**SUMMARY**

**Overall Functional Score**

hover for MAXIMO scoring guide on overall functional score

820

**Asset Type**

- DST
- DwL

**Catchment**

- Dandenong
- Maribymong
- Wentbee
- Westernport
- Yarra

**CLS6 or MWC**

- CLS6
- MwC

**Sub-Catchment**

- Cardinia
- Cherry, Kororoit, Lavert...
- Dandenong
- French and Phillip Islan...
- Lower Bunyip, Lang La...
- Lower Maribymong
- Lower Yarra
- Middle Yarra
- Mornington Peninsula

**Functional Score**

- 0 - No Data
- 00 - N/A
- 1 - Very Good
- 2 - Good
- 3 - Fair
- 4 - Poor
- 5 - Very Poor

**FOCUS AREA**

820 Breakdown of Key Functional Criteria

hover for notes on individual functional criteria

**Inlet Blocked**

10	141	433
67	169	101

**Outlet Blocked**

11	133	436
68	159	102

**Weed Coverage (Aquatic Zones)**

3	204	441
1	171	101

**Sediment Accumulation**

19	76	182
1	65	102

**Water Level Function**

7	26	343
101	101	101

**Macrophyte Cover**

155	104	112
4	102	102

Other tabs

- OPEN DATA TABLE
- OPEN DST INSPECTION FORM
- OPEN DWL INSPECTION FORM

LEGEND

- Unable to assess, NA or no condition data
- Very Good
- Good
- Fair
- Poor
- Very Poor

Asset Count X

**CATCHMENT VIEW**

temp filter

**DATA BATCH**

- 001\_JUL
- 002\_AUG1
- 003\_AUG2
- 004\_SEP
- NDFORM

# Maintenance program considerations

## Seek to understand

- Site and asset condition

## What are you trying to protect?

- Water quality
- Habitat
- Cultural values
- Amenity
- Flooding

# Maintenance program considerations

## Constraints

- Budget
- Disposal cost - industrial waste priority waste (Category A, B, C, D or Cleanfill, +/- asbestos)
- Network capacity e.g. sediment pond fill frequency – design vs reality
- Works delivery – online/offline
- Available space, and space constraints (slope, public accessibility)
- Seasonality of maintenance works – asset dependent
- Prioritisation process - what are you trying to protect?

**Thank you**

Insert contact details here if required