Stormwater Harvesting,

You Can’t Set and Forget!

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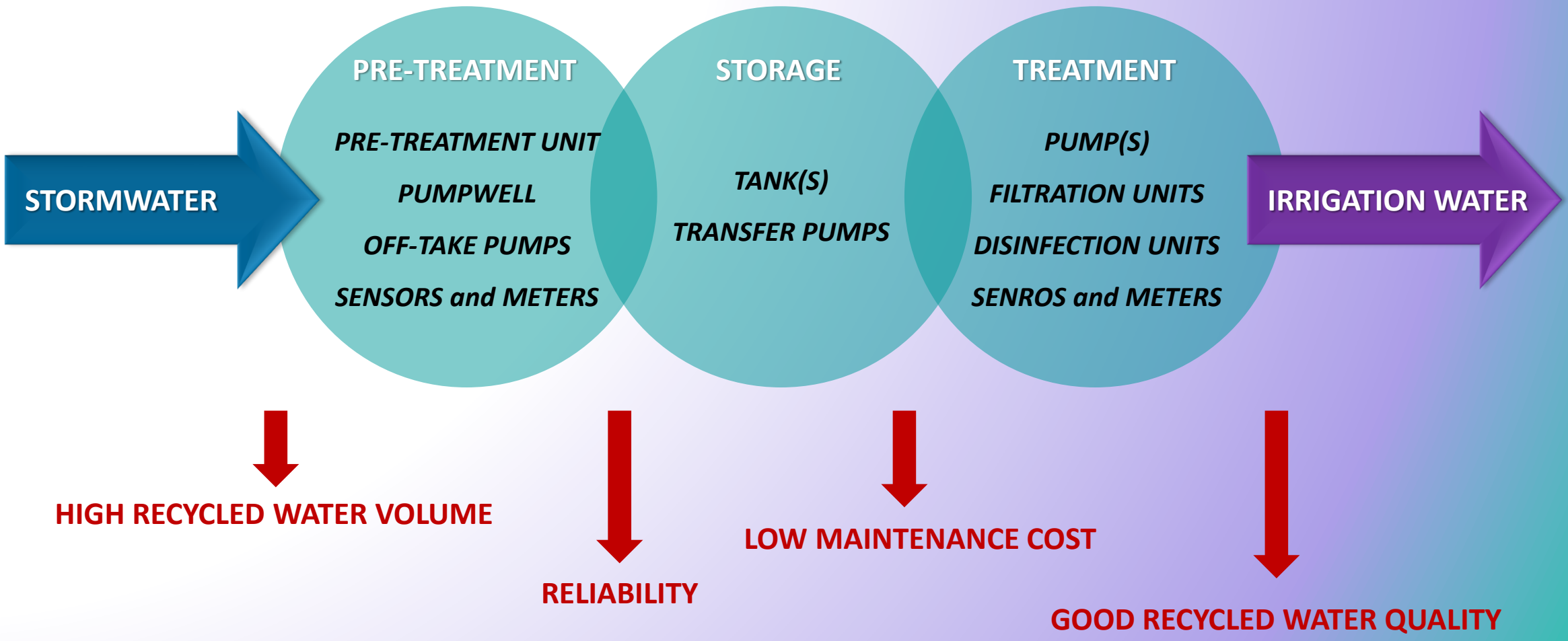
Process & Operations Engineer
Optimal Stormwater

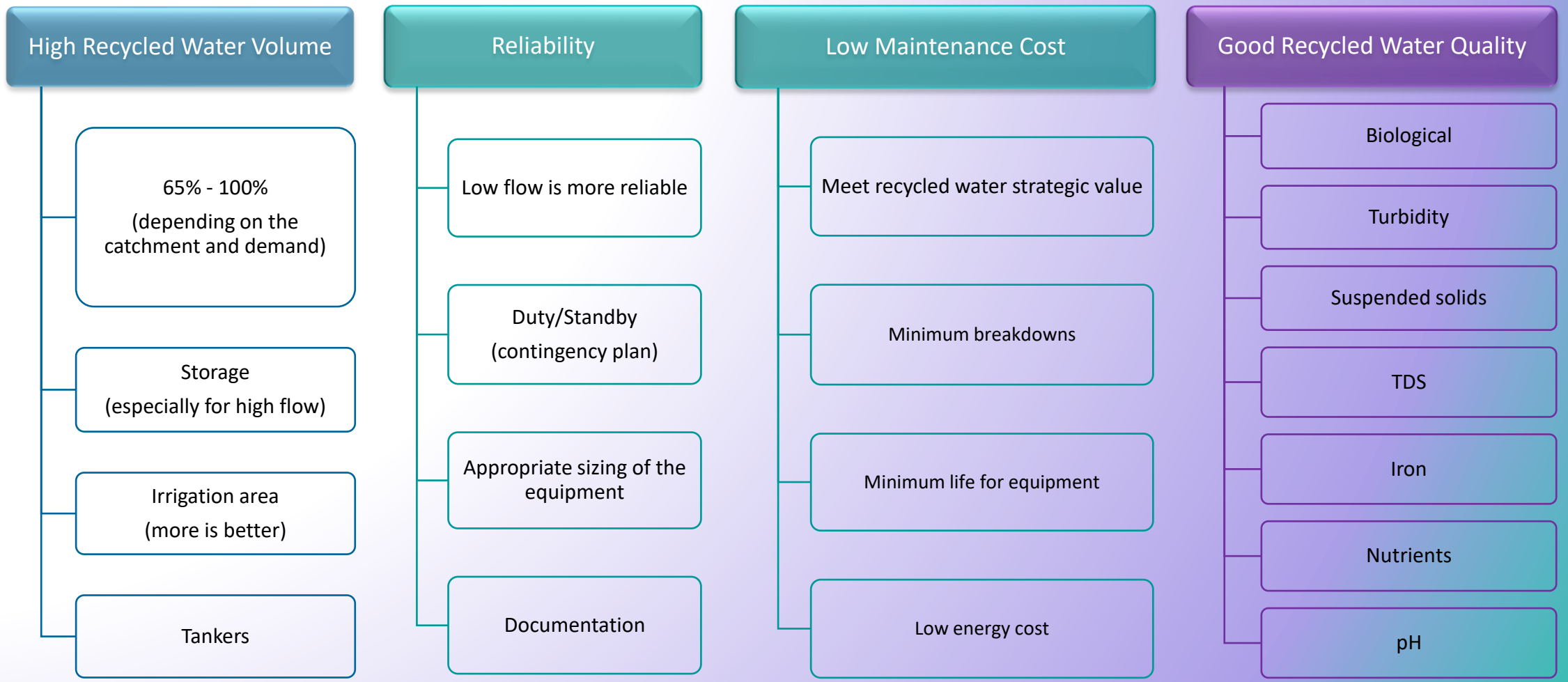
Omid Sayar
Process & Operations Engineering Manager
Optimal Stormwater

June 2023

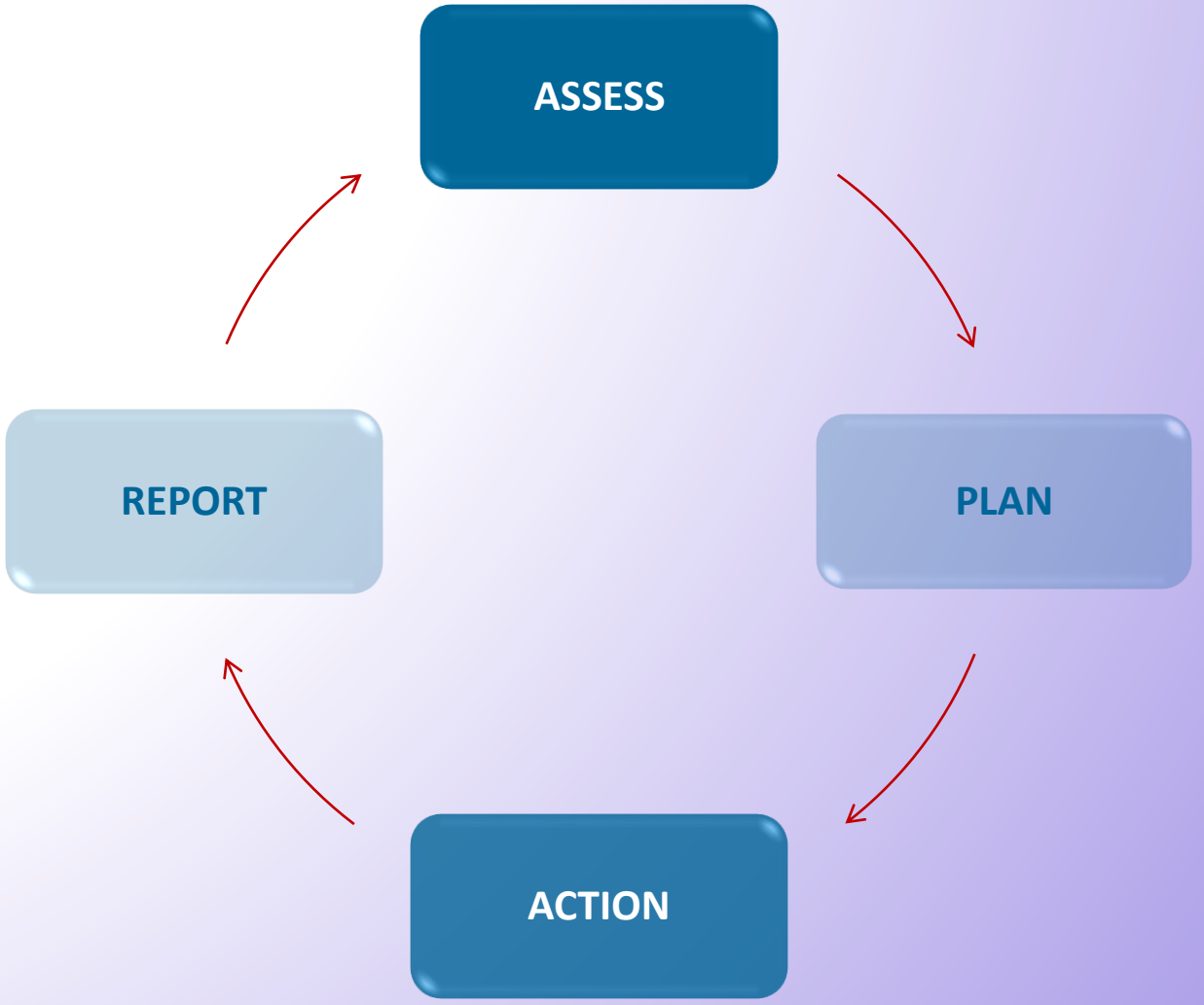
Stormwater Harvesting Scheme Overview



Stormwater Harvesting Scheme – Objectives



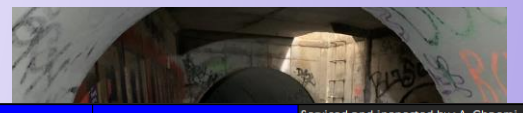
Stormwater Harvesting Scheme – Proactive Approach

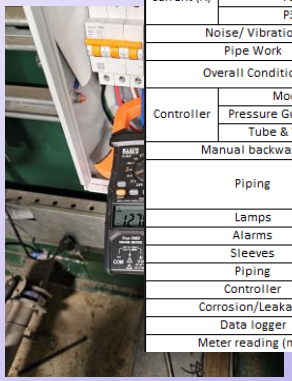


Optimal Proactive Approach

- Existing Document Review
- Pre-treatment and Storage Condition Assessment
- Equipment and Control Condition Assessment
- Water Balance Modelling
- Water Quality Analysis

ASSESS



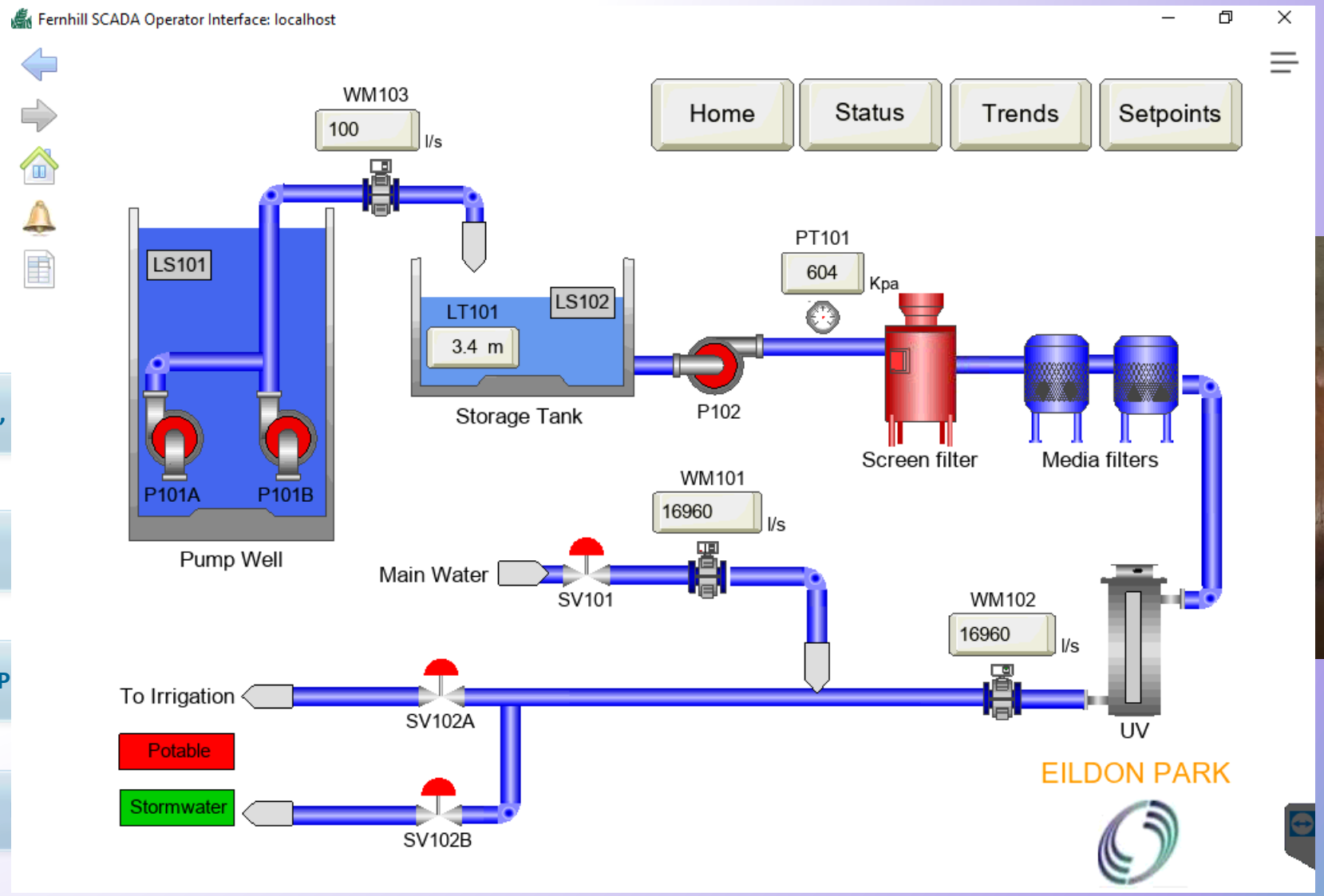


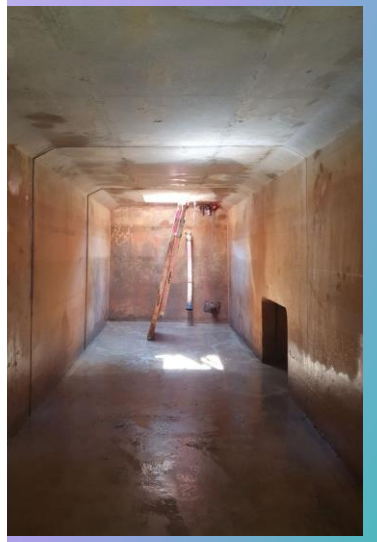
Service Checklist			Service Report	Serviced and inspected by : A. Ghaemi, M. Najmi Date: September 2022	Reviewed by : O. Sayar
Checked Item		Status		Comments	General Status
Lid & Key Hole					TBC
Permeable Filter					
Overall Condition					
Lid Condition		In good condition	Pump Well was inspected.		No action required
Pipe Work		No damage or leakage			
Sedimentation Level		No data sheet			
Level Sensor/Transmitter		Operational			
Isolation Valve		Not found			
Controller	Mode	Off	General check has been done.		No action required
	Alarms	No alarm			
Pressure (kPa)		No pressure sensor			
Flow		5m3/hr			
Current (A)	P1	-			
	P2	-			
	P3	-			
Noise/ Vibration		Ok			
Level Switche		Not checked			
Pipe Work		No damage or leakage			
Sensor Condition		Operational	General check has been done.		No action required
Tubes and Wiring		No damage			
Overall Condition		Acceptable			
Corrosion/Leakage		No damage or leakage	General check has been done.	1- The data is not recorded within the SCADA.	Action Required
Data Logger		**Non-operational**			
Meter Reading (m3)		-			
Access/Ladder		**Heavy Ilids**	General check has been done.	1- Tank has leakage and should be darined to be checked through confined space entry. 2- The outlet pipe of the tank should be thoroughly examined once the tank is emptied.	Action Required
Pipe Work		**Maintenance Required**			
Level Sensor/Transmitter		Operational			
Sedimentation Level		No data sheet			
Overall Condition		**Unacceptable**			
Controller	Mode	Off	General check has been done.	1- The upstream of the suction coming from the storage tank should be checked as the pumps currently cannot be primed.	Action Required
	Alarms	No alarm			
Pressure (kPa)		0.3kpa			
Flow		-			
Current (A)	P1	-			
	P2	-			
	P3	-			
Noise/ Vibration		Ok			
Pipe Work		**Maintenance Required**			
Overall Condition		Acceptable	General check has been done.		No action required
Controller	Mode	Auto	General check has been done.	1- Throughout the audit process, the screen was found to be constantly in backwash. Consequently, the filter was diassembles, cleaned and reassembled. Afterwards, while testing the system and with the screen being in filter mode, it was noticed that leakage is happening in the bottom half of the screen.	Action Required
	Pressure Guage (kPa)	Not found			
	Tube & Wiring	No damage			
Manual backwash		**Non-operational**			
Piping		**Maintenance Required**			
Lamps		**Maintenance Required**	General check has been done.	1- through the sudit process it was indicated that one of the lamps had been burnt out and should be replaced.	Action Required
Alarms		Lamp alarm			
Sleeves		Not checked			
Piping		No damage or leakage			
Controller		Operational			
Corrosion/Leakage		No damage or leakage	General check has been done.	1- The data is not recorded within the SCADA.	Action Required
Data logger		-			
Meter reading (m3)		9812m3			

Optimal Proactive Approach

Asset List												
No.	Assets Details											
	Description	Asset ID	Location	Manufacturer	Type	Model	Capacity/Size	Control	Installation Date	Overall Condition	Criticality	Approximate Value	Expected Life Span
1	**Hydrofilter**	HF-101	Pre-Treatment	Humes	Hydrofilter	HF1000	TBC	TBC	2012	TBC	Very Important	$ 100,000.00	30 yrs
2	**Pump Well**	PW-101	Pre-Treatment	TBC	Concrete	N/A	4m3	Control Panel	2012	Acceptable	Very Important	$ 40,000.00	30 yrs
3	**Transfer Pump**	P-101	Pre-Treatment	Grundfos	Submersible Pump	Unilift-KP-250-A-1	Unknown	Control Panel	2012	Acceptable	Important	$ 1,000.00	5-7 yrs
4	**Turbidity Meter**	AT-101	Pre-Treatment	Observator Instruments	Turbidity Probe	ANALITE NEP9000 Series	400NTU	Control Panel	2012	Acceptable	Important	$ 1,000.00	10 yrs
5	**Water Meter**	FE-101	Treatment Room	AVFI	Electromagnetic Water Meter	EvoQ4	TBC	Control Panel	2012	Minor Defects	Important	$ 2,000.00	10 yrs
6	**Raw Water Storage Tank**	T-101	Storage Tank	TBC	Underground Tank	TBC	300kL	Control Panel	2012	Major Defects	Very Important	$ 100,000.00	25 yrs
7	**Irrigation Pumps**	P-1012 A,B	Treatment Room	Grundfos	Vertical Multistage Pump	CRE15-07 A-F-A-E-HQQE	17m3/h 5.50kW	Grundfos Control Panel	2012/2022	Minor Defects	Important	$ 3,000.00	5 -7 yrs
8	**Pressure Tank**	PV-101	Treatment Room	Grundfos	Cylindrical	GT-D-80V	80L/ 10bar/ 90°C	TBC	2012	Acceptable	Important	$ 500.00	10 yrs
9	**Self-Cleaning Filter**	F-101	Treatment Room	Triangle Filters	Screen Filter	M100-1500	200 microns	Switch Box	2012	Minor Defects	Very Important	$ 10,000.00	5 yrs
10	**UV Disinfection**	UV-101	Treatment Room	ProMinent Systems	Dulcodes	TBC	TBC	Dulcometer	2012	Minor Defects	Very Important	$ 5,000.00	15 yrs
11	**Water Meter**	FE-102	Treatment Room	Triangle Filteration & Irrigation	Flanged Water Meter	TBC	TBC	N/A	2012	Minor Defects	Important	$ 1,000.00	10 yrs

Optimal Proactive Approach





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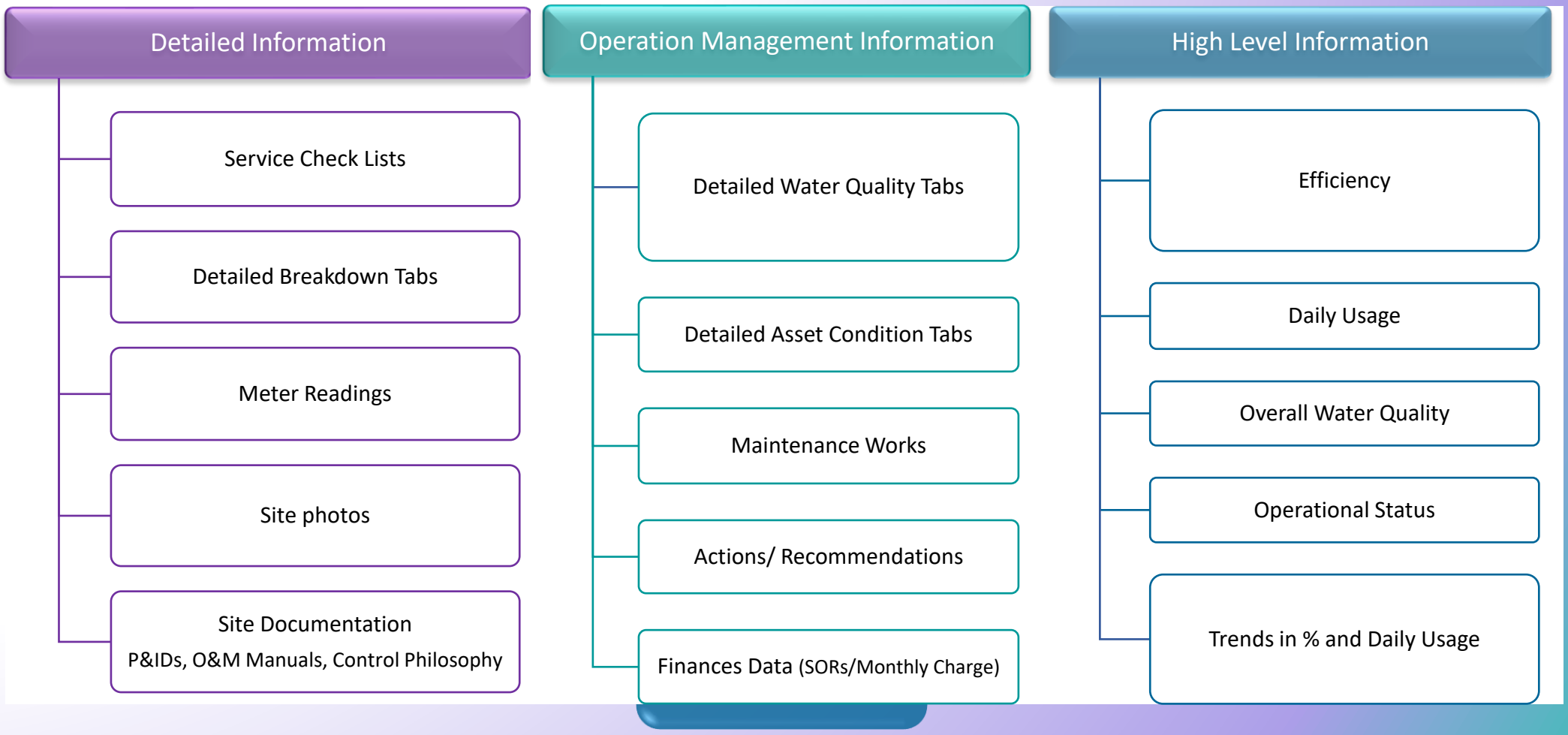
Optimal Proactive Approach

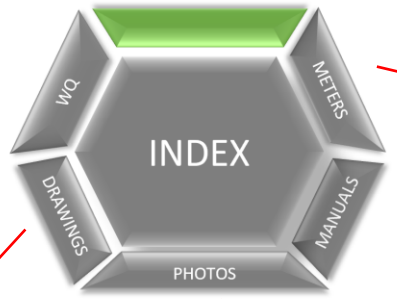


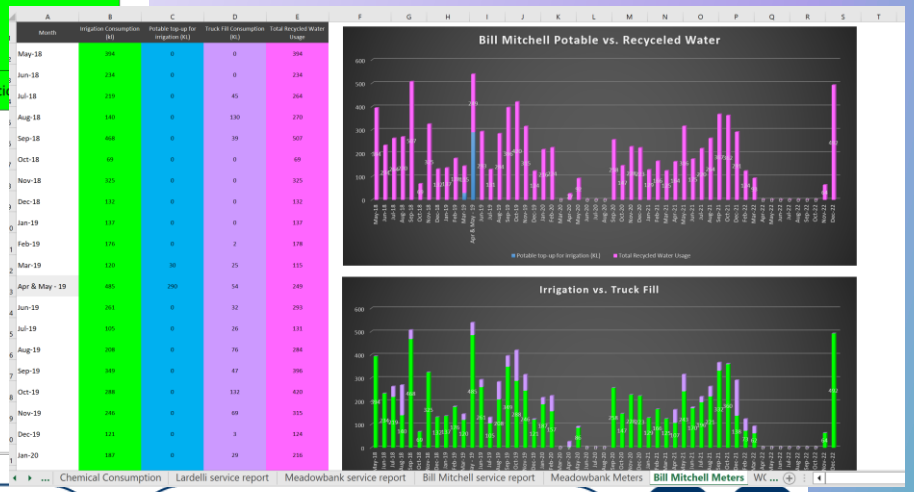
Detailed Information – Site Documentation

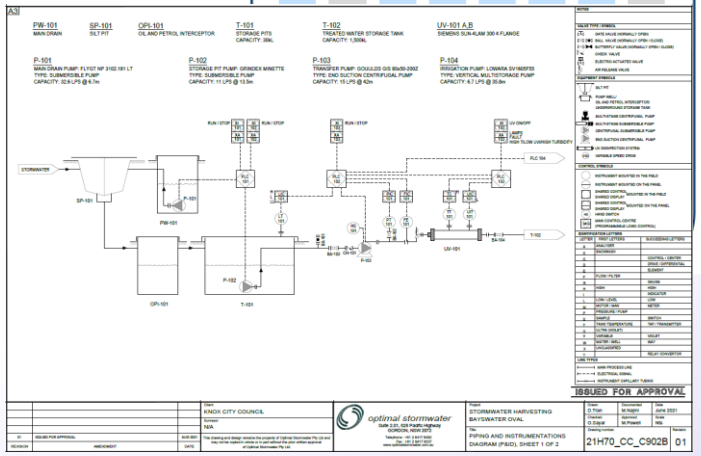
4	Irrigation meter	Meter reading (kl)	5799	1-Meter reading has been done 2-General check has been done		No action required
5	Irrigation control system	Overall condition	ok	1-The irrigation control system has been checked		No acti

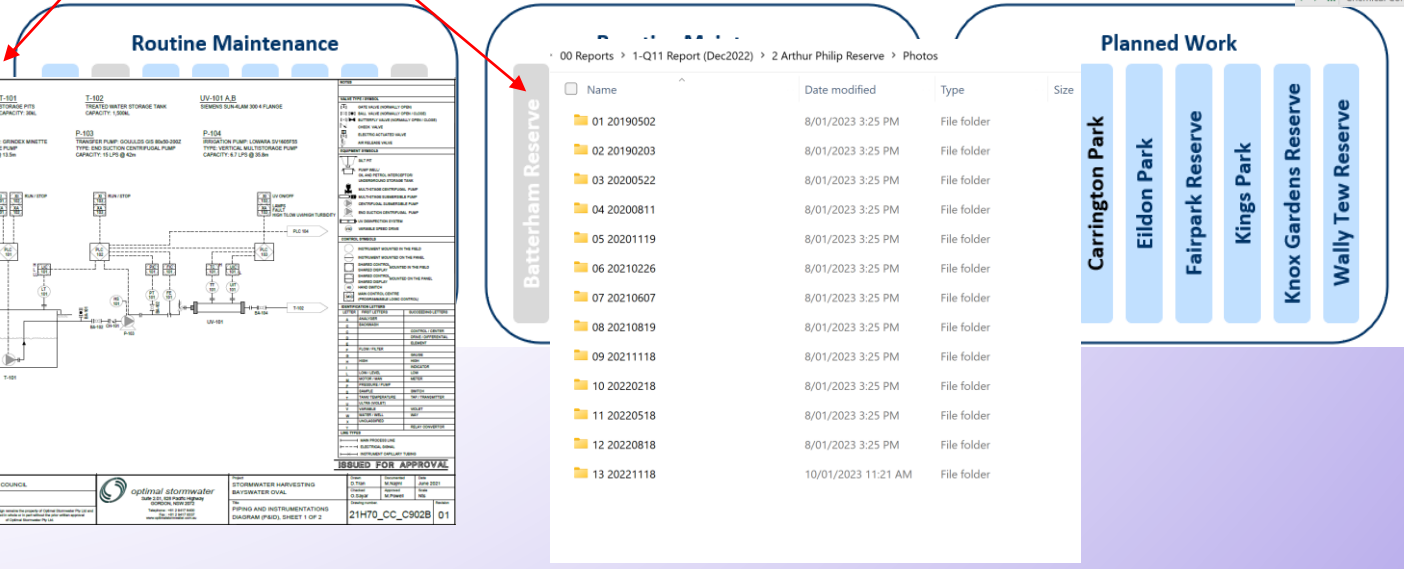
Knox City Council

- Batterham R
- Bayswater C
- Carrington P
- Eildon Park
- Fairpark Res
- Kings Park
- Knox Garden
- Wally Tew Reserve









Date	Read by	No. Days	Irrigation Reading (KL)	Potable Reading (KL)	Truck Fill Reading (KL)	Irrigation Consumption (KL)	Potable Consumption (KL)	Truck Fill Consumption (KL)
24/07/2018	Mahdi	26	3181	4142	63	3,181	4,142	#VALUE!
27/08/2018	Mahdi	34	3321	4151	193	140	9	130
2/10/2018	Mahdi	36	3789	4154	232	468	3	39
30/10/2018	Allen	28	3858	4157	232	69	3	0
11/12/2018	Allen	41	4183	4163	232	325	6	0
3/01/2019	Ben	23	4315	4165	232	132	2	0
25/01/2019	Ben	22	4452	4167	232	137	2	0
15/02/2019	Ben	21	4,628	4,186	234	176	19	2
14/03/2019	Hamid	30	4,748	4,224	234	120	38	0
28/03/2019	Hamid	14	4,748	4,256	259	0	32	25
23/05/2019	Arman	56	5,233	4,550	313	485	294	54
3/06/2019	Arman	10	5,390	4,555	324	157	5	11
18/06/2019	Arman	15	5,493	4,562	326	103	7	2
5/07/2019	Arman	17	5,494	4,564	345	1	2	19
1/08/2019	Allen	28	5,599	4,567	371	105	3	26
27/08/2019	Allen	26	5,807	4,571	447	208	4	76
2/10/2019	Arman	36	6,156	4,575	494	349	4	47
6/11/2019	Saeed	35	6,444	4,580	626	288	5	132
9/12/2019	Saeed	33	6,690	4,585	695	246	5	69
9/01/2020	Arman	31	6,811	4,588	698	121	3	3
30/01/2020	Arman	21	6,998	4,590	727	187	2	29
2/03/2020	Arman	31	7,155	4,597	794	157	7	67
24/03/2020	Arman	22	7,155	4,599	794	0	2	0
27/04/2020	Arash	34	7,157	4,603	819	2	4	25
27/05/2020	Arash	31	7,243	4,607	825	86	4	6
27/06/2020	Arash	31	7,243	4,611	825	0	4	0
27/07/2020	Arash	31	7,243	4,614	825	0	3	0
28/08/2020	Arash	32	7,243	4,617	825	0	3	0
29/09/2020	Arash	32	7,501	4,626	825	258	9	0
30/10/2020	Arash	31	7,648	4,635	825	147	9	0
29/11/2020	Arash	30	7,876	4,665	825	228	30	0
29/12/2020	Arash	30	8,099	4,681	825	223	16	0
29/01/2021	Arash	31	8,228	4,689	825	129	8	0
1/03/2021	Arash	31	8,394	4,708	825	166	19	0

Operation Management Information – Water Quality Data

City of Sydney Water Recycling System- Water Quality Database	
Monthly Samples	Statistics Data
Apr-21	PH
May-21	TDS
Jun-21	TSS
Jul-21	Turbidity
Aug-21	Faecal Coliforms
Sep-21	Enterococci
Oct-21	UV Transmission @ 254nm
Nov-21	Sydney Park Leachate Quality 2021
Dec-21	Sydney Park Leachate Quality 2022
Jan-22	
Feb-22	
Mar-22	
Apr-22	
May-22	
Jun-22	

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Turbidity (NTU)

NHMRC, 2009 Stormwater reuse

Sampling Location	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22
Alexandria Oval	0.7	0.9	0.6	0.4	1.04	1.2	0.5	0.5	1.4	0.8	0.7	1	2.9	3	1.6	1.6	1.7	1.4	1.9	1.8
Barcom Park	0.3	0.7	0.7	0.2	0.2	0.2	<0.1	0.8	1.5	0.1	0.1	0.5	0.1	1	0.8	0.1	0.9	0.8	0.9	0.8
Beare Park	2.3	1.7	2.4	1.8	6.4	2.9	1.4	1.5	3.8	12.4	9.5	1.5	17.3	19	3.4	14.8	3.3	3.9	4.1	3.9
Corning Park	34.7	21	13	1.6	1.2	1.2	4	2.7	4.5	3.9	3.5	3	5.6	6.5	2.8	26.1	2.5	2.3	2.1	1.8
Crown Park	2.3	1.9	2	2.5	2	2.5	2.2	0.6	0.75	7.6	1.8	1.1	2.8	2.2	2.5	1.2	2.3	2.4	1.7	1.5
Harmony Park	2.1	2.4	3.5	0.3	0.6	0.7	2	1.7	1.9	2.7	2.5	1.7	2	2.5	1.8	1	1.9	2	1.9	1.7
Harold Park	0.5	0.9	0.7	0.5	0.3	0.07	0.6	1.2	1.2	1.7	1.5	1.2	1.9	2.6	1.1	0.7	1	1.1	1.6	1.4
Lilian Fowler Reserve	0.8	1	1.9	0.8	2.6	2.1	2.6	1.1	1.2	0.5	0.5	1	0.5	1	1		1.1	1	1.2	1.1
Mary O'Brien Reserve	54.4	4.5	4.2	1.5	2.6	2.1	1.1	NA	1.8	1.4	0.5	0.8	6.3	4.5		0.7	1.2	1.7	2.1	2
Nuffield Park	0.4	0.4	0.4	3.2	1.5	2.1	3.1	2.1	2.3	4.3	1.1	1.5	4.8	5	4.5	7.4	4.6	5.2	6.1	5.1
Paddington Reserve	0.2	0.9	0.8	<0.1	<0.1	<0.1	0.2	0.1	0.25	5	0.15	0.85	1.5	1.2	0.65	0.3	0.7	0.8	0.5	0.4
Peace Park	0.1	0.7	1.5	<0.1	<0.1	0.05	<0.1	0.8	1.1	0.1	0.3	0.5	0.4	0.85	0.85	0.2	0.9	0.8	0.9	0.8
Sydney Park	0.1	0.7	1.5	<0.1	<0.1	0.05	<0.1	0.8	1.1	0.1	0.3	0.5	0.4	0.85	0.85	0.2	0.9	0.5	0.6	0.5
Pirrama Park	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prince Alfred Park	1.8	1.8	1.1	47	1	NA	2.5	1.1	1.5	0.6	1.5	0.5	18.6	12.5	1.5	0.2	1.6	1.4	1.5	1.2
Solander Park	2	2.3	2.8	4	3.5	3.2	5.5	1.2	5.4	7.5	6.5	1.24	5.2	3.5	1.1	4.7	1	1.1	2.1	1.8
St. James	7.3	1.6	4.8	1.3	1.3	2.7	2.4	2.4	3	1.2	1.1	2.1	2.1	1.8	2.3	5	2.4	2.7	3.1	2.8
Trurruwul Park	0.8	0.4	0.6	60.2	<0.1	1.5	0.6	0.25	2.35	0.6	1.7	1	0.7	0.85	3.4	1.3	3.3	3.7	3.1	2.8
Waterloo Oval	0.1	3.2	5.6	0.8	3.8	4.1	1.3	2.18	3.1	2	2	1.5	3.2	2.9	10.5	17.1	10.1	7.1	3.6	2.5
Redfern Oval	395	34	36	107	95.1	93	538	11.5	6.5	397	410	3.5	238	115	12	3150	12.1	8.5	5.1	5.4
Erskineville Oval									0.25	0.3	0.4	0.9	0.7	0.9	1.9	0.6	1.8	1.2	7.4	5.1
Turbidity NTU Limit	25																			

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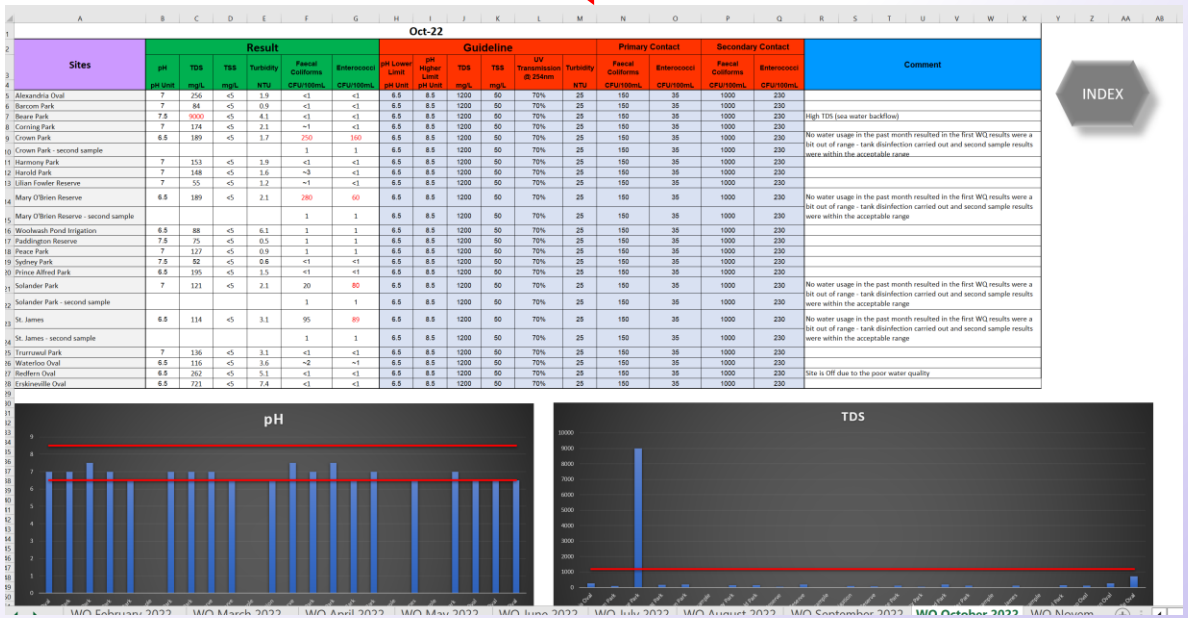

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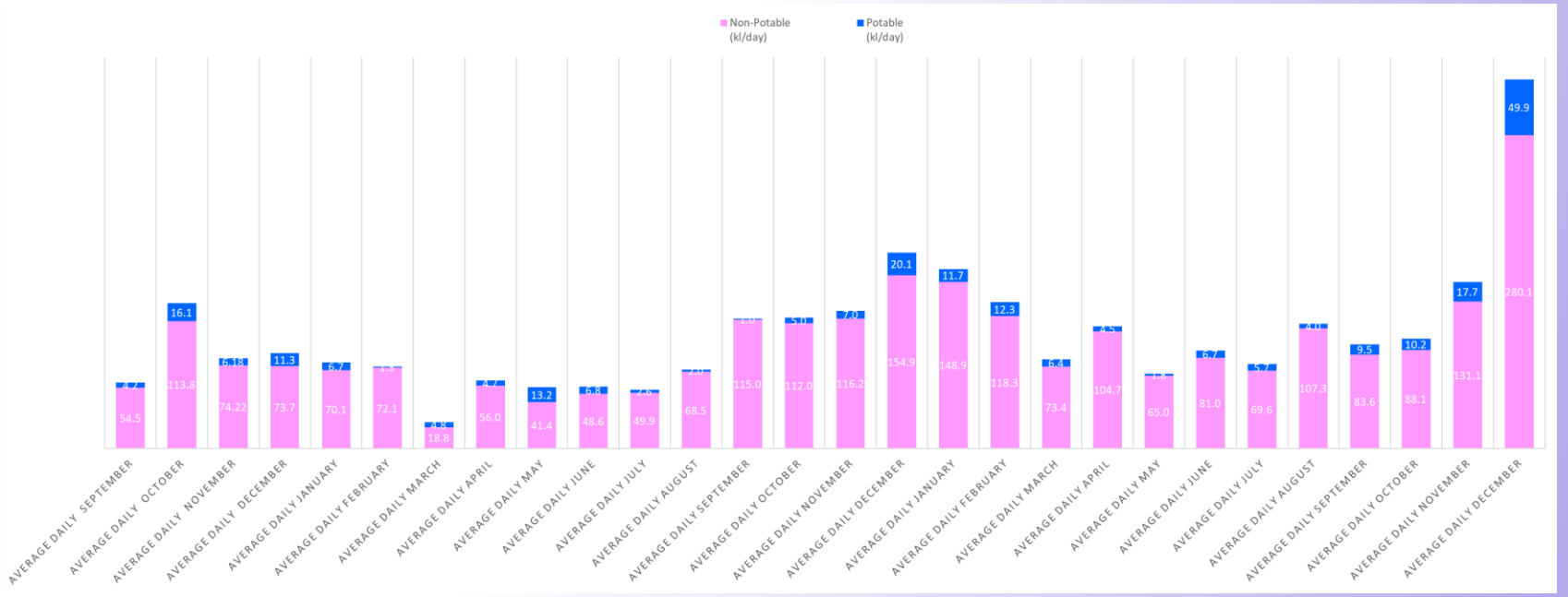
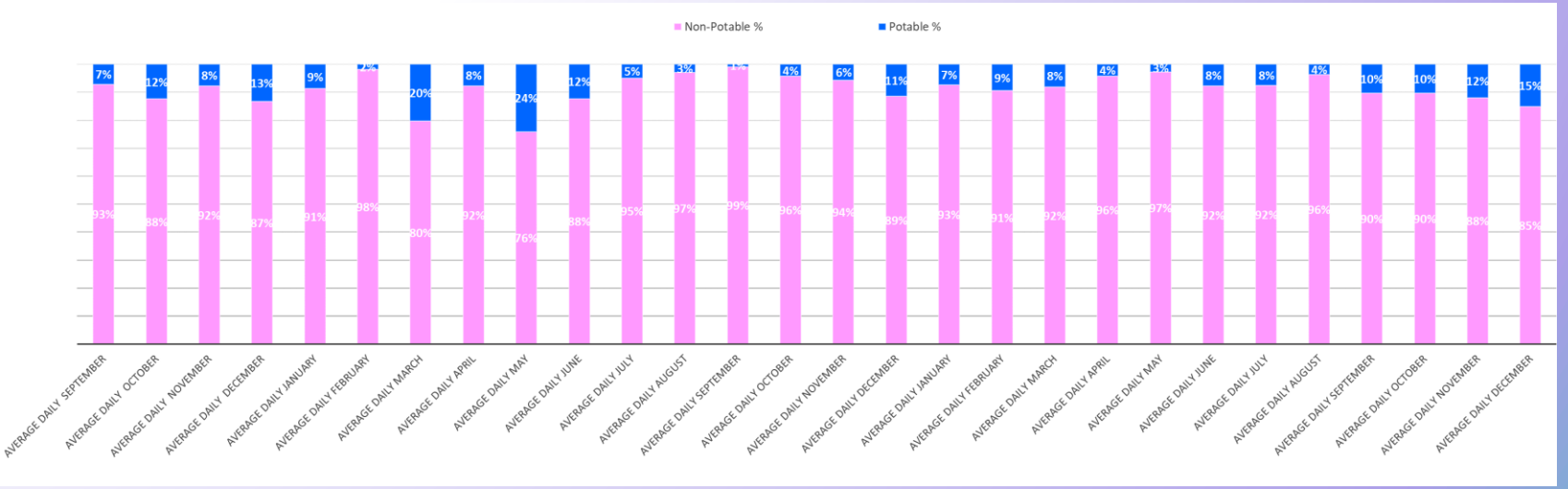
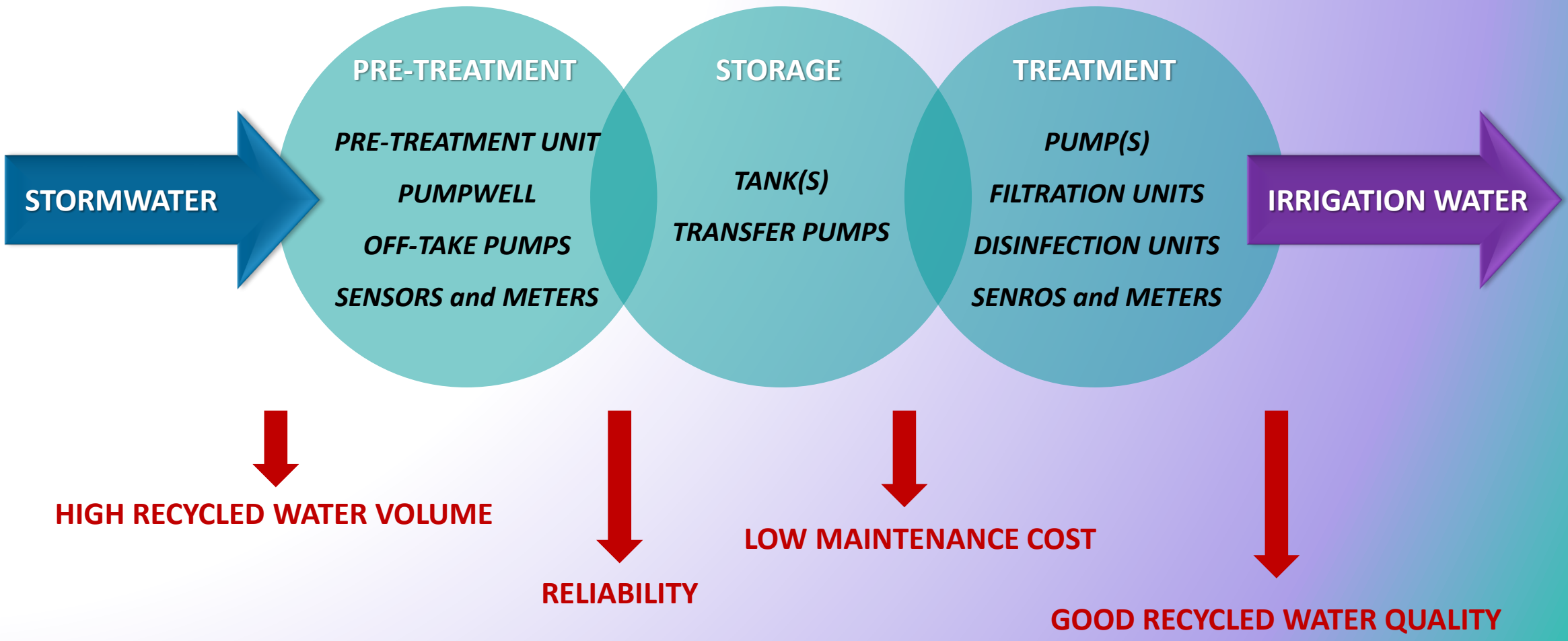
High Level Information – Daily Water Supply





Stormwater Harvesting Scheme Overview



Thank you for your attention! ☺