



Murrumbidgee
Irrigation



2021 Annual Compliance Report

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Abbreviations

AFFRA	Acoustic Flowmeter For Remote Areas
ANZECC	Australian and New Zealand Environment and Conservation Council
BBS	Barren Box Storage
CSIRO	Commonwealth Scientific Investigation and Research Organisation
DPIE	NSW Department of Planning, Industry and Environment
EC	Electrical Conductivity
EES	Environment, Energy and Science
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ETo	Evapotranspiration (crop reference)
GIS	Geographic Information System
GMSRR	EPL Point 5 - Gogeldrie Main Southern Drain River Road
ha	Hectare(s)
LAG	EPL Point 4 - Gogeldrie Main Drain at Gooragool Lagoon
LTA	Long-term average
MI	Murrumbidgee Irrigation Limited
MIA	Murrumbidgee Irrigation Area
MIRFLD	EPL Point 15 - Mirrool Creek Floodway Wyvern Station
ML	Megalitre
NARREG	Narrandera Regular
NRAR	Natural Resources Access Regulator
ROCUDG	EPL Point 7 - Point Cudgel Creek Roaches Escape
SOP	Standard Operating Procedure
t	tonnes
µS/cm	micro siemens per centimetre
µg/L	micrograms per litre
WAL	Water Access Licence
YMS	EPL Point 6 - Yanco Main Southern Drain

Preface

The Annual Compliance Report for the financial year 2020/21 has been prepared to meet the reporting requirements of the licences held by Murrumbidgee Irrigation (MI).

MI operates under a Combined Water Supply Work Approval and Water Use Approval 40CA403245 (Combined Approval) issued by the NSW Department of Primary Industry – Water and regulated by the Natural Resources Access Regulator (NRAR). MI also holds an Environment Protection Licence (EPL) 4651 issued by the NSW Environment Protection Authority (EPA).

MI is committed to achieving organisational excellence through operating safely, efficiently and effectively, all of which contribute towards the measure of MI's compliance performance.

COMBINED WATER SUPPLY WORK APPROVAL AND WATER USE APPROVAL

1 Statement of compliance

MI has met the conditions of the Monitoring and Reporting Plan dated 16 March 2018 for our Combined Approval in 2020/21. The compliance requirements are cross referenced within this report and listed in Table 1.

MI has quality assurance and control procedures for data integrity and to ensure that all compliance obligations are met. This includes using a NATA accredited laboratory for water sample analysis and contracting an external hydrological service provider to manage and maintain our licensed supply and discharge points.

Table 1 Combined Approval (40CA403245) reporting summary

Approval section	Condition	Report section
Submission of annual compliance report	1	This report
Plans of the area of operations, authorised works, monitoring sites and water management infrastructure	2.1	2. Plan of operations and works
	2.2	
Statement of compliance	2.3	1. Statement of compliance
Presentation of data and analyses	2.4	Sections 3 - 7
	2.5	
	2.6	
	2.7	Provided via email with report
	2.8	1. Statement of Compliance
New measures to limit groundwater recharge and discharge of salt	2.9	8. New measures to limit groundwater recharge and discharge of salt
Reporting on water management	2.10	3.3 Diversions and water allocation
	2.11	0 Water discharged from area of operation
	2.12	3.6 Water balance
	2.13 (a) (b)	3.1 Climate conditions
	(c) – (i)	4. Water use
Reporting on salinity and salt load	2.14	5. Salinity and salt load
	2.15	
	2.16	

Approval section	Condition	Report section
Reporting on groundwater conditions	2.17	6. Groundwater conditions
Discharge of noxious aquatic weeds	5	9.1 Discharge of noxious aquatic weeds
Discharge of blue green algae	6	9.2 Discharge of blue-green algae

Table 2 outlines the number of significant events that occurred in 2020/21 that required notification to the Minister. The significant events are detailed in Attachment A.

When a significant event occurs MI lodge an S91i -self reporting form, MI engage a Duly Qualified Person (DQP) to rectify the issue. A Certification of Validation is completed and an S91 completion form is lodged with the relevant supporting documentation.

Table 2 Significant event notifications (S91i events)

Year	Number of significant events
2020/21	7

MI did not change or modify the condition of the existing authorised water supply works or authorised discharge works listed in the Combined Approval during 2020/21. MI did not construct new works that would allow further discharge from the Area of Operations.

2 Plan of operations and works

MI's area of operations, storages and major supply and drainage channels are presented in Figure 1. There were no changes from the prior financial year. Figures 1 and 2 have also not changed from the prior financial year report.

The Murrumbidgee Irrigation Area (MIA) is supplied by water stored in Burrinjuck and Blowering dams and released to the Murrumbidgee River. Water is diverted from the Murrumbidgee River in accordance with the conditions of the Combined Approval via two authorised supply works (Figure 2):

- NARREG - Narrandera Regulator (after diversion from Berembed Weir via Bundidgerry Creek and regulator)
- STURT - Sturt Regulator (after diversion from Gogeldrie Weir)

There are five (5) sites which have the potential to discharge water outside MI's area of operations, which are presented in Figure 2. These sites are monitored in accordance with MI's Combined Approval and Environmental Protection Licence (EPL) 4651.

MI's five discharge monitoring points are:

- EPL Point 4 - LAG – Gogeldrie Main Drain at Gooragool Lagoon
- EPL Point 7 - ROCUDG – Cudgel Creek Roaches Escape
- EPL Point 6- YMS – Yanco Main Southern Drain
- EPL Point 5 - GMSRR – Gogeldrie Main Southern Drain River Road
- EPL Point 15 - MIRFLD – Mirrool Creek Floodway Wyvern Station

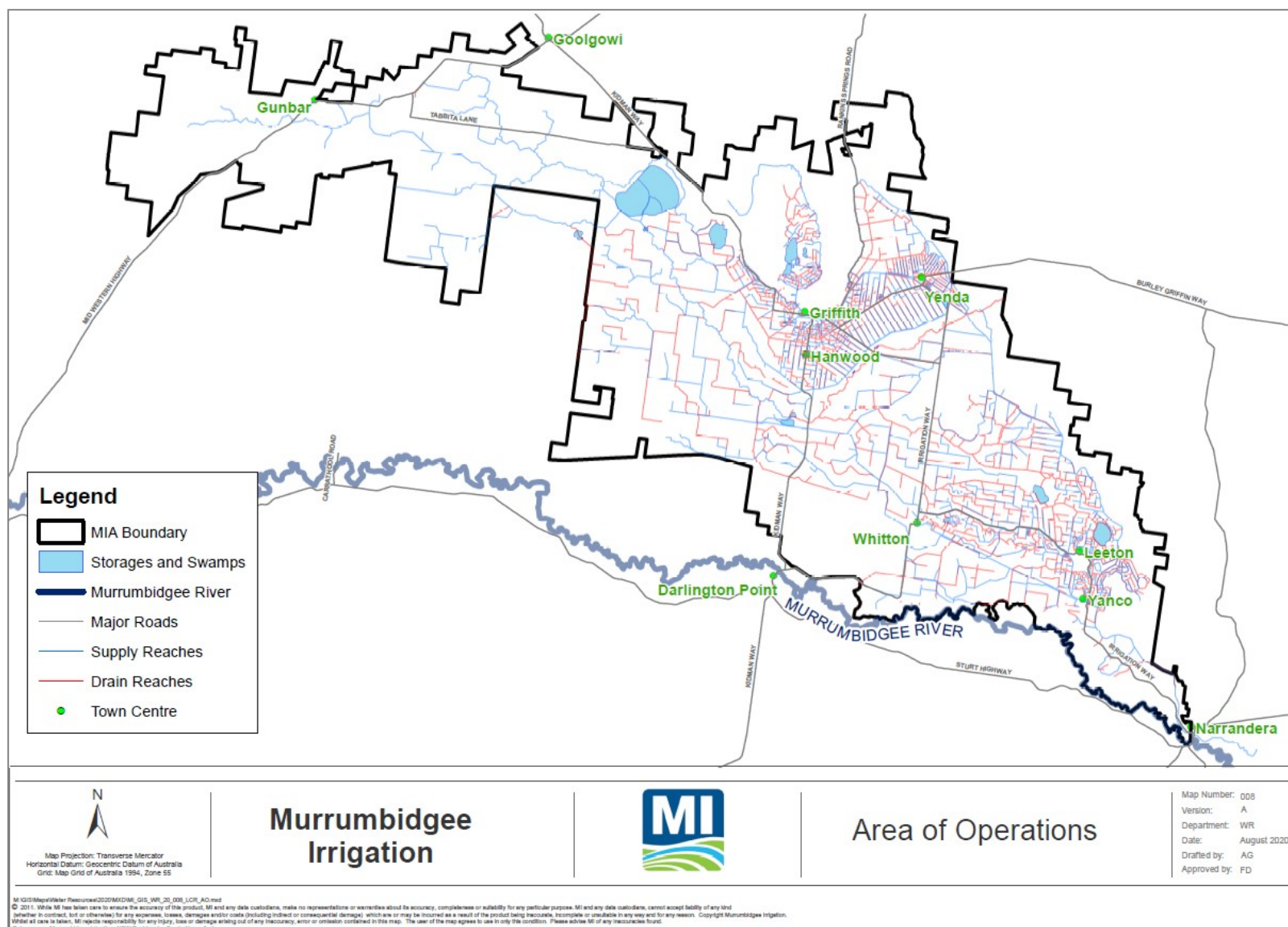


Figure 1 Murrumbidgee Irrigation's Area of Operations

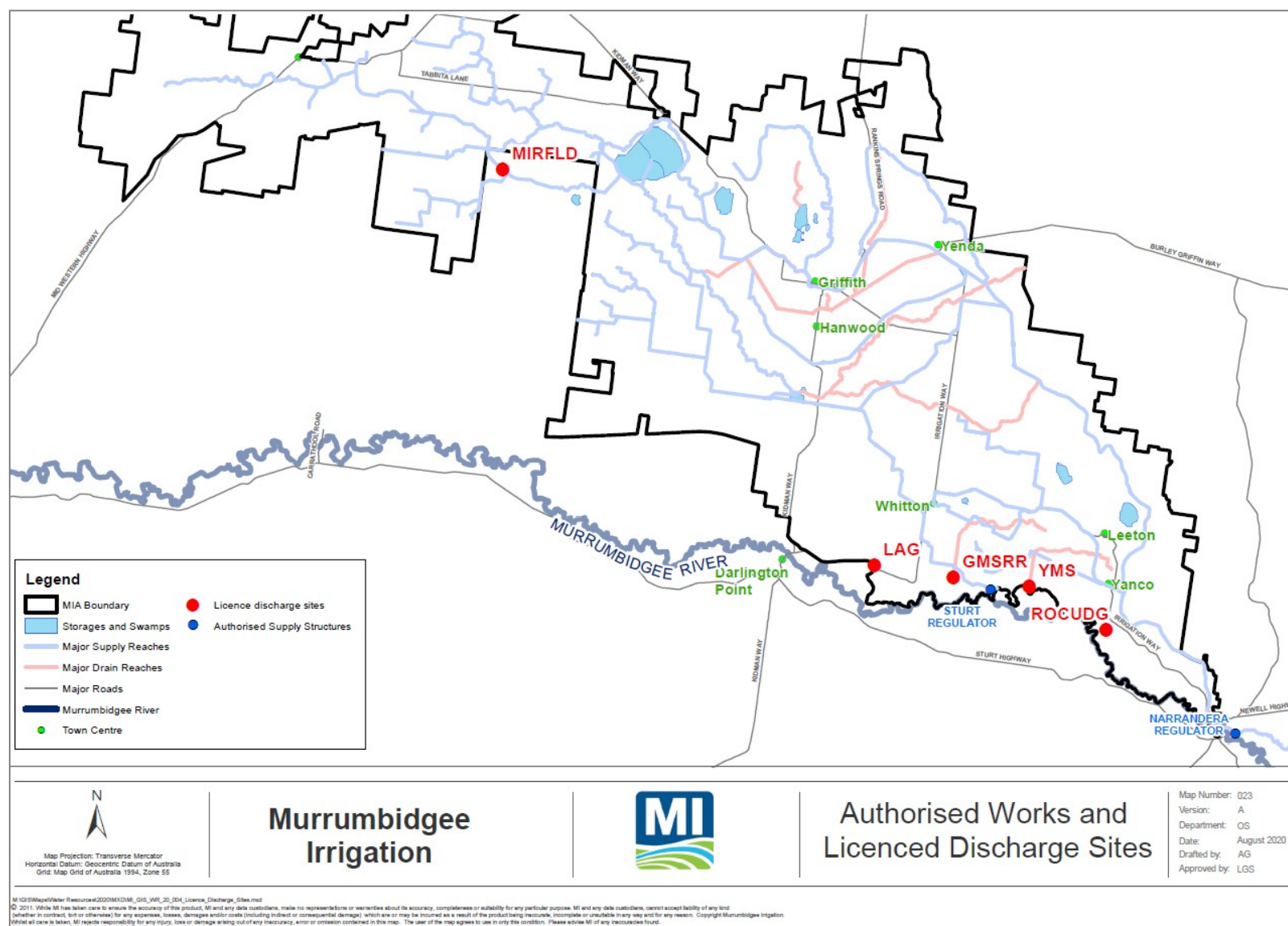


Figure 2 Location of authorised supply works and licence discharge points

3 Reporting on water management

MI's water management information is presented below. There are no internal benchmarks or targets that are relevant to this report.

The reference year of 2014-15 was chosen for this year's report. The reference year has comparable rainfall and evapotranspiration (ETo) levels with the past few years, as well as very similar diversion and delivery volumes.

3.1 Climate conditions

Rainfall and ETo data recorded at the Griffith CSIRO weather station is presented in Table 3.

Above average rainfall was recorded in 2020/21 reporting period, with an increase of 77mm from the prior reporting period. The rainfall recorded in 2020/21 is the highest received throughout the last four years, however ETo was lower, likely due to lower temperatures and a higher number of rain days.

Table 3 Griffith CSIRO weather station rainfall and ETo

Year	Total rainfall (mm)	Total ETo (mm)
2020/21	441	1,646
2019/20	364	1,784
2018/19	337	1,914
2017/18	315	1,894
2014/15	348	1,776

3.2 Calibration report for Main Canal and Sturt Canal AFFRA units

The calibration reports for Narrandera Regulator (NARREG) and Sturt Canal offtake (STURT) AFFRA units have been provided by Ventia as part of a contract with MI to ensure flow measurements meet the conditions of Combined Approval 40CA403245.

The calibration report summary for the NARREG AFFRA unit is presented in Table 4 and the STURT AFFRA unit presented in Table 5. The VENTIA flow, EC, and salt load monitoring financial year report is included as Attachment B.

Table 4 Main Canal at NARREG (410127) calibration report

Date	Time (24hr)	Calibration measurements: Q measured discharge ML/day	AFFRA sensor: Q recorded mean ML/day	Deviation (%)
28/08/2020	11:26	3945.9	3902.5	1.11%
30/09/2020	15:37	1380.84	1320	4.61%
28/10/2020	12:54	558.3	515.75	8.25%*
28/10/2020	13:40	564.43	575.75	-1.97%
26/11/2020	9:28	3496.5	3516	-0.55%^
29/01/2021	9:32	1577.77	1506.92	4.70%
25/02/2021	11:56	3355.81	3312.31	1.31%

Date	Time (24hr)	Calibration measurements: Q measured discharge ML/day	AFFRA sensor: Q recorded mean ML/day	Deviation (%)
31/03/2021	13:37	536.24	410.89	30.51% [#]
29/04/2021	12:43	1554.95	1539.33	1.01%

Table 5 Sturt Canal at STURT (410129) calibration report

Date	Time (24hr)	Calibration measurements: Q measured discharge ML/day	AFFRA sensor: Q recorded mean ML/day	Deviation (%)
29/08/2020	07:23	1715.00	1647.5	4.10%
30/09/2020	10:15	796.01	816.75	-2.54%
30/09/2020	11:14	809.77	832.25	-2.70%
11/12/2020	13:43	1434.41	1484.00	-3.34% [!]
15/12/2020	13:02	1025.00	1042.73	-1.7% [!]
16/12/2020	13:29	1497.59	1570.77	-4.66%
16/12/2020	14:23	1515.31	1572.86	-3.66%
24/02/2021	15:39	1092.84	1073.85	1.77%
30/03/2021	16:02	77.181	94.46	-18.3% [#]
28/04/2021	15:31	696.62	713.43	-2.36%

*Flows were not kept stable by MI operators during gauging.

Very low flow with strong winds.

^ Documentation misplaced – gauging start and end times estimated based on field sheets from the visit.

! Gaugings conducted by MI. The measurement was conducted with a moderate wind blowing directly upstream and has been discounted for use with the index table.

3.3 Diversions and water allocation

A monthly summary of gross water diverted from the Murrumbidgee River is presented in Table 6. These volumes represent diversions entering the supply system via MI's two authorised water supply works at NARREG and STURT.

The total diversion volume of 880,456 ML includes an environmental water diversion volume of 3,482.5 ML diverted on behalf of Department of Planning, Industry and Environment–Environment, Energy and Science (DPIE-EES).

Table 6 Monthly summaries of water diversions delivered to customers, 2020/21

Month	STURT	NARREG	Total diversion	Delivered to customers
Jul-20	368	3,650	4,018	2,024
Aug-20	15,420	40,600	56,020	39,938
Sep-20	22,616	47,450	70,066	44,931
Oct-20	23,444	50,700	74,144	57,309
Nov-20	29,454	90,300	119,754	105,422
Dec-20	35,577	113,550	149,127	134,312
Jan-21	35,302	116,050	151,352	136,600
Feb-21	29,119	76,850	105,969	84,952

Month	STURT	NARREG	Total diversion	Delivered to customers
Mar-21	13,699	30,299	43,998	53,859
Apr-21	9,199	31,011	40,210	33,945
May-21	15,066	35,274	50,340	39,036
Jun-21	2,264	13,194	15,458	16,660
Total	231,528	648,928	880,456	748,988

Note: All figures in ML

Table 7 compares water allocations, diversions, total deliveries and climate data from the 2020/21 reporting year to prior years. Although announced allocations determine much of the irrigation demand, rainfall and ETo can significantly affect the total diversions for the year.

Table 7 Water allocation, total diversions and deliveries 2020/21 compared to previous years

Year	Announced allocation (%) general / high	Diversions (ML)	Deliveries (ML)	Rainfall (mm) Griffith AWS	ETo (mm) Griffith AWS
2020/21	100/100	880,456	748,988	441	1,646
2019/20	11/95	349,523	285,270	364	1,784
2018/19	7/95	586,752	487,204	337	1,914
2017/18	45/95	945,805	800,963	315	1,894
2014/15	53/95	878,614	730,016	349	1,776

Note: All figures in ML

Above average rainfall was recorded throughout local and upriver catchments in 2020/21, resulting in 100% allocation for General Security and 100% allocation for High Security allocation. An increase of 530,933ML diversions and 463,718ML of deliveries occurred from 2019/20. The diversions and deliveries supplied in 2017/18 and the 2014/15 reference year are very similar to those in 2020/21.

The volume of water diversions debited to each grouping of MI's Water Access Licences are shown in Table 8.

Table 8 Diversions debited to Water Access Licences groups

Year	WAL 1 High Security	WAL 2 General Security	WAL 3 Towns	WAL 4 Stock & Domestic	WAL 5 Other
2020/21	231,450	404,808	19,699	6,384	218,115
2019/20	212,062	50,985	19,699	7,263	59,514
2018/19	269,817	161,433	19,699	7,345	128,458
2017/18	265,936	495,573	19,699	7,345	157,252

Note: All figures in ML. WAL 5 Other includes Supplementary Water Access and Conveyance licences

3.4 Environmental diversions

At the request of DPIE-EES, 3,482.5 ML of environmental water was delivered in 2020/21 as shown in Table 9. This volume is accounted for in total diversions and deliveries shown in Table 7.

Table 9 Environmental water diversions for 2020/21

Month	Tuckerbill Swamp	Turkey Flats	Yanco Ag	Campbell's Swamp	Fivebough Swamp	Coononcabil Lagoon	Total
Jul-20	0	0	0	0	0	0	0
Aug-20	0	0	0	0	0	0	0
Sep-20	0	0	0	0	0	0	0
Oct-20	104.3	0	0	0	0	504.2	608.5
Nov-20	246	25	433	13.6	0	547.8	1,265.4

Month	Tuckerbill Swamp	Turkey Flats	Yanco Ag	Campbell's Swamp	Fivebough Swamp	Coononcabil Lagoon	Total
Dec-20	207	0	0	178.8	216.4	0	602.2
Jan-21	0	78	0	0	0	349.4	427.4
Feb-21	50	311.3	0	0	0	0	361.3
Mar-21	0	117.2	0	100.5	0	0	217.7
Apr-21	0	0	0	0	0	0	0
May-21	0	0	0	0	0	0	0
Jun-21	0	0	0	0	0	0	0
Total (ML)	607.3	531.5	433	292.9	216.4	1,401.4	3,482.5

A total of 3922 ML was diverted into the Barren Box Wetland cell as a means of flood mitigation from floodwater entering Mirrool Creek during June 2021. The water diverted is unable to be recovered or diverted to customers for use. The diversion is accounted for as a diversion under MI's BBS management plan as wetland watering.

3.5 Water discharged from area of operations

Monthly discharge volumes for each discharge monitoring point are shown in Table 10. A total of 900 ML was discharged from MI's Area of Operations during 2020/21.

Table 10 Monthly discharge volumes (ML) recorded at monitoring points

Month	LAG (41010940)	ROCUDG (41010005)	YMS (410083)	GMSRR (41010921)	MIRFLD (41010163)
Jul-20	0	0	0	0	0
Aug-20	34 ^R	1.7 ^B	0	2.1 ^R	0
Sep-20	59.8 ^R	12.1 ^R	0	0	0
Oct-20	4.7 ^R	13.7 ^R	1.2	0	0
Nov-20	13.9 ^R	85 ^R	2.2	0	0
Dec-21	23 ^R	0	0	0	0
Jan-21	58 ^B	0	0	0	0
Feb-21	35 ^B	0	0	0	0
Mar-21	143.7	102 [*]	102	133 ^R	0
Apr-21	9.8 ^R	4 ^R	0	0	0
May-21	1 ^R	10.4 ^R	0	0	0
Jun-21	8.5 ^R	23	15.8	0	0
Total	391.4	251.9	121.2	135.1	0

Note: All figures in ML

^{*}Debris effecting sensor

^R Rating table extrapolated

^B Backed-up stage

Table 11 shows total discharge volumes from MI's Area of Operations compared to prior years.

The total volume discharged in 2020/21 was notably higher compared to prior years. This was a result of several factors including:

- Above average rainfall
- Increased announced allocation 100%
- Saturated catchments
- Increase in diversions and deliveries
- Increase in winter cropping

Table 11 Total volumes discharged from the MIA

Year	Total discharged (ML)
2020/21	900
2019/20	127
2018/19	642
2017/18	4,471
2014/15	675

3.6 Water balance

The annual water balance in Table 12 has been produced to meet condition 2.12 of the Combined Approval Monitoring and Reporting Plan. To assist with interpretation of this water balance, each line has been referenced to the specific requirements of Condition 2.12.

The conveyance volumes represented in this water balance account for seepage, evaporated water from in channel and storage, and general conveyance required to deliver water to customers.

Total gross diversions of 880,456 ML for 2020/21 were used to generate water deliveries of 748,988 ML to customers and 7,405 ML for environmental water diversions including 3,922 ML into Barren Box Wetland.

There were no flood events resulting in captured flood water deliveries during 2020/21, therefore the total volume of water delivered to customers for 2020/21 was sourced from river diversions and internal storage.

Table 12 Annual water balance as at 1 July 2021 and prior years

Condition	Sources	2020/21	2019/20	2018/19	2017/18	2014/15
2.10 (a) (b) (c)	River diversions	880,456	349,523	586,752	945,805	878,614
2.12 (c)	Internal storage (July 1)	4,724	2,434	25,256	32,318	19,119
2.12 (b)	Water captured (estimate)	5,870	0	0	5,007	0
	Total	891,050	351,957	612,008	983,131	897,733
	Applications					
2.10 (d)	Deliveries to customers (river and storages)	748,988	281,658	484,208	800,963	730,016
2.11 (a)	Discharges (without credit)	4,822+	127	642	4,471	671
2.11 (b)	Environmental water diversions	3,483	3,612	2,996	600	2,472
2.12 (b) loss	Overland flood discharge	0	0	0	0	0
2.12 (b) loss	Conveyance	98,355	61,836	121,728	151,904	148,850
2.12 (c)	Internal storage (June 30)	35,402	4,724	2,434	25,256	15,724
	Total	891,050	351,957	612,008	983,131	897,733

Note: All figures in ML.

+ includes 3922ML of wetland watering for BBS wetland

4 Water use

4.1 Crop statistics

Customers are required to nominate the intended water use to a crop or purpose when placing water orders. This data is not validated at the farm level and is therefore an estimate only. Table 13 shows water deliveries and estimated crop water use for 2020/21. It is important to note the water use data presented for the total area of crop is influenced by seasonal rainfall, ETo and irrigation practices.

The 'Not Defined' category refers to water taken by MI customers without placing an order. This information is obtained after the meter is read and does not provide opportunity to allocate the water to a use.

Table 13 Summary of water deliveries for major crop groupings 2020/21

Crop/ purpose	Area (ha)	Volume delivered (ML)	Crop water use (ML/ha)
Citrus	7,733	34,674	4.5
Cotton	7,931	62,778	7.9
Environment	-	3,251	-
Industrial	27.2	6,531	-
Nuts	7,210	55,309	7.7
Other crops	182.8	1,033.2	5.7
Other fruits	1,042	4,733	4.5
Plantation	93	269	2.9
Rice	19,166	250,516	13.1
Stock & Domestic	263.7	6,692.6	-
Summer cereals	1,741	20,425	11.7
Summer oilseeds	476	3,361	7.1
Summer pasture	1,095	8,426	7.7
Town supply	4	13,868	-
Vegetables	1,388.4	11,587	8.3
Vines	17,551.8	82,172	4.7
Winter cereals	62,609.1	120,674	1.9
Winter oilseeds	2,406	6,786	2.8
Winter pasture	4,995	17,316	3.5
Not defined*	-	34,587	-
Total	135,914	744,988	

*No crop type assigned

A comparison of crop water use for 2020/21 with prior years is presented in Table 14 and Figure 3.

Increased general security allocation saw significant increases in seasonal summer cropping deliveries in 2020/21. Rice crops accounted for the highest volume of water deliveries in the MIA. In previous years permanent plantings of citrus, vines and other fruits were the main crop type to receive the highest proportion of water delivery volumes.

Figure 3 shows the past financial year water deliveries correlate strongly with the 2014/15 comparison year. This is likely due to the seasonal outlook and allocations being very similar. The differences in the two prior years strongly reflect the lower allocations and watering of permanent plantings over seasonal crops. In addition, 'Other crops and plantations' has been influenced over the past two years due to the increase in nut plantations in the MIA, requiring watering across the year.

Table 14 Total deliveries to major crop types 2020/21 compared to previous years

Year	Rice	Pasture	Cereal and oil seeds	Vegetables	Citrus, vines, other fruits	S&D, towns, industrial	Other crops, plantations	Cotton
2020/21	250,516	25,742	151,247	11,587	121,579	27,092	56,611	62,778
2019/20	27,302	4,346	30,105	10,655	114,229	22,216	23,969	1,170
2018/19	37,171	12,753	88,968	10,518	130,716	22,174	71,460	113,443
2017/18	220,423	37,952	123,439	10,940	134,046	24,123	76,864	174,778
2014/15	255,384	32,206	171,645	12,216	149,045	20,547	28,295	60,678

Note: All figures in ML

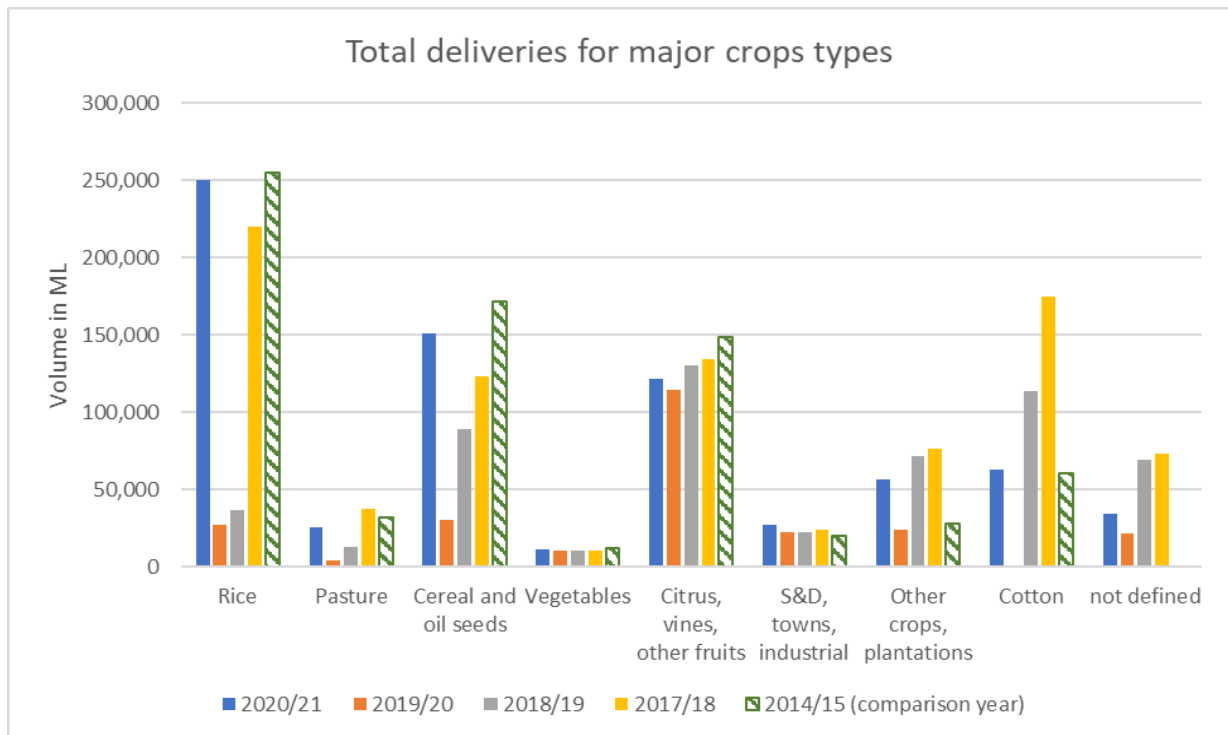


Figure 3 Comparison of total water deliveries to major crop types

4.2 Irrigation intensity

Irrigation intensity is displayed in Figure 4 by water use (ML/ha) at a property level.

This map identifies locations of landholdings using between >0 to 4; >4 to 8; and above 8 ML/ha of irrigation water.

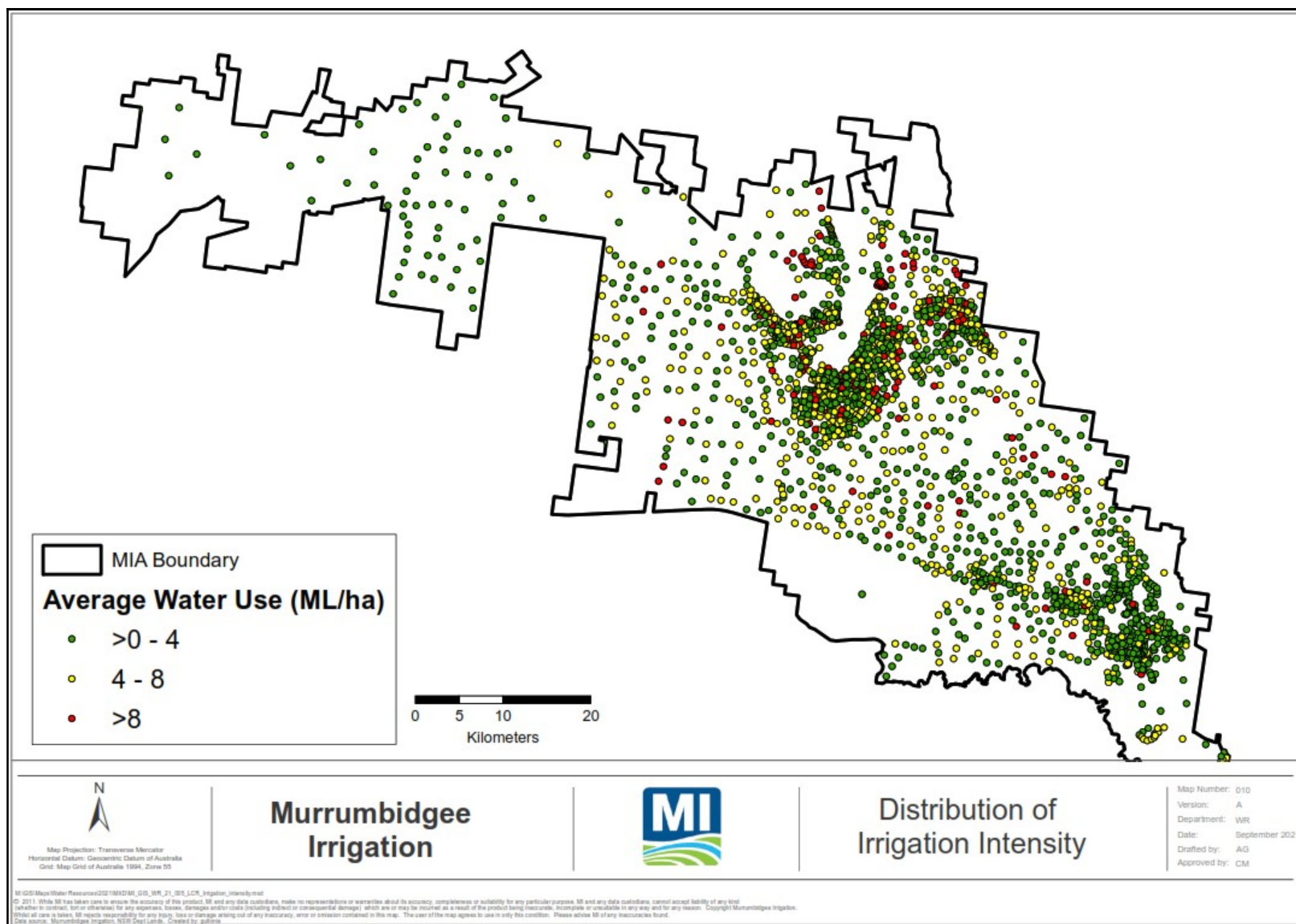


Figure 4 Distribution of irrigation intensity across the MIA

5 Salinity and salt load

5.1 Extracted salt load

The monthly mean electrical conductivity (EC) values and extracted salt loads are calculated using EC sensors at MI's two river offtake sites NARREG and Sturt and presented in Table 15. Attachment B contains Ventia's report which outlines the data and quality assurance information.

Table 15 Total extracted salt load for 2020/21

Month	STURT			NARREG		
	Flow (ML)	Mean EC (µS/cm)	Salt (t)	Flow (ML)	Mean EC (µS/cm)	Salt (t)
Jul-20	368	227	16	3,650	172	307
Aug-20	15,420	229	1914	40,600	219	4,670
Sep-20	22,616	194	2235	47,450	194	5,458
Oct-20	23,444	183	2651	50,700	160	4,584
Nov-20	29,454	184	3207	90,300	185	9,128
Dec-20	35,577	109	2606	113,550	103	6,696
Jan-21	35,302	102	2121	116,050	93.8	6,247
Feb-21	29,119	134	1803	76,850	135	6386
Mar-21	13,699	113	923	30,299	118	3711
Apr-21	9,199	198	1058	31,011	203	3682
May-21	15,066	138	1221	35,274	125	2565
Jun-21	2,264	165	220	13,194	124	923
Total	231,528		19,975	648,928		53,357

Note:

See Ventia's report in Attachment B for further details.

Table 16 presents the total extracted salt loads for 2020/21 and prior years.

During 2020/21, an estimated 73,332 tonnes of salt was imported into MI's area of operations from the Murrumbidgee River. An increase of 54,515 tonnes of salt was imported into MI's area of operations compared to 2019/20.

In 2014/15 MI received similar diversions to 2020/21 (within 1%) however, in 2020/21 an increase of over 24% by volume of salt was imported into MI's area of operation.

Table 16 Extracted salt-load (t) for 2020/21 compared to prior years

Year	Diversions (ML)	Extracted salt load (t)		
		STURT	NARREG	Total
2020/21	880,456	19,975	53,357	73,332
2019/20	349,523	1,787	17,030	18,817
2018/19	586,752	6,952	27,570	34,522
2017/18	945,805	14,920	50,030	64,950
2014/15	878,614	14,587	44,270	58,858

5.2 Discharged salt load

There are five licensed locations where discharge water from MI's area of operations is monitored. The locations of these sites are shown in Figure 2.

Flow, EC and salt load data for these sites is presented in Table 17. When standing water is held at a discharge location, while EC measurements are taken, no discharge occurs. Alternatively, minor flows do not trigger accurate measurements to enable robust salt load calculations.

An estimated 88.5 tonnes were discharged from MI's area of operations through the five discharge monitoring points in 2020/21.

Table 17 Monthly summary of flow, EC and salt loads at monitoring points for 2020/21

Month	Flow (ML)	Mean EC (µS/cm)	Min EC (µS/cm)	Max EC (µS/cm)	Salt load (t)
Yanco Main Southern Escape (YMS) 410083					
Jul-20	-	-	-	-	-
Aug-20	-	-	-	-	-
Sep-20	-	48.5	0	559	-
Oct-20	1.2	83	0	310	0.1
Nov-20	2.2	204	0	435	0.3
Dec-20	-	195	146	270	-
Jan-21	-	181	130	297	-
Feb-21	-	220	148	384	-
Mar-21	102	295	181	973	19.3
Apr-21	-	185	0	469	-
May-21	-	-	-	-	-
Jun-21	15.8	75.1	0	425	0.8
Total	121.2				20.5
Gooragool Lagoon Escape (LAG) 41010940					
Jul-20	-	-	-	-	-
Aug-20	34	138	0	609	5
Sep-20	59.8	277	0	495	11
Oct-20	4.7	161	0	515	1
Nov-20	13.9	166	0	706	2
Dec-20	23	181	0	611	3
Jan-21	58	53.1	0	343	-
Feb-21	35	287	0	740	-
Mar-21	143.7	77.6	0	828	17
Apr-21	9.8	52.7	0	254	1
May-21	1	214	0	507	-
Jun-21	8.5	232	0	986	-
Total	391.4				40
Gogeldrie Main Southern Escape (GMSRR) 41010921					
Jul-20	-	-	-	-	-
Aug-20	2.1	2.9	0	167	-

Month	Flow (ML)	Mean EC (µS/cm)	Min EC (µS/cm)	Max EC (µS/cm)	Salt load (t)
Sep-20	-	5.3	0	167	-
Oct-20	-	-	-	-	-
Nov-20	-	-	-	-	-
Dec-20	-	-	-	-	-
Jan-21	-	-	-	-	-
Feb-21	-	-	-	-	-
Mar-21	133	35.4	0	252	15
Apr-21	-	-	-	-	-
May-21	-	-	-	-	-
Jun-21	-	-	-	-	-
Total	135.1				15
Cudgel Creek Escape (ROCUDG) 41010005					
Jul-20	-	-	-	-	-
Aug-20	1.7	215	203	227	-
Sep-20	12.1	171	97.6	256	1
Oct-20	13.7	160	110	203	1
Nov-20	85	212	179	322	10
Dec-20	-	201	12.3	234	-
Jan-21	-	-	-	-	-
Feb-21	-	-	-	-	-
Mar-21	102	-	-	-	-
Apr-21	4	187	156	204	-
May-21	10.4	111	98.1	139	1
Jun-21	23	139	97.6	206	-
Total	251.9				13
Mirrool Creek Floodway (MIRFLD) 41010163					
	-	-	-	-	-
Total	-				-

Note:

See Ventia's report in Attachment B for further details

Table 18 details the discharged salt load for the current reporting year and prior years, including the reference year.

While the salt load in tonnes increased, as expected with the higher volume discharged, overall the percentage of salt load per megalitre reduced compared to both the prior year and the reference year. These percentages are 0.098 t/ML; 0.197 t/ML and 0.142 t/ML respectively.

The reduction in salt can be attributed to MI's efforts to recycle irrigation discharge water within the MIA and our customers' efforts to improve water efficiency and recycle irrigation waters on-farm.

Table 18 Discharged salt load 2020/21 compared to prior years

Year	Water discharged (ML)	Discharged Salt load (t)
2020/21	900	88.5
2019/20	127	25

Year	Water discharged (ML)	Discharged Salt load (t)
2018/19	642	98
2017/18	4,471	854
2014/15	675	96

5.3 Salt load summary

The salt loads presented in Table 19 show 73,332 tonnes of salt was received through diversions recorded at MI's authorised supply works (NARREG and STURT). A total of 88.5 tonnes was discharged from the area of operations and an estimated 73,243.5 tonnes was retained within the MIA.

Table 19 Salt load summary for 2020/21

Extracted	Salt load (t)
STURT	19,975
NARREG	53,357
Total extracted	73,332
Discharged	Salt load (t)
YMS	20.5
GMSRR	15
LAG	40
ROCUDG	13
MIRFLD	0
Total discharged	88.5
Retained	Salt load (t)
MIA	73,243.5

It is important to note that this is a simple annual salt balance that considers salt loads entering via authorised works and leaving via approved discharge locations. The balance does not consider other factors that impact total salt loads in the MIA.

No additional data is held by MI that is relevant to the assessment of salinity impacts under the Murray Darling Basin – Basin Salinity Management 2030.

6 Groundwater conditions

The following information is provided from MI's groundwater network monitoring only. MI cannot comment on influences on groundwater from other sources, including groundwater extraction by private owners or other entities and any recharge or disturbance from other developments or activities.

6.1 Groundwater monitoring and reporting

Groundwater monitoring was completed in the last quarter of 2020. The network consists of piezometers in the Shallow and Deep Shepparton Formation and a smaller monitoring network in the Calivil Formation.

A total of 641 piezometers are required to be monitored and reported on as per Attachment 2 of the Monitoring and Reporting Plan. The locations of these bores are displayed in Figure 5. Figure 4 locations have not changed from the prior reporting year.

Table 20 provides a status summary of the groundwater piezometers monitored in 2020.

A total of 545 piezometers were read during the monitoring, an increase of 11 from the prior year. The total piezometers read equates to 85% of the network.

Factors affecting the percentage read includes an increasing number of piezometers found to be destroyed by land development or other activities outside of MI's control. During the 2020 and 2021 monitoring rounds, a concerted effort was made to validate where piezometers were destroyed or not found. The 2020 monitoring therefore read 98.2% of the piezometers still available to be read.

Table 20 Groundwater piezometer status summary 2020

Total bores	Total destroyed+	Dry, flooded or blocked	Not found	Total read
641	86	50	10	545

Note: + piezometers damaged or destroyed in the field due to land development or other uses or actions.

Depth to water table data is reported for 2020/21, 2019/20, 2018/19 and 2007/08. Groundwater data was read in August 2020 and therefore more likely to be influenced by the prior year. The 2007/08 year was chosen as the historical reference year for groundwater. That year had climatic conditions such as rainfall and evapotranspiration, along with announced allocation in the MIA comparable to the 2019/20 year.

The number of piezometers read within depth ranges for 2020 are shown in Table 21.

Table 21 Number and percent of total piezometers readings within each depth range

Year	<2M of surface	2-4M of surface	>4M of surface	% <2M of surface	% 2-4M of surface	% >4M of surface	Total
2020	12	86	437	2%	16%	82%	535
2019	5	96	386	1%	20%	79%	487
2018	23	151	367	4%	28%	68%	541
2007	11	207	609	1%	25%	74%	827

Table 21 shows groundwater depth at each piezometer is increasing, with 82% of piezometers reading at a depth greater than four metres below the ground surface.

Table 22 provides a comparison of the three depth class areas relative to the prior three years and a historical reference year. The standing water levels measured by the piezometers at known points are interpolated to each pixel within MI's area of operations using the nearest neighbour resampling method. The area for each depth class equals the count of pixels within the depth class * pixel size. Data for each year in the table was cropped to the extent of MI's area of operations for comparison. This information can change if certain piezometers are not read due to being blocked, flooded, destroyed or lack of access.

In 2020 when compared to 2019 there has been a minor increase of hectares in the shallow depth range, including when compared to the 2007 figures. The small rise in hectares from 2020 to 2019 for shallow groundwater levels may not be significant, given the inherent uncertainties in the area calculations.

The overall trend in groundwater levels using both point data from Table 21 and area data from Table 22 shows groundwater levels are at a deeper level when compared to both recent years and the benchmark year of 2007.

The area of operations has decreased between 2007 and 2020 and approval granted in 2015 to reduce the groundwater piezometer network.

Table 22 Change in groundwater depth

Groundwater	Depth to water table area (ha)	Change in depth
-------------	--------------------------------	-----------------

Murrumbidgee Irrigation Limited

depth range (m)						[+ = rising] [- = falling]			
	2020	2019	2018	2017	2007	2020 vs 2019	2020 vs 2018	2020 vs 2017	2020 vs 2007
<2M	178	161	0	1,821	280	+17	+178	-1,643	-102
2-4M	24,392	26,924	52,383	71,558	56,127	-2,532	-27,991	-47,166	-31,735
>4M	336,117	343,045	317,747	272,639	313,690	-6,928	+18,370	+63,478	+22,427
Total	360,687	370,130	370,130	346,018	370,097				

Note: Previous years data was cropped to match MI's area of operations for comparison

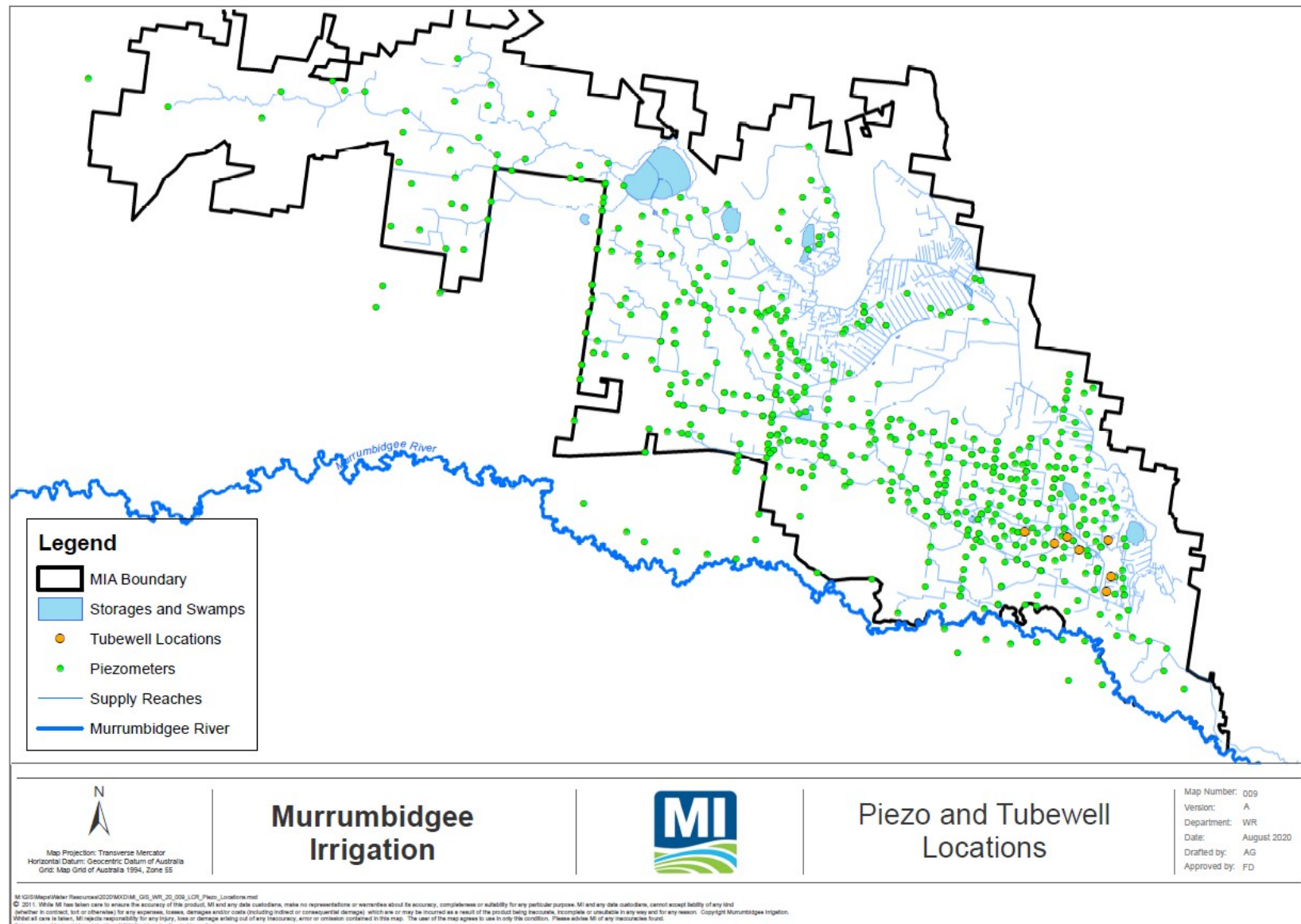


Figure 5 Location of piezometers and tubewells in the MIA 2020/21

6.2 Groundwater salinity

Groundwater salinity was not requested by the Minister for 2020/2021 reporting year.

6.3 Shallow Shepparton Formation

The depth to water table in 2020 for piezometers in the shallow Shepparton Formation are presented in Figure 6 to Figure 10.

Groundwater levels in this formation are expected to be highly influenced by seasonal rainfall, geology, and irrigation. A comparison between Figure 6 and Figure 7 demonstrates that the overall groundwater levels have lowered in comparison with prior years.

When compared to 2007/08 (Figure 9), recent groundwater levels have mainly lowered across the MIA, with more piezometers reading standing water levels greater than 4 m from surface level. Groundwater levels have likely lowered due to a reduction in flood irrigation practices and improved water efficiency on farms.

In 2020 six piezometers experienced a greater than 1 m rise in standing water level. The piezometers are positioned in crop areas that contain significant watering such as rice and cotton. In 2019/20 MIA experienced above average rainfall, periods of saturated catchments, higher diversions, and allocations. In addition, more cropping occurred over winter than in previous years likely due to a combination water availability, seasonal outlook and commodity prices.

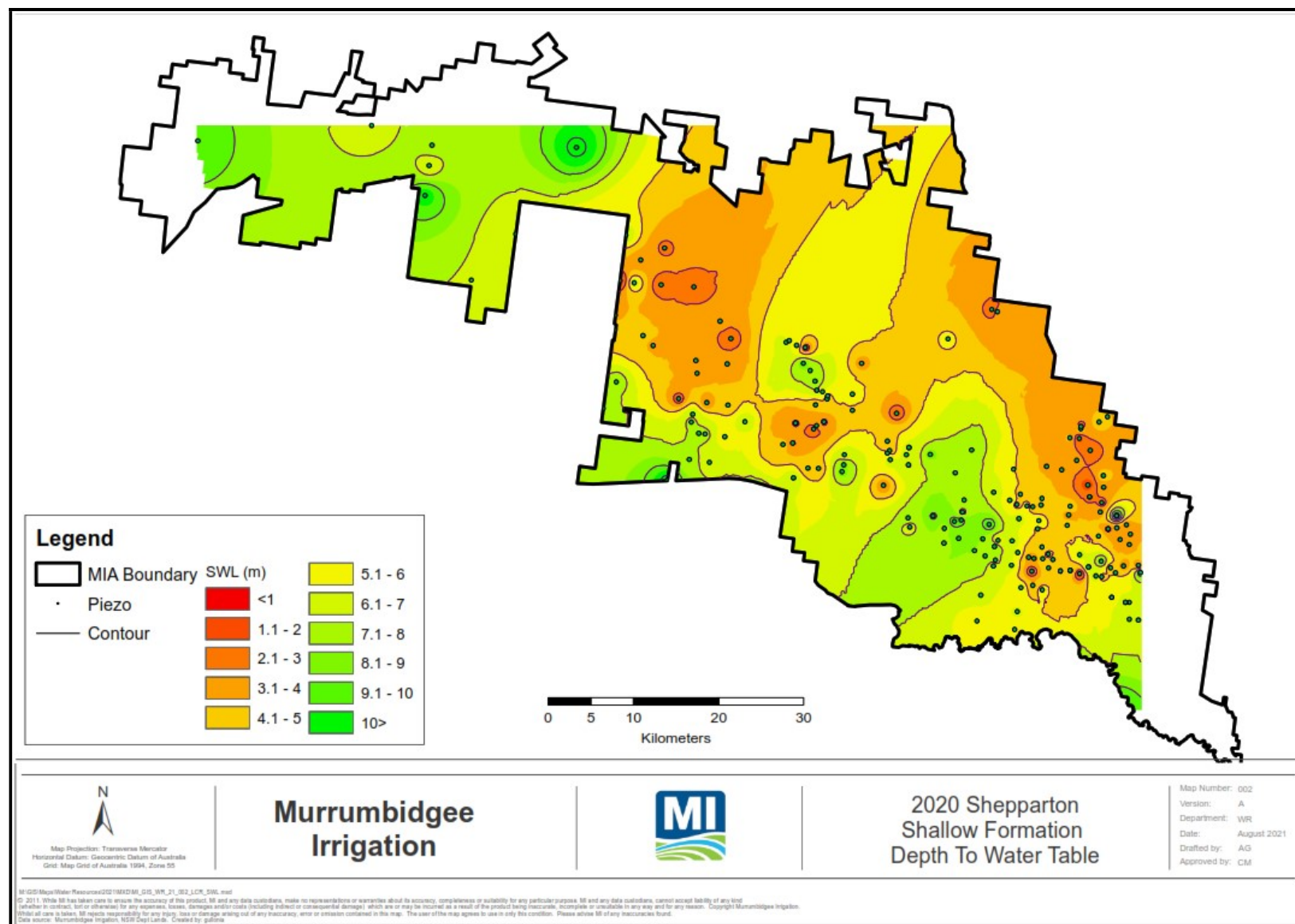


Figure 6 Shallow Shepparton Formation – depth to water table 2020

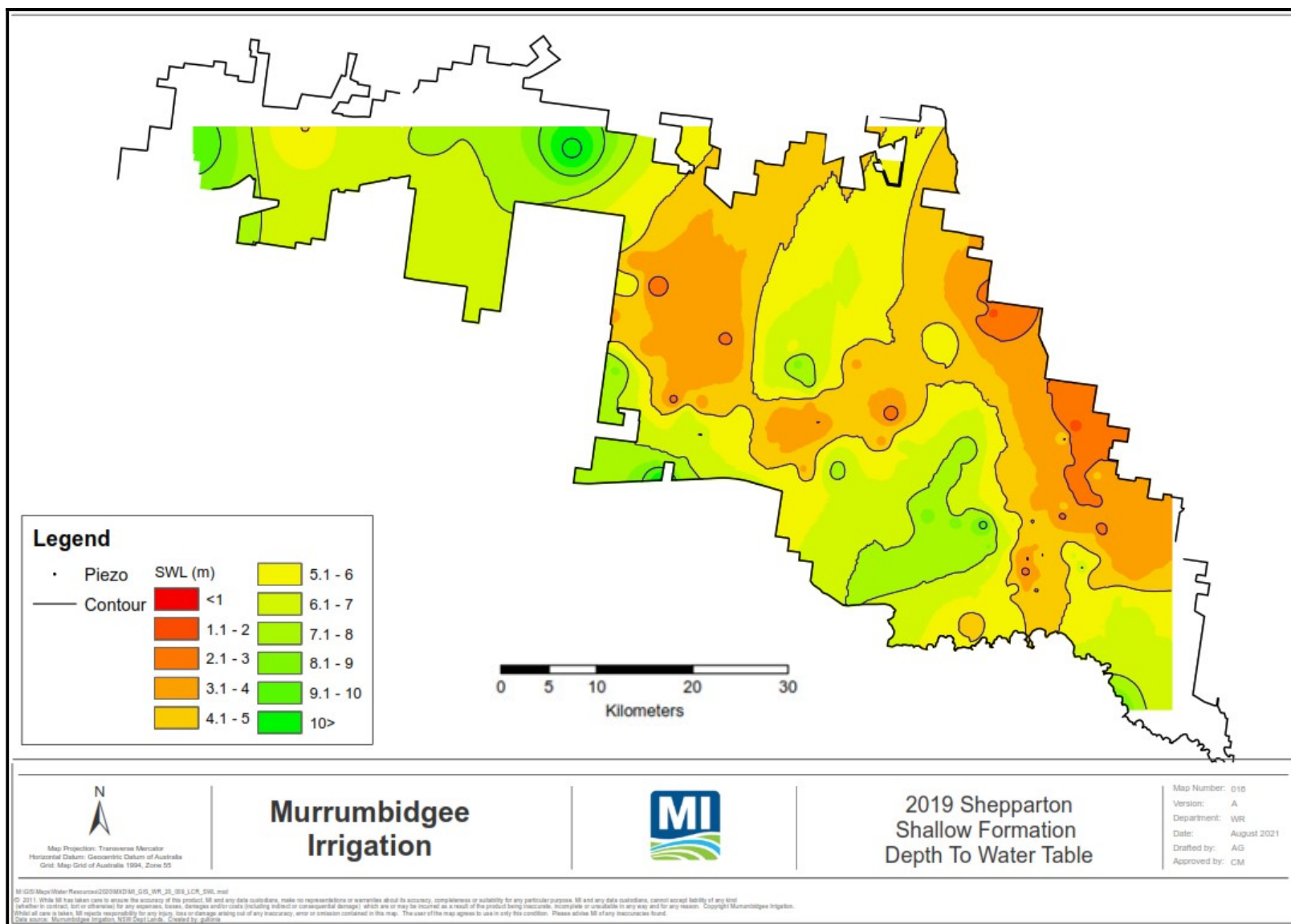


Figure 7 Shallow Shepparton Formation – depth to water table September 2019

(Note: A data error occurred in last FY report and Figure 6 has been updated to address)

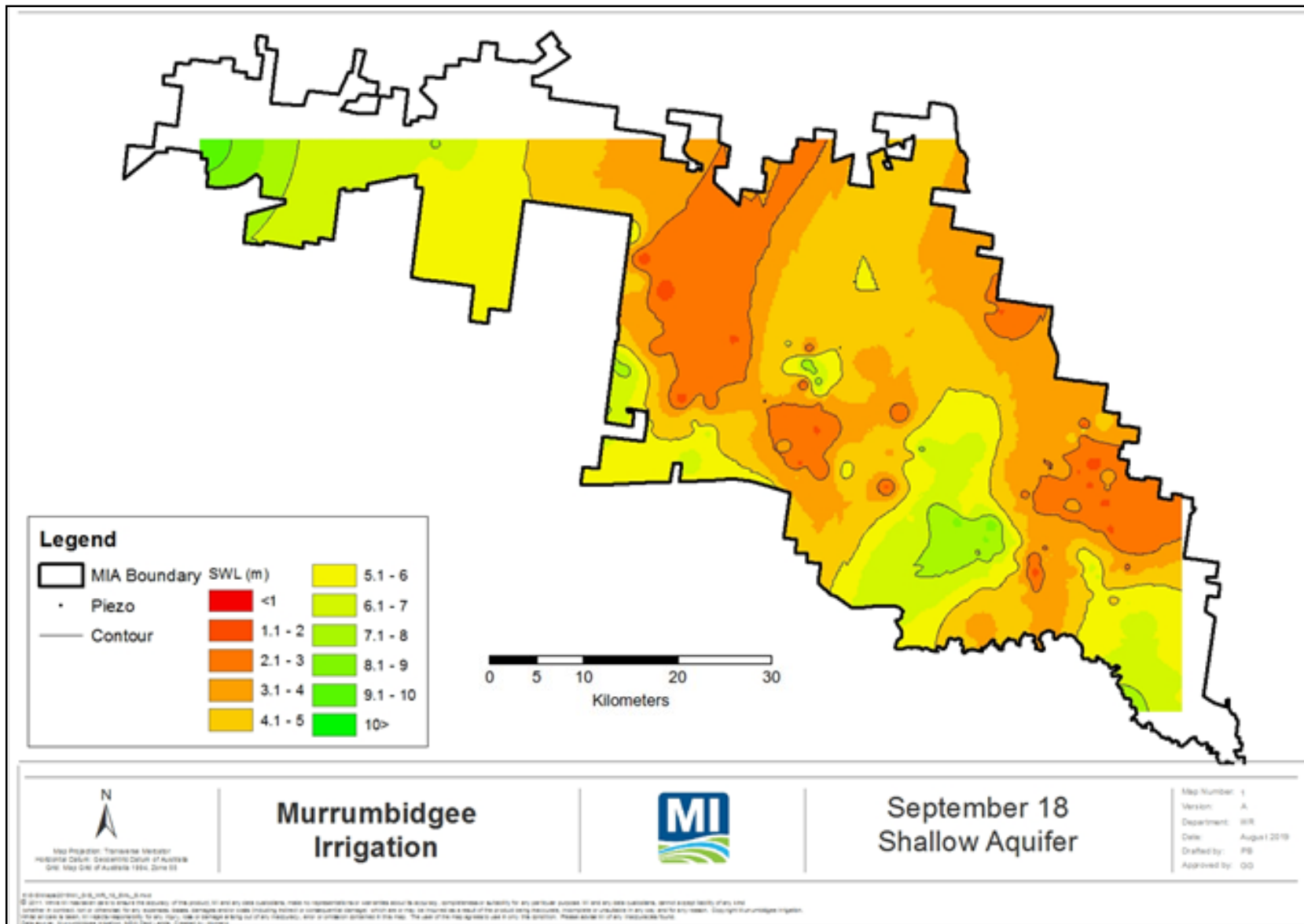


Figure 8 Shallow Shepparton Formation - depth to water table, September 2018

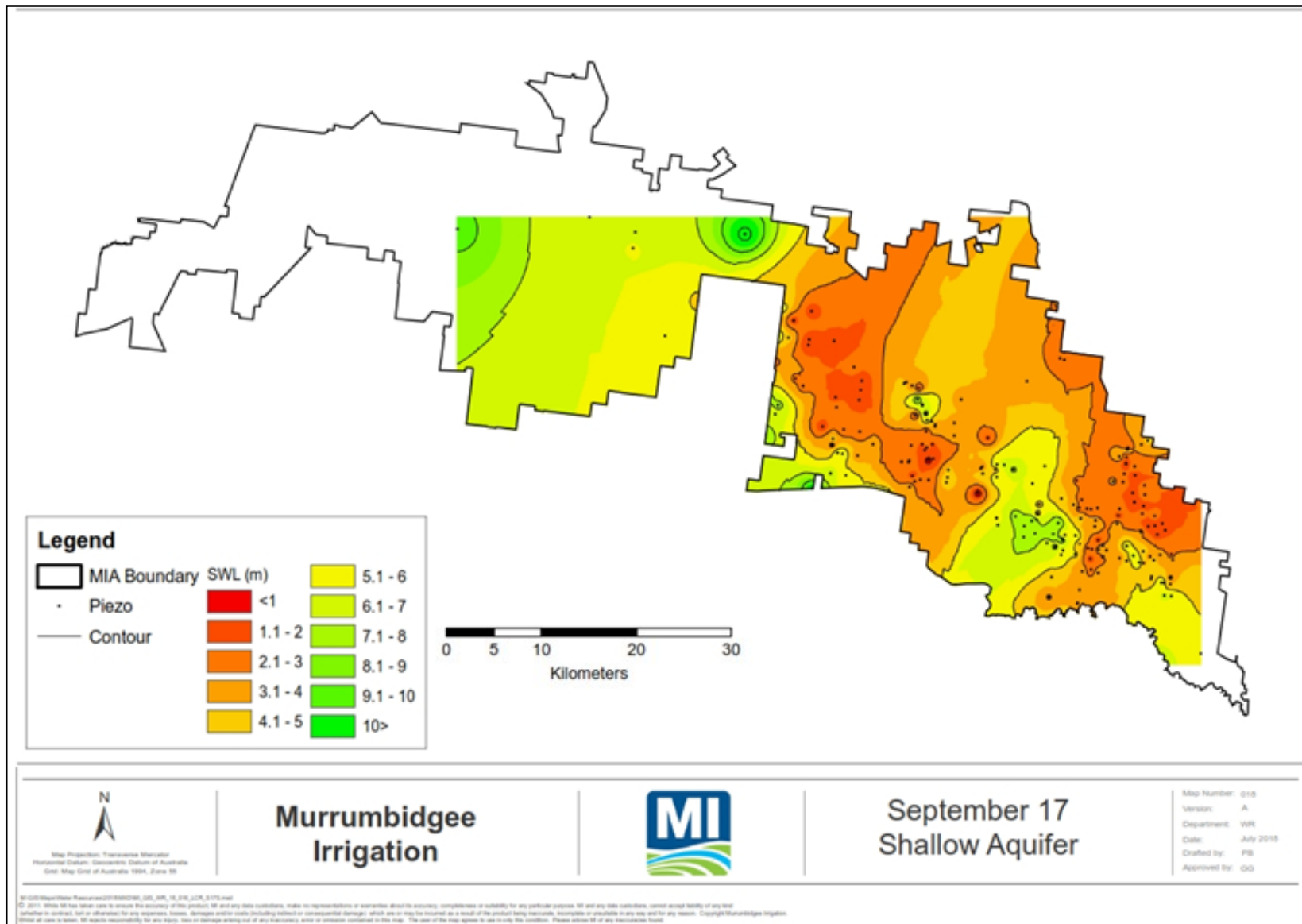


Figure 9 Shallow Shepparton Formation - depth to water table, September 2017

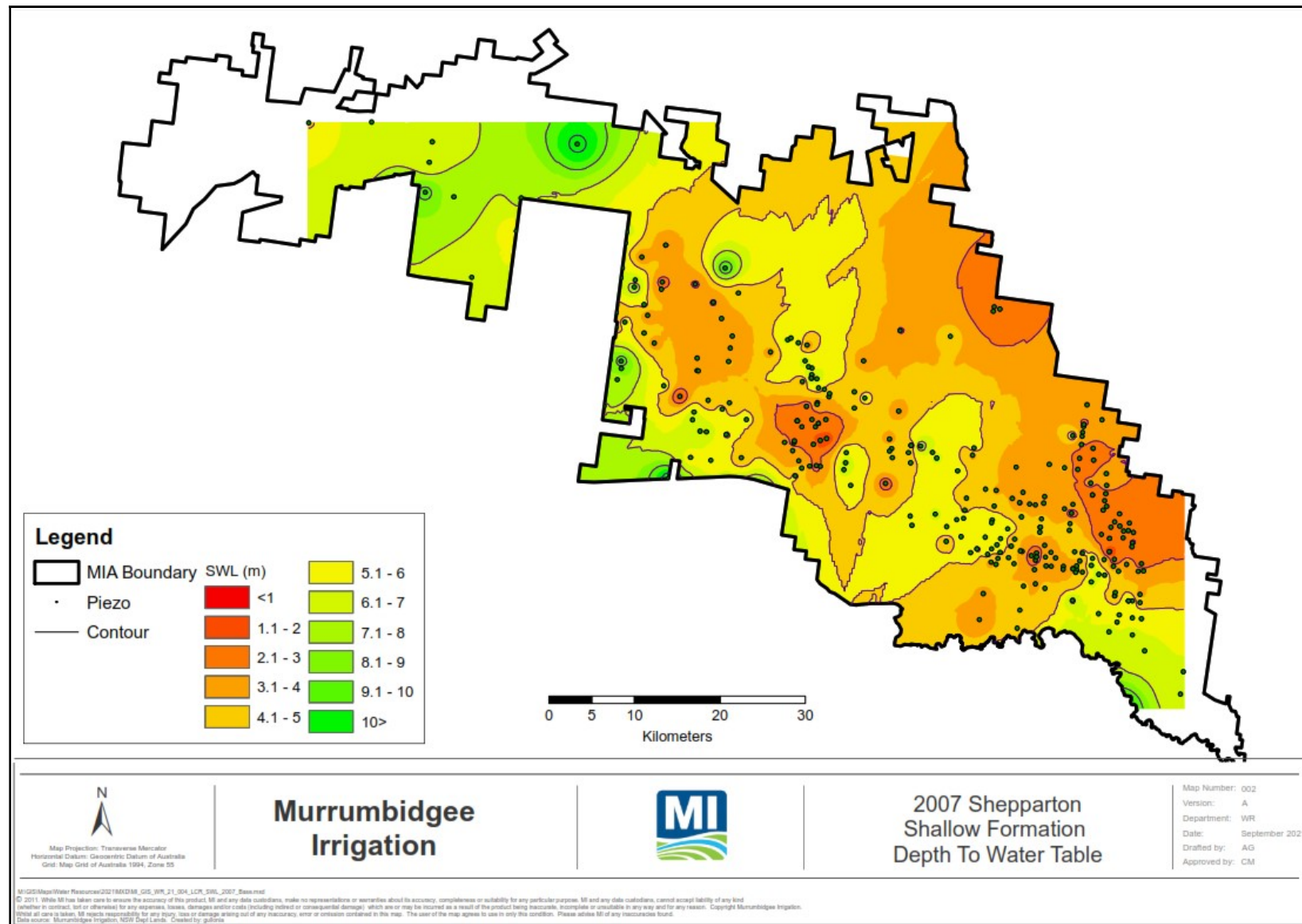


Figure 10 Shallow Shepparton Formation - depth to water table, September 2007

6.4 Deep Shepparton Formation

Depth to water table for piezometers in the deep Shepparton Formation are presented in Figure 11 to Figure 15.

Groundwater levels in the deep Shepparton Formation, in the longer term, are also influenced by rainfall and irrigation practices along with the connectivity with the shallow Shepparton Formation. Therefore, the trends observed in the shallow Shepparton Formation are also often seen in the deep Shepparton Formation. Groundwater extraction may also influence these levels, however MI does not have access to this data.

A comparison between Figure 11 and Figure 12 also demonstrates groundwater levels deepening across MIA for previous reporting years, including the historical reference year 2007/08, Figure 14.

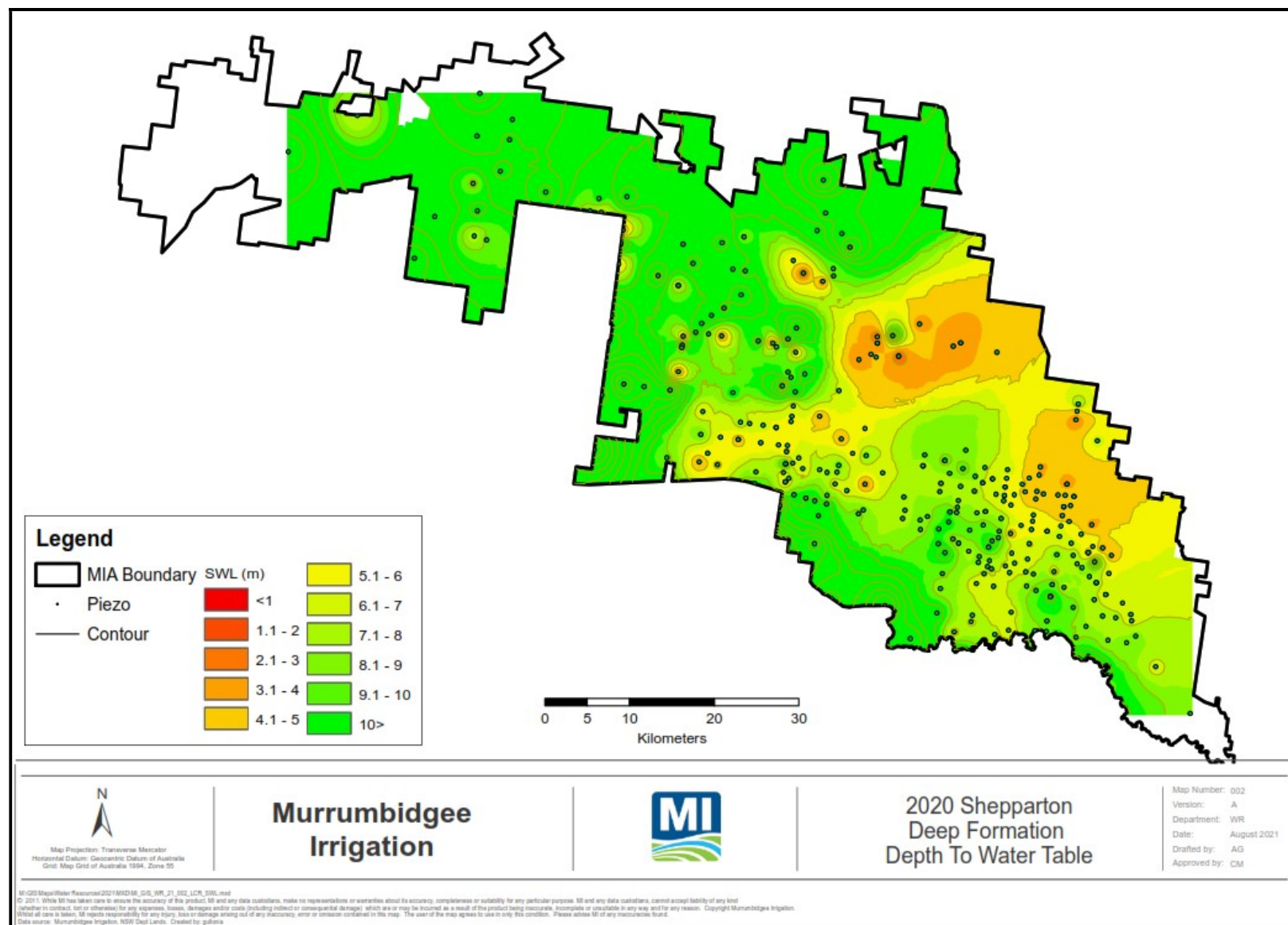


Figure 11 Deep Shepparton Formation - depth to water table, 2020

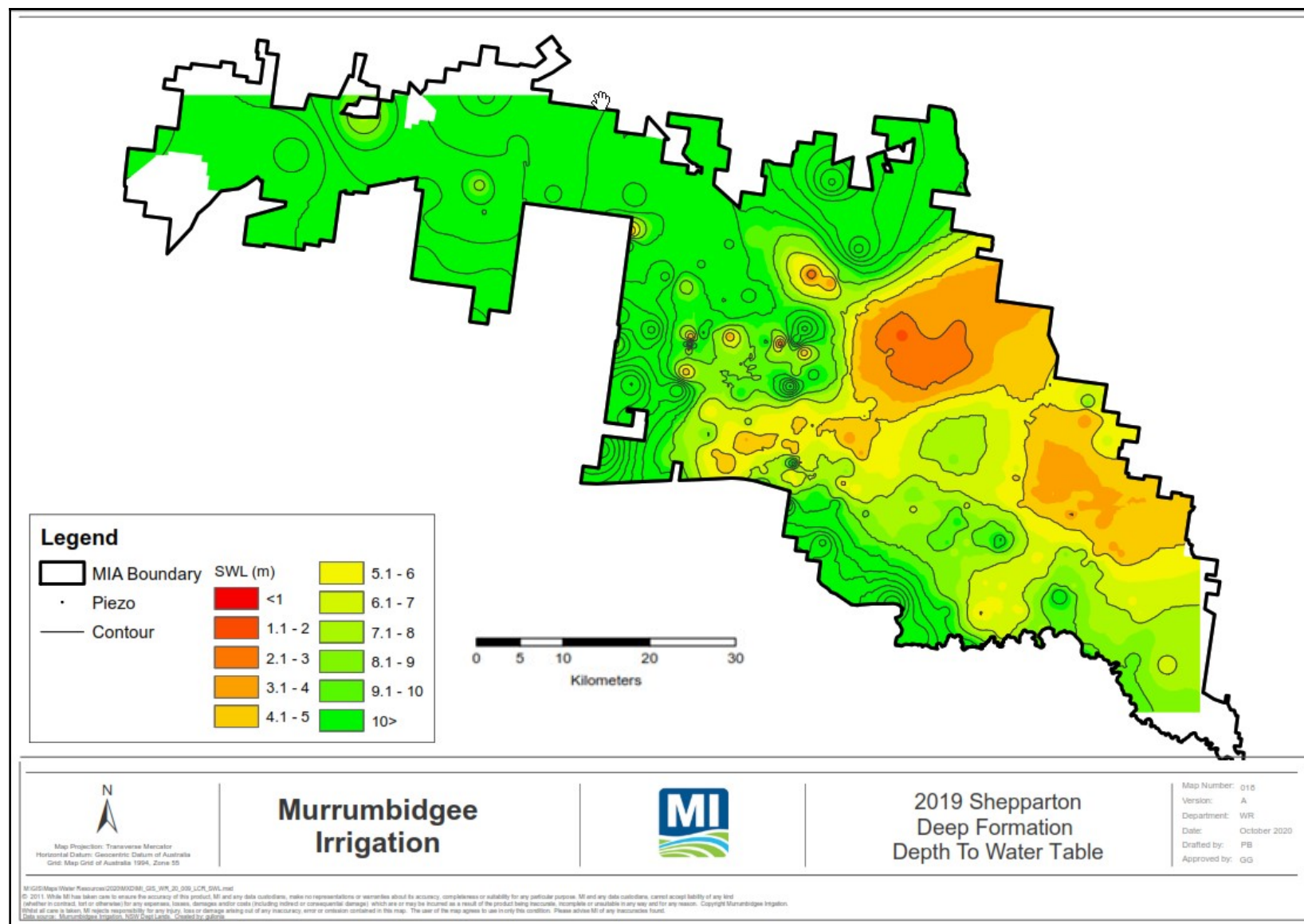


Figure 12 Deep Shepparton Formation - depth to water table, September 2019

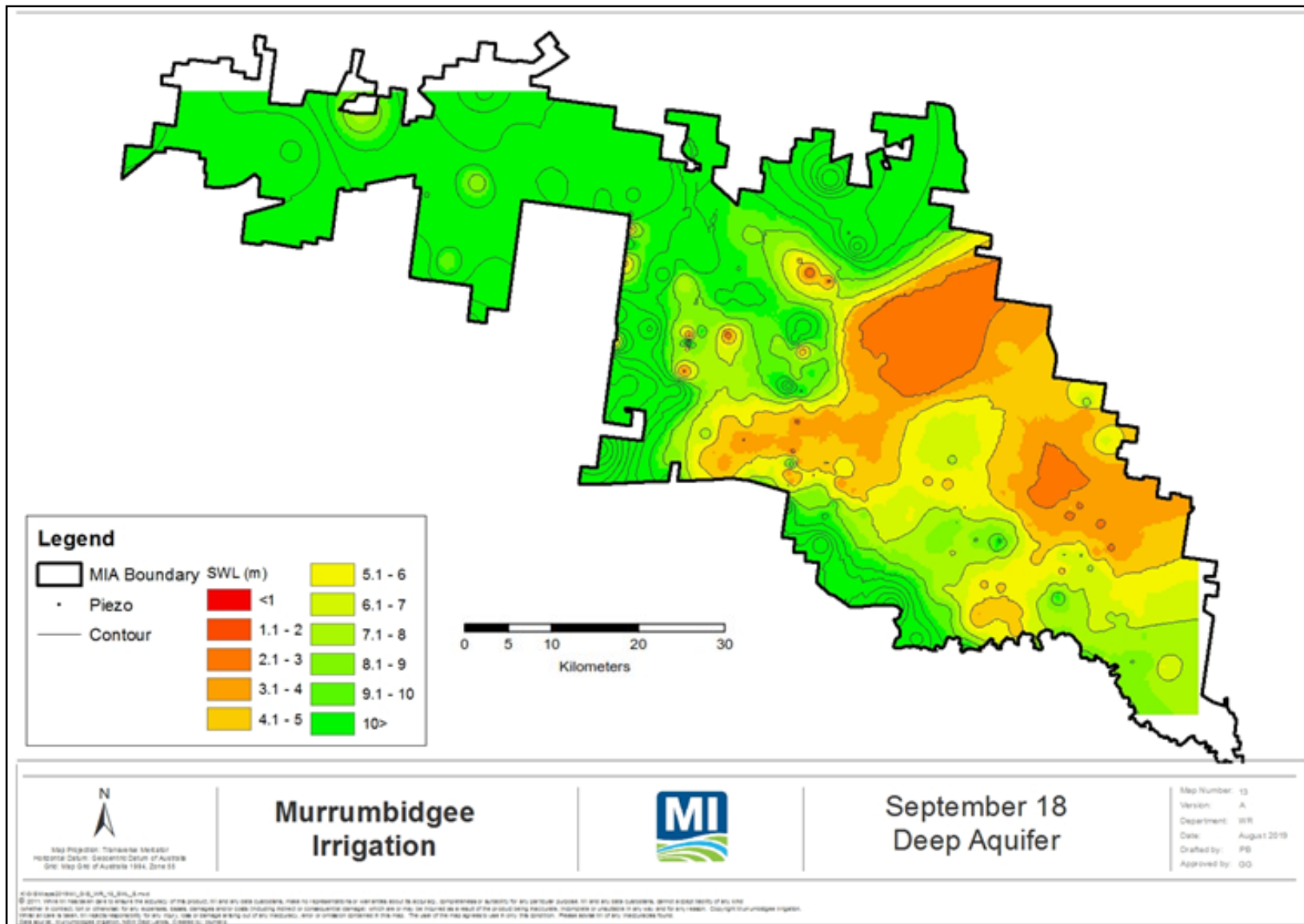


Figure 13 Deep Shepparton Formation - depth to water table, September 2018

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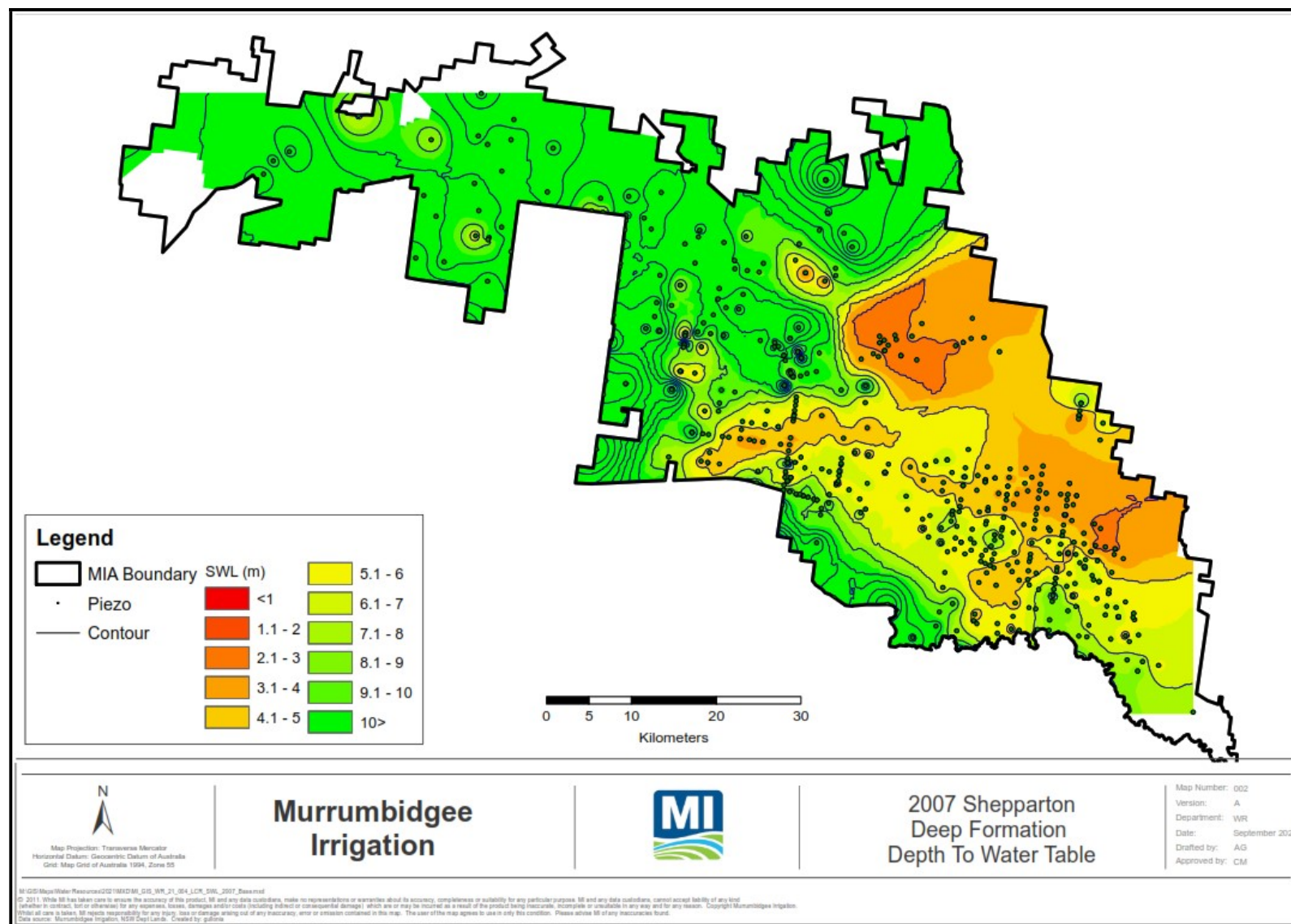


Figure 15 Deep Shepparton Formation – depth to water table, September 2007

6.5 Calivil Formation

Depth to water table for piezometers in the Calivil Formation are presented in Figure 16 to Figure 20.

Level trend in this formation generally represent drawdown from the shallow and deep Shepparton aquifers. Therefore, when comparing Figure 16 and Figure 17 the depth to water table has lowered. Overall, the levels in this aquifer remain consistent for all reporting years, with majority of piezometers reading a depth to water table of more than 10 metres.

The depth to water table area (Table 22) represents that the groundwater range greater than 4 metres continues to contain the largest area. Throughout the last three years there has been a gradual increase in piezometers reading standing water levels greater than 4 metres from the surface.

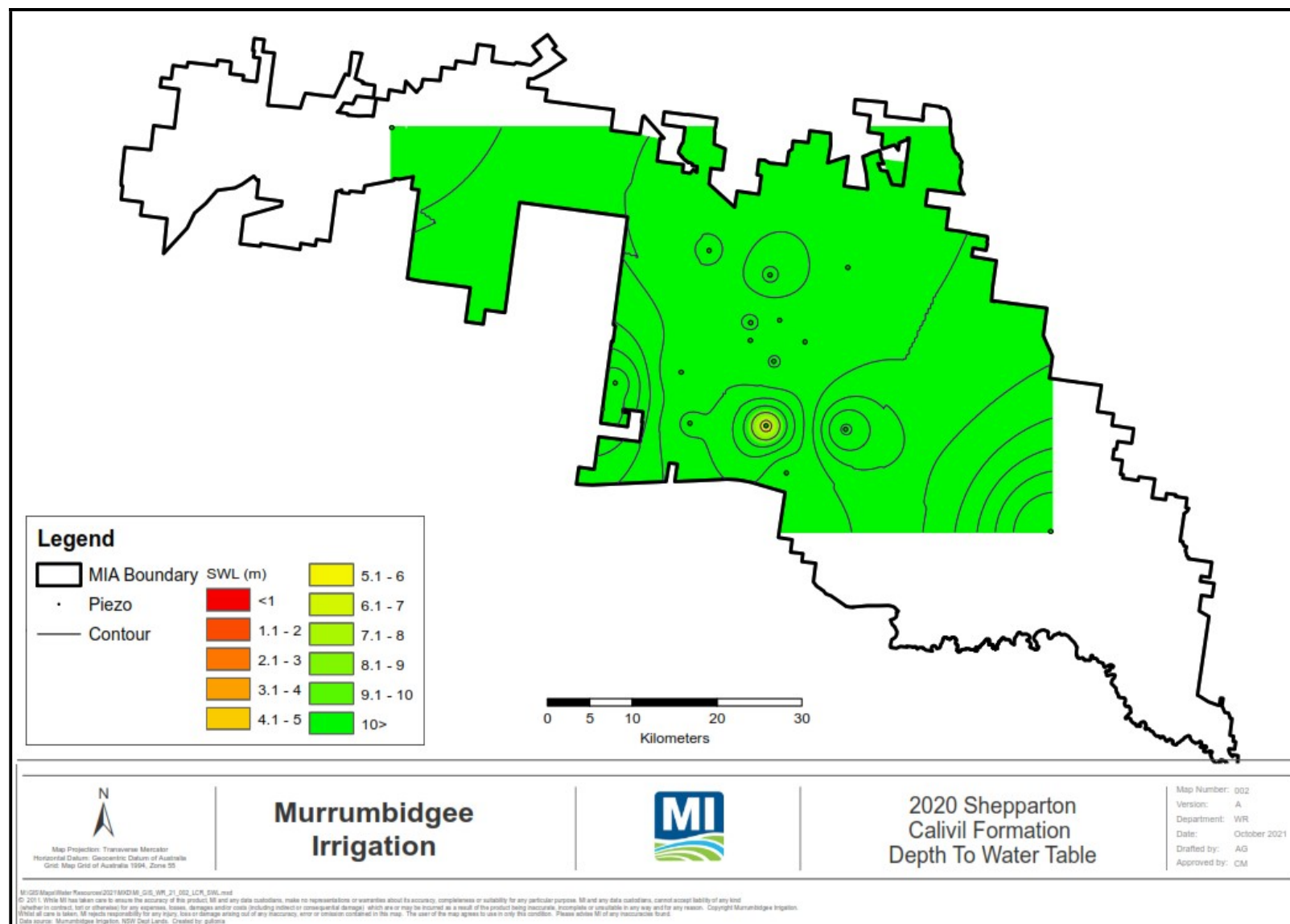


Figure 16 Calivil Formation – depth to water table, 2020

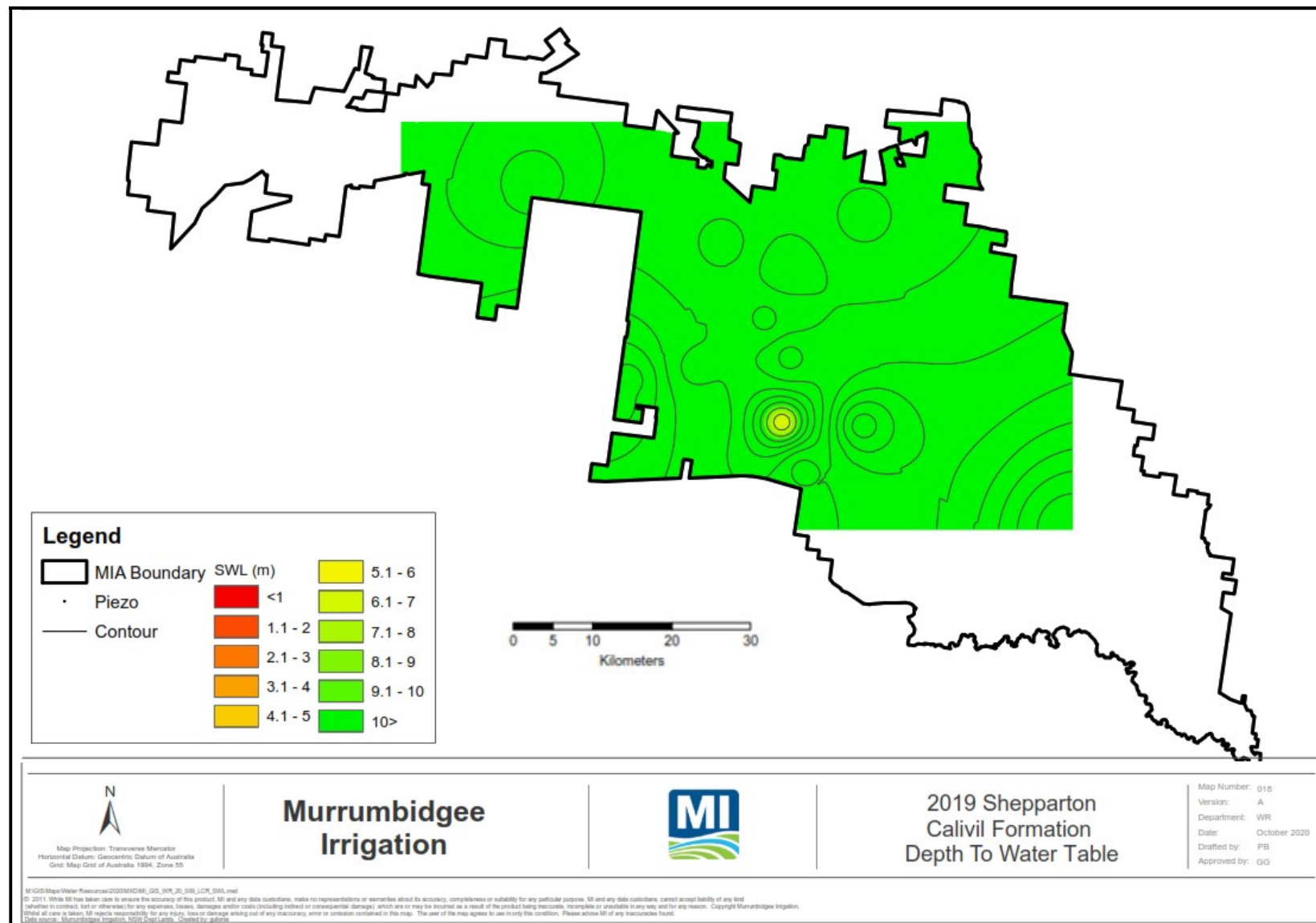


Figure 17 Calivil Formation - depth to water table, September 2019

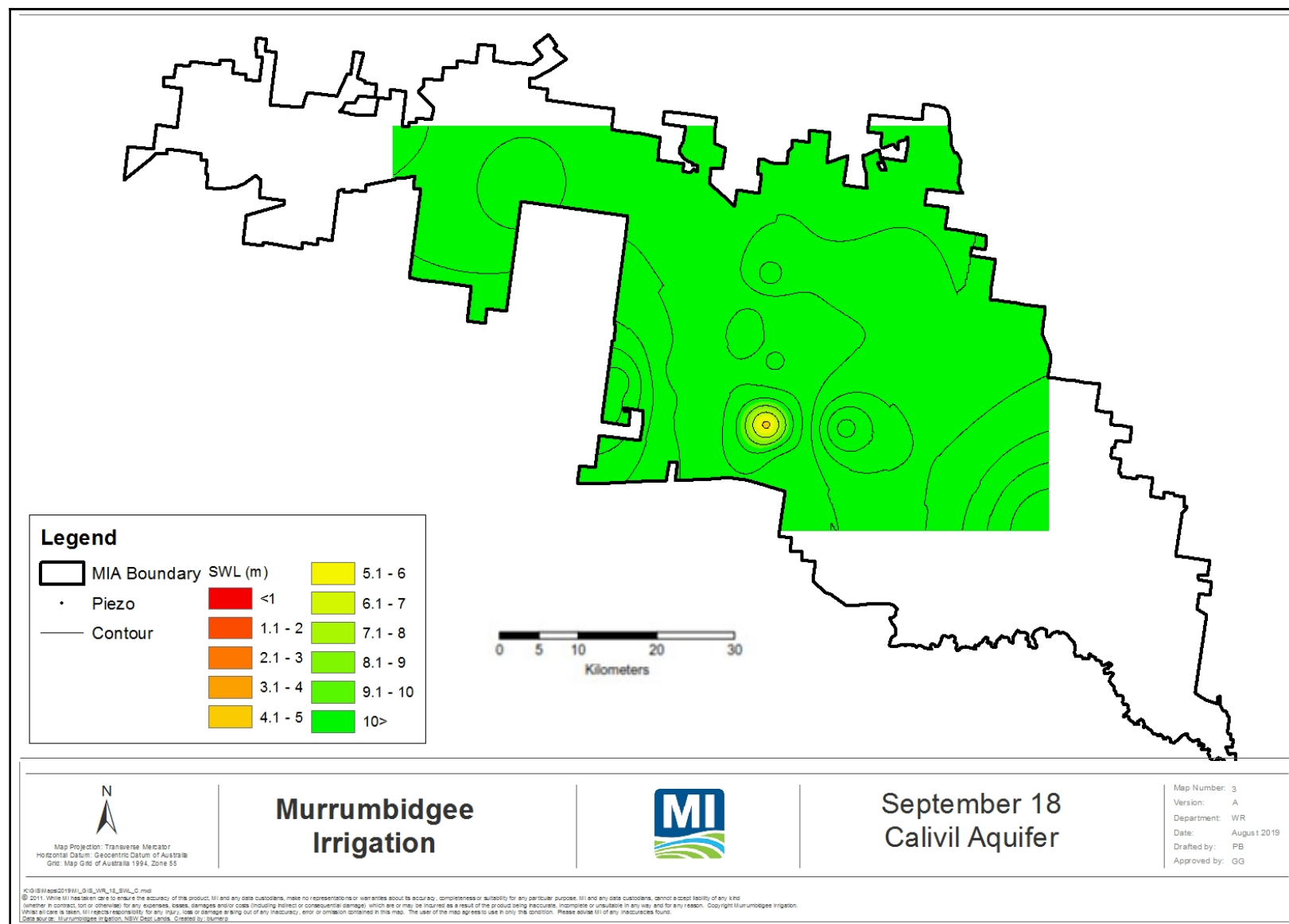


Figure 18 Calivil Formation - depth to water table, September 2018

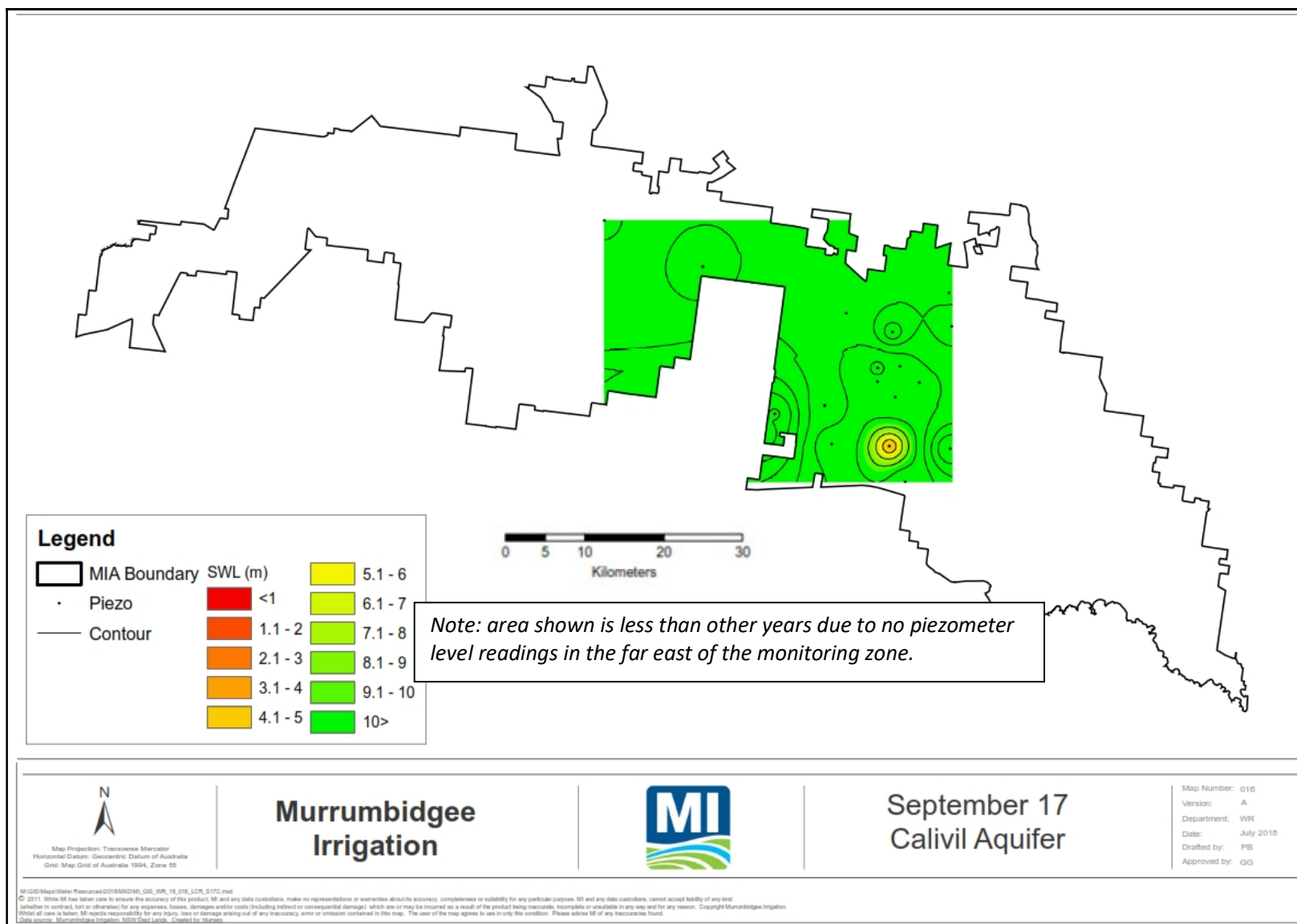


Figure 19 Calivil Formation - depth to water table, September 2017

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7 Tubewells

MI monitors the volume of water and salt load pumped from seven tubewells within the MIA when operational. The locations of the tubewells are shown in Figure 5.

No tubewells were operated during the 2020/21 reporting period. MI will consult with the relevant authority as to their future operation.

8 New measures to limit groundwater recharge and discharge of salt

No new measures were implemented for 2020/21.

9 Environmental protection and management

9.1 Discharge of noxious aquatic weeds

During 2020/21 irrigation year, there was no known actual or potential discharge of Class 1, 2 or 3 declared aquatic weeds from MI's Area of Operation.

One potential notification was provided to NRAR on 16 December 2020, based on a third party notification. Upon further investigations it was determined the plant was not a Weed of National Significance.

9.2 Discharge of blue-green algae

No Red alert levels of blue-green algae were detected from any water sampled during discharge from MI's area of operation.

ENVIRONMENTAL PROTECTION LICENCE 4651

10 Statement of compliance

MI has fulfilled the compliance requirements as set out in EPL 4651 for 2020/21. A summary of the compliance requirements is cross referenced to this report and listed in Table 23.

No non-compliances were recorded and reported on during 2020/21.

Quality assurance and control procedures are in place to ensure data integrity and all compliance obligations are fulfilled. This includes using a NATA accredited laboratory for water sample analysis and contracting an external hydrological service provider to manage and maintain automated monitoring stations at discharge points. Internal Standard Operating Procedures (SOPs) for monitoring and reporting are reviewed and updated regularly.

MI has in place a process to receive complaints from members of the public in relation to MI's activities via the business telephone number. Contact information for complaints can be found on MI's website (<https://www.mirrigration.com.au/company/contact>).

Table 23 EPL 4651 monitoring and reporting requirements

Licence section	Requirement	Compliant	Included in this report
Administrative Conditions	1	Yes	No, not applicable
Discharges to Air and Water and Applications to Land	2	Yes	N/A
Limit Conditions	3	Yes	N/A
Operating Conditions	4	Yes	N/A
Maintain a Chemical Contingency Plan	O3.1	Yes	No, see: https://www.mirrigration.com.au/water/water-quality
Maintain a Chemical Control Plan	O3.5	Yes	
Maintain Pollution Incident Response Management Plan	Required for all EPL holders under the <i>Protection of Environment Operations Act 1997</i>	Yes	
Monitoring and Recording Conditions	5	Yes	10. Statement of Compliance
Monitoring Records	M1	Yes	No - available upon request from EPA
Requirement to monitor concentration of pollutants discharged	M2	Yes	11. EPL Monitoring and Reporting
Testing Methods	M3	Yes	No - Internal documents
Recording of pollution complaints	M4	Yes	No - available upon request from EPA
Telephone complaints line	M5	Yes	10. Statement of Compliance
Requirement to monitor volume or mass	M6	Yes	11. EPL Monitoring and Reporting
Other Monitoring and recording conditions	M7	Yes	9.1. Noxious Weed Management

Licence section	Requirement	Compliant	Included in this report
Annual return documents	R1	Yes	Submitted 23 August 2021
Annual system performance report	R4 Summary R2, R3 & R5	Yes	a) 3. Reporting on water management b) 11. EPL monitoring and reporting & 11.2 Water quality monitoring c) 11.3. Summary of events d) 12. Proposed changes

11 EPL monitoring and reporting

Under MI's EPL 4651, five locations (Figure 2) are licensed to allow water to be discharged outside MI's Area of Operation, with the condition that all flows are recorded, and specified water quality parameters are monitored. These discharge points are listed below:

- POINT 4 LAG - Gogeldrie Main Drain at Gooragool Lagoon
- POINT 5 GMSRR – Gogeldrie Main Southern Drain River Road
- POINT 6 YMS – Yanco Main Southern Drain
- POINT 7 ROCUDG – Cudgel Creek Roaches Escape
- POINT 15 MIRFLD – Mirrool Creek Floodway Wyvern Station

11.1 System performance

Table 24 presents total diversions into the MIA and total water discharged from the MIA for 2020/21 compared to previous years. In 2020/21, 900 ML was discharged, an increase of 773 ML compared to last reporting period 2019/20.

The diversions for 2020/21 are comparable to 2014/15, however 2020/21 discharged 229 ML more than 2014/15. This is due to 100% allocations and above average rainfall received for 2020/21.

Table 24 Total water volumes

Year	Diversions (ML)	Discharged (ML)
2020/21	880,456	900
2019/20	349,523	127
2018/19	586,752	642
2017/18	945,805	4,471
2014/15	878,614	671

11.2 Water quality monitoring

Monthly summaries for each monitoring point are presented in Table 25 to Table 29. Monitoring consisted of thirty sampling events, with twelve Notification level detections and five Action level detections.

Diuron and metolachlor were the two chemicals detected above licence limits in 2020/21. Chemical detections were found at three of the five licenced sites, Point 4 – LAG, Point 5 - GMSRR and, Point 7 - ROCUDG.

Table 25 Monitoring results for Point 4 - LAG

Month	Discharged (ML)	Sampling events	Detections	Chemical detection details
Jul-20	0	0	0	-
Aug-20	34	2	2	17/08/2020 Notification level Diuron (0.406µg/L) 31/08/2020 Action level Diuron (1.15µg/L)
Sep-20	59.8	2	0	-
Oct-20	4.7	0	0	No sample taken. Low flows didn't trigger alarm
Nov-20	13.9	3	2	10/11/2020 Notification level Diuron (0.286µg/L) 10/11/2020 Action level Metolachlor (0.104µg/L)
Dec-20	23	3	1	19/12/2020 Notification level Metolachlor (0.083µg/L)
Jan-21	58	2	0	-
Feb-21	35	3	3	05/02/2021 Notification level Metolachlor (0.052µg/L) 12/02/2021 Action level Metolachlor (0.475µg/L) 15/02/2021 Action level Metolachlor (0.813µg/L)
Mar-21	143.7	1	2	22/03/2021 Notification level Diuron (0.552µg/L) 22/03/2021 Notification level Metolachlor (0.071µg/L)
Apr-21	9.8	1	0	-
May-21	1	0	0	-
Jun-21	8.5	1	2	25/06/2021 Notification level Diuron (0.443µg/L) 25/06/2021 Notification level Metolachlor (0.089µg/L)
Total	391.4	18	12	

Table 26 Monitoring results for Point 5 - GMSRR

Month	Discharged (ML)	Sampling events	Detections	Chemical detection details
Jul-20	0	0	0	-
Aug-20	2.1	0	0	Supply water release (overtopped structure) No sample taken
Sep-20	0	0	0	-
Oct-20	0	0	0	-
Nov-20	0	0	0	-
Dec-20	0	0	0	-
Jan-21	0	0	0	-
Feb-21	0	0	0	-
Mar-21	133	1	1	24/03/2021 Notification level Diuron (0.644µg/L)
Apr-21	0	0	0	-
May-21	0	0	0	-
Jun-21	0	0	0	-
Total	135.1	1	1	

Table 27 Monitoring results for Point 6 - YMS

Month	Discharged (ML)	Sampling events	Detections	Chemical detection details
Jul-20	0	0	0	-
Aug-20	0	0	0	-
Sep-20	0	0	0	-
Oct-20	1.2	0	0	-
Nov-20	2.2	1	0	-
Dec-20	0	0	0	-
Jan-21	0	0	0	-
Feb-21	0	0	0	-
Mar-21	102	1	0	-
Apr-21	0	0	0	-
May-21	0	0	0	-
Jun-21	15.8	1	0	-
Total	121.2	3	0	

Table 28 Monitoring results for Point 7 - ROCUDG

Month	Discharged (ML)	Sampling events	Detections	Chemical detection details
Jul-20	0	0	0	-
Aug-20	1.7	0	0	-
Sep-20	12.1	1	0	-
Oct-20	13.7	0	0	No sample taken. Low flows throughout the month due to rainfall, didn't trigger an alarm.
Nov-20	85	2	0	-
Dec-20	0	0	0	-
Jan-21	0	0	0	-
Feb-21	0	0	0	-
Mar-21	102	2	2	25/03/2021 Notification level Metolachlor (0.047µg/L) 31/03/2021 Notification level Metolachlor (0.08µg/L)
Apr-21	4	0	0	No sample taken. Low flows didn't trigger alarm
May-21	10.4	1	1	27/05/2021 Notification level Metolachlor (0.041µg/L)
Jun-21	23	2	1	06/06/2021 Action level Metolachlor (0.115µg/L)
Total	251.9	8	4	

Table 29 Monitoring results for Point 15 - MIRFLD

Month	Discharged (ML)	Sampling events	Detections	Chemical detection details
Jul-20	0	0	0	-
Aug-20	0	0	0	-
Sep-20	0	0	0	-

Month	Discharged (ML)	Sampling events	Detections	Chemical detection details
Oct-20	0	0	0	-
Nov-20	0	0	0	-
Dec-20	0	0	0	-
Jan-21	0	0	0	-
Feb-21	0	0	0	-
Mar-21	0	0	0	-
Apr-21	0	0	0	-
May-21	0	0	0	-
Jun-21	0	0	0	-
Total	0	0	0	-

Figure 21 provides a comparison of annual rainfall received, compared to the number of chemical detections for the last four years.

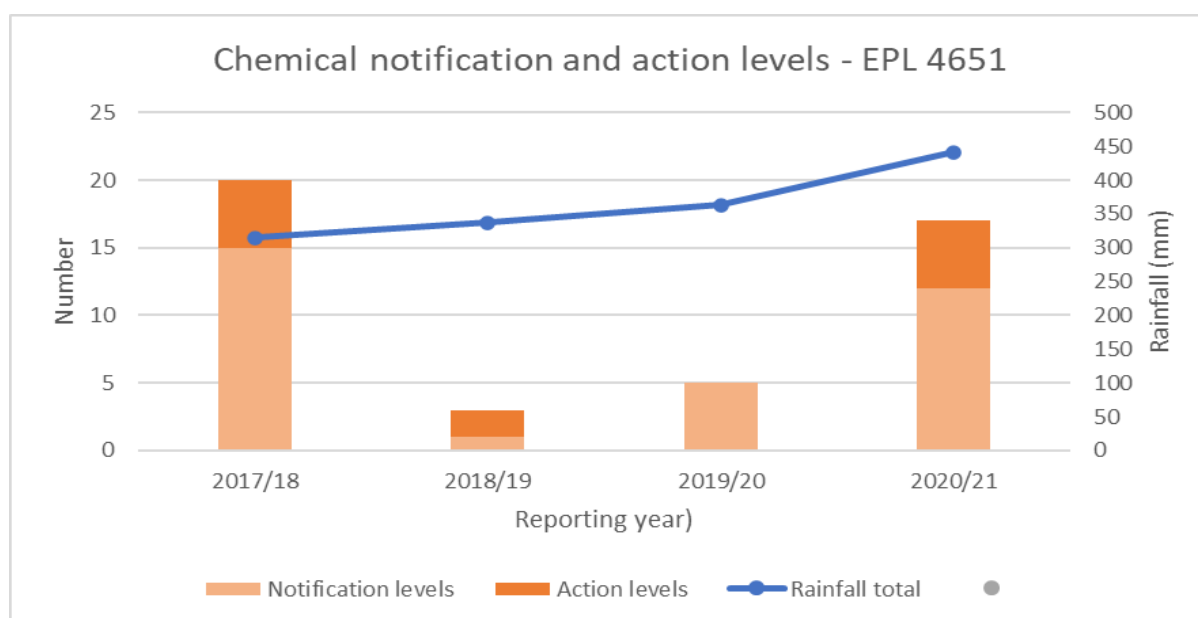


Figure 21: Comparison of irrigation drainage water notification trends

The number of Notification and Action level detections has increased compared to the prior reporting year where no Action levels were detected. This correlates with increased water deliveries to customers, increased cropping and local rainfalls yielding increased drainage water discharges.

Another influence on the results is a change in March 2020 to Diuron notification and action levels under MI's EPL4651. These levels were decreased, leading to increased instances where notification to EPA is required.

Overall, in the 2020-21 year Diuron accounted for five reports to the EPA and Metolachlor accounted for twelve. MI has provided information to our customers via our Customer Newsletters and Chemical Fact Sheets via our website to raise awareness in the MIA on the risks of chemical use and the need to comply with MI's Drainage Use Rules. Where investigations have been undertaken, direct contact with customers occurs via phone calls, letters, emails and in-field meetings to raise awareness on MI's EPL

requirements, Drainage Use Rules and the need for customers to comply with all pesticide legislative requirements, included using chemicals in accordance with their approved labels.

11.3 Summary of events

Table 30 contains a summary of all events that have been reported on during 2020/21. No events occurred that triggered notification of environmental harm or a written report to the EPA under the EPL. A total of 17 exceedances were recorded during 2020/21 reporting period.

Table 30 Summary of events 2020/21

Year	Notification of environmental harm	Written report (of an event)	Exceedances
2020/21	0	0	17

12 Proposed changes

MI propose no changes to the EPL conditions at this time.

Attachment A: Significant events for 2020/21

Murrumbidgee Irrigation notified the minister of seven significant events during 2020/21 reporting year. Each significant event details are outlined below in below Table 31. Each significant event was notified to the minister using the S91i process.

Table 31 Summary of significant events 2020/21

Date lodged	Reference	Site	Event details	Occurrence	Corrected by	Date closed
7/06/2021	CS0352556	Sturt Offtake	low river levels	Low river levels with potential for inaccurate flow measurements	Certificate of Validation provided	27/06/2021
23/02/2021	CS0321512	Sturt Offtake	Single door operation	Single gate operation at low flows	Updated site operating protocols. Introduced gate operation interlocks below a low flow threshold.	16/03/2021
2/12/2020	CS0296001	Sturt Offtake	Mechanical Fault	Component failure	Component repaired	30/01/2021
28/08/2020	CS0002573	Sturt Offtake	Component failure	Component failure	Component repaired	10/10/2020
30/07/2020	CS0002427	Sturt Offtake	low flow conditions	Site operating at low flow conditions	Updated site operating protocols	4/10/2020
27/07/2020	CS0002420	Narrandera Offtake	low levels	Low river levels with potential for inaccurate flow measurements	Updated site operating protocols	4/10/2020
1/06/2020	CS0002332	Sturt Offtake	Meter algorithm updated	Identified opportunity to increase accuracy of meter	Updated flow measurement algorithm in Affra Unit	10/10/2020

Attachment B: VENTIA flow, EC, and salt load monitoring financial year report

MURRUMBIDGEE IRRIGATION LIMITED - FLOW, EC & SALT LOAD MONITORING FINANCIAL YEAR 2020/2021 REPORT

Issue	04
Issued Date	22/10/2021

Prepared	Hussain Morssi (<i>Data Analyst</i>)
Reviewed	Matthew Bamford (<i>Area Manager</i>)
Approved	Rebekah Webb (<i>Hydrology Manager</i>)

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Report No.	RPT0555
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Document Control

Amendment	Date	Page	Description	Authorised
02	03/08/2021	-	-	Matthew Bamford
03	26/08/2021	-	New data received	Matthew Bamford
04	22/10/2021	-	Updated Sections 3.2 & 4.2	Matthew Bamford

Notification / Distribution List

Section/Group	Contact
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Murrumbidgee Irrigation Limited	Fern Dorricott
Murrumbidgee Irrigation Limited	Cindy McGrath
Ventia Utility Services	Matthew Bamford
Ventia Utility Services	Rebekah Webb

The above notification list is a minimum controlled distribution and it is the responsibility of the persons receiving the notification to further notify other Ventia personnel within their area if required.

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1.0 Introduction

Ventia Utility Services is contracted by Murrumbidgee Irrigation Limited (MIA) to conduct continuous level/flow and salinity monitoring at a range of locations distributed across their area of operations.

This report presents monthly statistics and annual summaries of total flow and salt loads derived from the monitoring at drain sites for the 2020/2021 financial year. Site 410083 contains no flow or salt load data as the rating table was suspended as of the 01/06/2010 to present due to the installation of new gates.

This report contains information relating to Murrumbidgee Irrigation Limited Compliance sites, 410083, 41010005, 41010921 and 41010940. Also reported on are the two offtake sites being 410127 and 410129. An annual site summary can be found in this report on all sites maintained by Ventia field staff.

All data reported is extracted from the Ventia Hydstra software archive to an accuracy of three (3) significant figures.

A data extraction process called HYTAB is used when extracting the data. HYTAB utilises a configuration file provided by MIA to format the data. This file stipulates reporting to four (4) significant figures. Using four significant figures implies an unrealistic level of accuracy for the data collection processes undertaken. Ventia data reporting standards recommend a maximum of three (3) significant figures.

2.0 Annual Flow Summaries

2.1 Compliance Sites

Please note that [#] implies that although a mean monthly flow figure has been given, this flow figure is only the mean based off data capture and does not include data on days in the monthly period where a flow could not be determined. [V] denotes that the data is operational only data, the data was unable to be validated during the field visit.

Site	410083	YANKO MAIN SOUTHERN DRAIN AT OUTFALL (YMS)										Site	410083
Variable	141.00	Stream Discharge (Ml/d) in megalitres/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[]M	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]	
Median	[]M	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]	
Inst.Max	[]M	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]	
Inst.Min	[]M	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]	
Total	[]M	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]S	[]	
Annual Mean	[]	M ... Equipment malfunction											
Ann. Median	[]	S ... Rating table suspended											
Annual Total	[]	All Totals are in megalitres											

The rating table for this site was suspended by Ventia on the 01/06/2010 as new gates were installed by Murrumbidgee Irrigation. Ventia does not currently supply flow data for this site.

Site	41010005	CUDGEL CREEK AT ROACHES OUTFALL (ROCUDG)										Site	41010005
Variable	141.00	Stream Discharge (Ml/d) in megalitres/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	0.0R	0.1B	0.4R	0.4R	2.8R	0.0R	0.0R	0.0R	3.3*	0.1R	0.3R	[0.8]	
Median	0.0R	0.0B	0.0R	0.3R	0.1R	0.0R	0.0R	0.0R	0.0*	0.0R	0.0R	[0.1]	
Inst.Max	0.0R	5.3B	2.9R	2.0R	23.0R	0.0R	0.0R	0.0R	34.3*	1.7R	3.1R	[17.6]	
Inst.Min	0.0R	0.0B	0.0R	0.1R	0.0R	0.0R	0.0R	0.0R	0.0*	0.0R	0.0R	[0.0]	
Total	0.000R	1.666B	12.07 R	13.70 R	85.04 R	0.000R	0.000R	0.000R	101.8 *	4.038R	10.35 R	[22.89]	
Annual Mean	[0.7]	# ... Other authorities data (MW)											
Ann. Median	[0.0]	* ... Debris Effecting Sensor											
Annual Total	[251.5]	? ... Irregular data use with caution											

41010005 experienced its highest flows in November 2020.

Site	41010921	GOGELDRIE MAIN SOUTHERN DRAIN AT RIVER ROAD (GMSRR)										Site	41010921
Variable	141.00	Stream Discharge (Ml/d) in megalitres/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	0.0R	0.1R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	4.3R	0.0R	0.0R	0.0R	
Median	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	
Inst.Max	0.0R	16.0R	0.1R	0.0R	0.0R	0.0R	0.0R	0.0R	123 R	0.0R	0.0R	0.0R	
Inst.Min	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	
Total	0.000R	2.058R	0.004R	0.000R	0.000R	0.000R	0.000R	0.000R	132.6 R	0.000R	0.000R	0.000R	
Annual Mean	0.4R	N ... Rating Extrapol. within x1.5 max flow											
Ann. Median	0.0R	R ... Rating table extrapolated											
Annual Total	134.7 R	All Totals are in megalitres											

41010921 experienced its highest flows in March 2021.

Site	41010940	LAGOON DRAIN @ GOORAGOOL LAGOON (LAG)										Site	41010940
Variable	141.00	Stream Discharge (Ml/d) in megalitres/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Day
Mean	0.0R	1.1R	2.0R	0.2R	0.5R	0.7R	1.9B	1.3B	4.6R	0.3R	0.0R	0.3R	
Median	0.0R	0.0R	1.0R	0.0R	0.0R	0.2R	0.0B	0.8B	0.0R	0.0R	0.0R	0.0R	
Inst.Max	0.0R	8.2R	16.5R	1.5R	7.7R	6.9R	28.9B	6.9B	71.2R	4.2R	1.2R	9.7R	
Inst.Min	0.0R	0.0R	0.0R	0.0R	0.0R	0.0R	0.0B	0.0B	0.0R	0.0R	0.0R	0.0R	
Total	0.000R	34.01 R	59.79 R	4.651R	13.87 R	22.96 R	58.14 B	35.34 B	143.7 R	9.807R	0.986R	8.543R	
Annual Mean	1.1B	# ... Other authorities data (MW)											
Ann. Median	0.0B	B ... Backed-up stage											
Annual Total	391.8 B	R ... Rating table extrapolated											

41010940 experienced its highest flows in March 2021.

2.2 Offtake Sites

Site	410127	MAIN CANAL AT NARRANDERA REGULATOR										Site	410127
Variable	141.00	Stream Discharge (Ml/d) in megalitres/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	97.6?	1160 ?	1530 V	1560 V	2880	3510 V	3630 V	2670	1700	1030 V	1140 V	443 V	
Median	69.3?	479 ?	1460 V	1680 V	2800	3570 V	4050 V	3230	1870	968 V	1220 V	455 V	
Inst.Max	910 ?	5860 ?	3120 V	3990 V	5470	5060 V	5790 V	5620	3890	1770 V	2030 V	1220 V	
Inst.Min	-58.3?	-31.3?	317 V	233 V	308	1270 V	479 V	278	0.0	244 V	154 V	-19.9V	
Total	3026?	36090?	45770V	48400V	86510	109000V	112400V	74840	52660	30950V	35310V	13290V	
Annual Mean	1780 ?	? ... Irregular data use with caution											
Ann. Median	1400 ?	C ... Correlated data											
Annual Total	648200?	V ... Operational Data											

410127 experienced minor periods of negative flow due to seiching at the site.

Site	410129	STURT CANAL AT OFFTAKE										Site	410129
Variable	141.00	Stream Discharge (Ml/d) in megalitres/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	4.3V	470 #	751 E	810 E	981 V	1270 E	1150 E	898 V	448 V	303 V	489 V	73.3V	
Median	0.0V	162 #	714 E	843 E	871 V	1280 E	1290 E	955 V	395 V	258 V	495 V	0.0V	
Inst.Max	127 V	2560 #	3140 E	2260 E	3430 V	2190 E	2330 E	2940 V	1550 V	922 V	1150 V	905 V	
Inst.Min	0.0V	0.0#	0.0E	0.0E	84.9V	205 E	181 E	51.4V	0.0V	0.0V	48.2V	0.0V	
Total	132V	14580#	22520E	25110E	29440V	39250E	35510E	25150V	13900V	9094V	15140V	2200V	
Annual Mean	636 E	# ... Other authorities data (MW)											
Ann. Median	528 E	E ... Estimated											
Annual Total	232000E	K ... Minor editing											

410129 experienced its highest flows in December 2020.

3.0 Annual Salt Load Summaries

3.1 Compliance Sites

Please note that [#] implies that although a mean monthly flow figure has been given, this flow figure is only the mean based off data capture and does not include data on days in the monthly period where a flow could not be determined. [V] denotes that the data is operational only data, the data was unable to be validated during the field visit.

Site	410083	YANKO MAIN SOUTHERN DRAIN AT OUTFALL (YMS)										Site	410083
Variable	804.00	Salt Transport (t/d) in tonnes/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[]T	[]T	[]T	[]T	[]S	[]S	[]S	[]S	[]S	[]T	[]T	[]	
Median	[]T	[]T	[]T	[]T	[]S	[]S	[]S	[]S	[]S	[]T	[]T	[]	
Inst.Max	[]T	[]T	[]T	[]T	[]S	[]S	[]S	[]S	[]S	[]T	[]T	[]	
Inst.Min	[]T	[]T	[]T	[]T	[]S	[]S	[]S	[]S	[]S	[]T	[]T	[]	
Total	[]T	[]T	[]T	[]T	[]S	[]S	[]S	[]S	[]S	[]T	[]T	[]	
Annual Mean	[]	S ... Rating table suspended											
Ann. Median	[]	T ... Probe out of water/below instrument threshold											
Annual Total	[]	All Totals are in tonnes											

No salt loads can be produced for site 410083 as no flows are calculated by Ventia.

Site	41010005	CUDGEL CREEK AT ROACHES OUTFALL (ROCUDG)										Site	41010005
Variable	804.00	Salt Transport (t/d) in tonnes/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[]T	[0.0]	[0.0]	0.0R	0.3R	[0.0]	[]T	[]T	[]*	[0.0]	[0.1]	[0.0]	
Median	[]T	[0.0]	[0.0]	0.0R	0.0R	[0.0]	[]T	[]T	[]*	[0.0]	[0.1]	[0.0]	
Inst.Max	[]T	[0.0]	[0.2]	0.2R	2.8R	[0.0]	[]T	[]T	[]*	[0.2]	[0.2]	[0.1]	
Inst.Min	[]T	[0.0]	[0.0]	0.0R	0.0R	[0.0]	[]T	[]T	[]*	[0.0]	[0.1]	[0.0]	
Total	[]T	[0]	[1]	1R	10R	[0]	[]T	[]T	[]*	[0]	[1]	[0]	
Annual Mean	[0.1]	* ... Debris Effecting Sensor											
Ann. Median	[0.0]	? ... Irregular data use with caution											
Annual Total	[14]	B ... Backed-up stage											

Site	41010921	GOGELDRIE MAIN SOUTHERN DRAIN AT RIVER ROAD (GMSRR)										Site	41010921
Variable	804.00	Salt Transport (t/d) in tonnes/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[2.6]	[]T	[]T	[]T	
Median	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[1.1]	[]T	[]T	[]T	
Inst.Max	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[16.4]	[]T	[]T	[]T	
Inst.Min	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[0.0]	[]T	[]T	[]T	
Total	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[]T	[15]	[]T	[]T	[]T	
Annual Mean	[2.6]	N ... Rating Extrapol. within x1.5 max flow											
Ann. Median	[1.1]	R ... Rating table extrapolated											
Annual Total	[15]	T ... Probe out of water/below instrument threshold											

Site	41010940	LAGOON DRAIN @ GOORAGOOL LAGOON (LAG)										Site	41010940
Variable	804.00	Salt Transport (t/d) in tonnes/day, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[]T	[0.4]	[0.4]	0.0R	[0.2]	[0.1]	[]B	[]T	[1.7]	[0.1]	[0.0]	[0.0]	
Median	[]T	[0.2]	[0.3]	0.0R	[0.2]	[0.1]	[]B	[]T	[0.4]	[0.0]	[0.0]	[0.0]	
Inst.Max	[]T	[1.3]	[3.0]	0.3R	[1.3]	[0.9]	[]B	[]T	[13.8]	[0.3]	[0.2]	[0.0]	
Inst.Min	[]T	[0.0]	[0.0]	0.0R	[0.0]	[0.0]	[]B	[]T	[0.0]	[0.0]	[0.0]	[0.0]	
Total	[]T	[5]	[11]	1R	[2]	[3]	[]B	[]T	[17]	[1]	[0]	[0]	
Annual Mean	[0.3]		B ... Backed-up stage										
Ann. Median	[0.0]		R ... Rating table extrapolated										
Annual Total	[39]		T ... Probe out of water/below instrument threshold										

3.2 Offtake Sites

Site	410127	MAIN CANAL AT NARRANDERA REGULATOR										Site	410127
Variable	803.00	Salt Transport (calc from MDFs) (t/d) in tonnes/day, Available for release										Year	2020/21
Year	2020/21											Year	2020/21
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	9.9?	151 ?	182 V	148 V	[315]	216 K	202 K	228	120	123 V	82.7K	[33.0]	
Median	6.9?	64.6?	181 V	157 V	[317]	220 K	196 K	260	134	123 V	75.4K	[35.5]	
Inst.Max	85.2?	987 ?	387 V	375 V	[671]	340 K	377 K	540	286	217 V	153 K	[88.9]	
Inst.Min	-6.1?	-4.4?	37.9V	19.7V	[32.1]	75.5K	28.3K	19.0	0.0	17.6V	14.5K	[-1.0]	
Total	307?	4670?	5458V	4584V	[9128]	6696K	6247K	6386	3711	3682V	2565K	[923]	
Annual Mean	[150]	? ... Irregular data use with caution											
Ann. Median	[134]	C ... Correlated data											
Annual Total	[54360]	K ... Minor editing											

410127 has periods of negative salt loads due to negative flow caused by seiching at the site.

Site	410129	STURT CANAL AT OFFTAKE										Site	410129
Variable	803.00	Salt Transport (calc from MDFs) (t/d) in tonnes/day, Available for release										Year	2020/21
Year	2020/21											Year	2020/21
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Day
Mean	[1.0]	61.8?	[93.1]	[88.4]	107	84.1E	68.4E	[75.1]	29.8V	35.3	39.4	[27.5]	
Median	[0.0]	27.1?	[76.6]	[97.2]	103	74.5E	72.5E	[70.0]	25.0V	39.0	38.9	[32.3]	
Inst.Max	[16.0]	384 ?	[387]	[243]	390	182 E	147 E	[234]	102 V	96.5	108	[83.3]	
Inst.Min	[0.0]	0.0?	[0.0]	[0.0]	11.0	11.2E	10.6E	[3.3]	0.0V	0.0	4.7	[0.0]	
Total	[16]	1914?	[2235]	[2651]	3207	2606E	2121E	[1803]	923V	1058	1221	[220]	
Annual Mean	[62.8]	# ... Other authorities data (MW)											
Ann. Median	[51.3]	? ... Irregular data use with caution											
Annual Total	[19980]	E ... Estimated											

410129 has periods of negative salt loads due to negative flow caused by seiching at the site.

4.0 Annual EC Summaries

4.1 Compliance Sites

Site	410083	YANKO MAIN SOUTHERN DRAIN AT OUTFALL (YMS)										Site	410083
Variable	820.00	Conductivity (µS/cm) in µS/cm@25°C, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	0.0T	0.0T	48.5T	83.0T	204 T	195	181	220	295	185 T	0.0T	75.1T	
Median	0.0T	0.0T	0.0T	0.0T	247 T	182	175	204	211	196 T	0.0T	0.0T	
Inst.Max	0.0T	0.0T	559 T	310 T	435 T	270	297	384	973	469 T	0.0T	425 T	
Inst.Min	0.0T	0.0T	0.0T	0.0T	0.0T	146	130	148	181	0.0T	0.0T	0.0T	
Annual Mean	123 T	T ... Probe out of water/below instrument th											
Ann. Median	157 T	V ... Operational Data											

Site	41010005	CUDGEL CREEK AT ROACHES OUTFALL (ROCUDG)										Site	41010005
Variable	820.00	Conductivity (µS/cm) in µS/cm@25°C, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[]T	[215]	[171]	160	212	[201]	[]T	[]T	[]*	[187]	[111]	139 #	
Median	[]T	[215]	[166]	164	213	[219]	[]T	[]T	[]*	[189]	[110]	141 #	
Inst.Max	[]T	[227]	[256]	203	322	[234]	[]T	[]T	[]*	[204]	[139]	206 #	
Inst.Min	[]T	[203]	[97.6]	110	179	[12.3]	[]T	[]T	[]*	[156]	[98.1]	97.6#	
Annual Mean	[173]	# ... Other authorities data (MW)											
Ann. Median	[179]	* ... Debris Effecting Sensor											

Site	41010921	GOGELDRIE MAIN SOUTHERN DRAIN AT RIVER ROAD (GMSRR)										Site	41010921
Variable	820.00	Conductivity (µS/cm) in µS/cm@25°C, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	0.0T	2.9T	5.3T	0.0T	0.0T	0.0T	0.0T	0.0T	35.4T	0.0T	0.0T	0.0T	
Median	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	
Inst.Max	0.0T	167 T	167 T	0.0T	0.0T	0.0T	0.0T	0.0T	252 T	0.0T	0.0T	0.0T	
Inst.Min	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	
Annual Mean	3.7T	T ... Probe out of water/below instrument th											
Ann. Median	0.0T	V ... Operational Data											

Site	41010940	LAGOON DRAIN @ GOORAGOOL LAGOON (LAG)										Site	41010940
Variable	820.00	Conductivity (µS/cm) in µS/cm@25°C, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	0.0T	138 T	277 T	161 K	166 T	181 T	53.1T	287 T	77.6T	52.7T	214 T	232 T	
Median	0.0T	0.0T	287 T	11.9K	8.0T	206 T	0.0T	278 T	0.0T	0.0T	262 T	231 T	
Inst.Max	0.0T	609 T	495 T	515 K	706 T	611 T	343 T	740 T	828 T	254 T	507 T	986 T	
Inst.Min	0.0T	0.0T	0.0T	0.0K	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	0.0T	
Annual Mean	152 T	# ... Other authorities data (MW)											
Ann. Median	118 T	K ... Minor editing											

4.2 Offtake Sites

Site	410127	MAIN CANAL AT NARRANDERA REGULATOR										Site	410127
Variable	820.00	Conductivity (µS/cm) in µS/cm@25°C, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	172	V	219	194	160	[185]	103 K	93.8K	135	118	203	125 K	[124]
Median	176	V	219	205	154	[192]	100 K	98.0K	124	118	185	131 K	[128]
Inst.Max	185	V	286	223	219	[233]	137 K	118 K	254	132	310	173 K	[157]
Inst.Min	150	V	156	152	139	[123]	82.9K	67.7K	94.6	107	105	74.8K	[77.9]
Annual Mean	[153]	K ... Minor editing											
Ann. Median	[153]	M ... Equipment malfunction											

Site	410129	STURT CANAL AT OFFTAKE										Site	410129
Variable	820.00	Conductivity (µS/cm) in µS/cm@25°C, Available for release										Year	2020/21
Year	2020/21												
Day	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
Mean	[227]	229 ?	[194]	[183]	184	109	102	[134]	113 V	198	138	[165]	
Median	[231]	227 ?	[206]	[180]	188	99.1	98.9	[130]	114 V	184	133	[166]	
Inst.Max	[242]	303 ?	[229]	[242]	232	150	128	[216]	125 V	297	190	[178]	
Inst.Min	[204]	168 ?	[152]	[162]	118	86.7	78.0	[96.5]	98.6V	120	91.4	[151]	
Annual Mean	[162]	# ... Other authorities data (MW)											
Ann. Median	[161]	? ... Irregular data use with caution											

5.0 Annual Site Summaries for sites affected by back-up

5.1 Compliance Sites:

- 41010005 was affected by backup during the period between 27/08/2020 and 29/08/2020.
- 41010940 was affected by backup during the period between 24/01/2021 and 21/02/2021.
- The remaining sites were not affected by backup during the report period of 2020/2021.

5.2 Offtake Sites:

No offtake sites were affected by backup during the reporting period of 2020/2021.

Site No.	Site Acronym	No. of Visits	No. of Data Downloads	Discharge Measurements		Sensor Changes	General Comments
				No. of Meas.	Comments		
410083	YMS	10	12	0	No flow conditions.		Block bank removed in November 2020 and built on again in April 2021. During this time water was leaking from the regulator. Battery was stolen at site; no data collected from 19 th July 2020 to 28 th July 2020.
410085	LMC	12	12	4			Stock access to drain has caused some damage to banks of control.
410164	BOD1	0	0	-	No data		Site discontinued 2017-18.
410167	BBOW	0	0	-	No data		Site decommissioned at end of 2018-19 season.
410174	MDJWE	12	12	4			Water flowing into drain from Warburton escape. Mice chewed through the orifice line, causing level data to be unreliable from 19 th May 2021 till 22 nd June 2021. New Orifice line installed on 22 nd June 2021.
41010005	ROCUDG	11	12	4			Limited flow conditions throughout season.
41010921	GMSRR	12	12	0			Limited flow conditions throughout season.
41010940	LAG	12	12	2			Limited flow conditions throughout season.
41010955	MIRMCN	12	12	4			Debris on bridge pylon following high flows has been affecting operational data.
410127	Main Canal	12	12	9			410127B water quality site established on 25 th February 2021. Hydrolab sensor and CR800 logger installed.
410129	Sturt Canal	12	12	10			410129B water quality site established on 23 rd February 2021. Hydrolab sensor and CR800 logger installed.
CD-2-1922	CD-2-1922	12	12	0			Updated program on 15 th June 2021. Limited flow conditions throughout season.
MS-2MDJY-01	MDJY	12	12	5			New rating updated on 24 th Feb 2021
Yoogali	MDJ_Yoogali	0	0	-	No data.		Site decommissioned in November 2018.
			TOTALS	42			
General Comments							

6.0 EWA's 2020/2021

W	= EWA submitted, waiting on approval
A	= EWA approved, works right to proceed
C	= EWA completed, ready to be invoiced
I	= EWA invoiced, closed out
N	= EWA cancelled, will not be approved

EWA REF		Site ID	Name	EXTRA WORKS DESCRIPTION	Issued by	Total Value (ex GST)	Status
MI	56	410129	Sturt Offtake	Assessment of AFFRA Unit SN: 1018412 - Delivery to Kern Elektronik in Switzerland from Shepparton. - Assessment of AFFRA head unit by Kern technician. - Quote provided for repair or replacement of unit.	SF	\$ 740	I
MI	57	Various	-	AWS Data Retrieval	SF	\$ 1669.40	I
MI	58	Various	-	Supply and installation of multiprobes.	SF	\$ 13,091	I
MI	59	Various	-	Supply and installation of dataflex sensors.	SF	\$ 46,650	I
MI	60	CD-2-1922	CD-2-1922	Remote program CD21922_2018-02-23.CR8 to output SCADA parameters.	SF	\$ 274.16	I
MI	61	410167	BBOW	Removal of all instrumentation from site (to be allocated as MIA spares)	SF	\$ 400.72	I
MI	62	41010955	MIRMCN	Orifice line replacement.	MB	\$ 273.22	I
MI	63	Various	-	Campbell's program to test Modbus outputs for Rubicon water	MB	\$ 274.16	I

7.0 410127 MAIN CANAL @ NARRANDERA REGULATOR

7.1 Measurement Summary

Date	Time	Calibration Measurements Q, Measured Discharge (ML/day)	AFFRA Sensor Q, (ML/day)	Deviation
28/08/2020	11:26	3945.90	3902.50	1.11%
30/09/2020	15:37	1380.84	1320.00	4.61%
28/10/2020	12:54	558.30	515.75	8.25% *
28/10/2020	13:40	564.43	575.75	-1.97%
26/11/2020	09:28	3496.50	3516.00	-0.55% ^
29/01/2021	09:32	1577.77	1506.92	4.70%
25/02/2021	11:56	3355.81	3312.31	1.31%
31/03/2021	13:37	536.24	410.89	30.51% #
29/04/2021	12:43	1554.95	1539.33	1.01%

* Flows were not kept stable by MI operators during gauging.

Very low flow with strong winds.

^ Documentation misplaced – gauging start and end times estimated based on field sheets from the visit.

Discharge Measurement Summary

Date Measured: Friday, August 28, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Narrandera OT	Party	SF
Station Number	410127	Boat/Motor	
Location	Between AFFRA posts	Meas. Number	105
System Information		System Setup	
System Type	RS-M9	Tagline Azimuth (deg)	349.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	45.12
		Discharge Method	Mid-Section
		Measurement Quality	--
		Units	
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.51%
		Velocity	0.19% 1.15%
		Width	0.10% 0.10%
		# Cells	0.11% --
		# Stations	1.70% --
		Instrument	0.25% 0.25%
		Overall	1.74% 1.29%
Discharge Results			
Total Area	72.469		
Mean Velocity	0.630		
Total Width	29.000		
Total Q	45.664		
Maximum Measured Depth(m)	3.282		
Maximum Measured Velocity(m/s)	0.872		
Mean Flow Angle	2.614		
Rated Discharge	45.120		
% difference Q	1.205		
Water Temperature (Independent)	10.800		
Mean Water Temperature	10.472		
Mean Weighted Gauge Height	5.115		

Discharge Measurement Summary

Date Measured: Wednesday, September 30, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Nar	Party	SF
Station Number	410127	Boat/Motor	
Location	Between affra posts	Meas. Number	106
System Information		System Setup	
System Type	RS-M9	Tagline Azimuth (deg)	349.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	15.29
		Discharge Method	Mid-Section
		Measurement Quality	--
		Units	
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.11% 0.47%
		Velocity	0.07% 0.98%
		Width	0.11% 0.11%
		# Cells	0.11% --
		# Stations	1.82% --
		Instrument	0.25% 0.25%
		Overall	1.85% 1.12%
Discharge Results			
Total Area	76.905		
Mean Velocity	0.208		
Total Width	31.500		
Total Q	15.987		
Maximum Measured Depth(m)	3.408		
Maximum Measured Velocity(m/s)	0.284		
Mean Flow Angle	3.023		
Rated Discharge	15.290		
% difference Q	4.561		
Water Temperature (Independent)	16.600		
Mean Water Temperature	16.679		
Mean Weighted Gauge Height	5.221		

Discharge Measurement Summary

Date Measured: Wednesday, October 28, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Naranderra OT	Party	SF
Station Number	410127	Boat/Motor	
Location	30m DS of footbridge.	Meas. Number	107
System Information	System Setup		Units
System Type	RS-M9	Tagline Azimuth (deg)	349.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	5.97
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO
Depth Reference	Vertical Beam	Depth	0.10% 0.47%
		Velocity	0.08% 1.22%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.70% --
		Instrument	0.25% 0.25%
		Overall	1.73% 1.33%
Discharge Results			
Total Area	74.782		
Mean Velocity	0.086		
Total Width	30.500		
Total Q	6.463		
Maximum Measured Depth(m)	3.135		
Maximum Measured Velocity(m/s)	0.158		
Mean Flow Angle	0.418		
Rated Discharge	5.970		
% difference Q	8.250		
Water Temperature (Independent)	22.000		
Mean Water Temperature	22.615		
Mean Weighted Gauge Height	5.218		

Discharge Measurement Summary

Date Measured: Wednesday, October 28, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Naranderra	Party	SF
Station Number	410127	Boat/Motor	
Location		Meas. Number	108
System Information	System Setup		Units
System Type	RS-M9	Tagline Azimuth (deg)	349.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	7.21
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO
Depth Reference	Vertical Beam	Depth	0.10% 0.70%
		Velocity	0.10% 1.78%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.76% --
		Instrument	0.25% 0.25%
		Overall	1.79% 1.93%
Discharge Results			
Total Area	74.762		
Mean Velocity	0.087		
Total Width	30.500		
Total Q	6.537		
Maximum Measured Depth(m)	3.124		
Maximum Measured Velocity(m/s)	0.172		
Mean Flow Angle	-2.890		
Rated Discharge	7.210		
% difference Q	-9.341		
Water Temperature (Independent)	21.000		
Mean Water Temperature	22.994		
Mean Weighted Gauge Height	0.000		

Discharge Measurement Summary

Date Measured: Friday, January 29, 2021

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Narrandera OT	Party	SF
Station Number	410127	Boat/Motor	
Location	Temporary endless wire.	Meas. Number	110
System Information		System Setup	
System Type	RS-M9	Tagline Azimuth (deg)	355.6
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	17.41
		Discharge Method	Mid-Section
		Measurement Quality	--
		Units	
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.61%
		Velocity	0.27% 2.17%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.76% --
		Instrument	0.25% 0.25%
		Overall	1.81% 2.28%
Discharge Results			
Total Area	74.568		
Mean Velocity	0.245		
Total Width	29.000		
Total Q	18.266		
Maximum Measured Depth(m)	3.128		
Maximum Measured Velocity(m/s)	0.339		
Mean Flow Angle	-0.014		
Rated Discharge	17.410		
% difference Q	4.915		
Water Temperature (Independent)	21.000		
Mean Water Temperature	20.902		
Mean Weighted Gauge Height	0.000		

Discharge Measurement Summary

Date Measured: Thursday, February 25, 2021

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Narrandera Offtake	Party	SF
Station Number	410127	Boat/Motor	
Location	80m US of regulator.	Meas. Number	111
System Information		System Setup	
System Type	RS-M9	Tagline Azimuth (deg)	355.7
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	38.33
		Discharge Method	Mid-Section
		Measurement Quality	--
		Units	
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.58%
		Velocity	0.09% 0.64%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.76% --
		Instrument	0.25% 0.25%
		Overall	1.79% 0.91%
Discharge Results			
Total Area	75.187		
Mean Velocity	0.516		
Total Width	30.000		
Total Q	38.824		
Maximum Measured Depth(m)	3.129		
Maximum Measured Velocity(m/s)	0.682		
Mean Flow Angle	-5.166		
Rated Discharge	38.328		
% difference Q	1.295		
Water Temperature (Independent)	24.400		
Mean Water Temperature	23.796		
Mean Weighted Gauge Height	5.230		

Discharge Measurement Summary

Date Measured: Wednesday, March 31, 2021

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Narrendra OT	Party	MS
Station Number	410127	Boat/Motor	
Location	80m U/S from regulator	Meas. Number	112
System Information		System Setup	
System Type	RS-M9	Tagline Azimuth (deg)	352.0
Serial Number	2457	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	5.27
		Discharge Method	Mid-Section
		Measurement Quality	--
		Units	
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.49%
		Velocity	0.26% 1.35%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.60% --
		Instrument	0.25% 0.25%
		Overall	1.65% 1.46%
Discharge Results			
Total Area	72.761		
Mean Velocity	0.083		
Total Width	30.500		
Total Q	6.022		
Maximum Measured Depth(m)	3.043		
Maximum Measured Velocity(m/s)	0.143		
Mean Flow Angle	3.443		
Rated Discharge	5.270		
% difference Q	14.276		
Water Temperature (Independent)	0.000		
Mean Water Temperature	23.079		
Mean Weighted Gauge Height	5.216		

Discharge Measurement Summary

Date Measured: Thursday, April 29, 2021

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Narrandera Offtake	Party	MS
Station Number	410127	Boat/Motor	
Location	Cableway	Meas. Number	113
System Information		System Setup	
System Type	RS-M9	Tagline Azimuth (deg)	355.7
Serial Number	2457	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	17.82
		Discharge Method	Mid-Section
		Measurement Quality	--
		Units	
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.41%
		Velocity	0.09% 0.61%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.65% --
		Instrument	0.25% 0.25%
		Overall	1.68% 0.78%
Discharge Results			
Total Area	75.104		
Mean Velocity	0.240		
Total Width	30.500		
Total Q	17.995		
Maximum Measured Depth(m)	3.105		
Maximum Measured Velocity(m/s)	0.330		
Mean Flow Angle	-2.752		
Rated Discharge	17.820		
% difference Q	0.980		
Water Temperature (Independent)	15.400		
Mean Water Temperature	15.495		
Mean Weighted Gauge Height	5.222		

8.0 410129 STURT CANAL @ OFFTAKE

8.1 Measurement Summary

Date	Time	Calibration Measurements Q, Measured Discharge (ML/day)	AFFRA Sensor Q, (ML/day)	Deviation
29/08/2020	07:23	1715.00	1647.50	4.10%
30/09/2020	10:15	796.01	816.75	-2.54%
30/09/2020	11:14	809.77	832.25	-2.70%
11/12/2020	13:43	1434.41	1484.00	-3.34% !
15/12/2020	13:02	1025.00	1042.73	-1.70% !
16/12/2020	13:29	1497.59	1570.77	-4.66%
16/12/2020	14:23	1515.31	1572.86	-3.66%
24/02/2021	15:39	1092.84	1073.85	1.77%
30/03/2021	16:02	77.181	94.46	-18.30% #
28/04/2021	15:31	696.62	713.43	-2.36%

Very low flow with strong winds.

! Gaugings conducted by MIA.

Discharge Measurement Summary

Date Measured: Saturday, August 29, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt OT	Party	SF
Station Number	410129	Boat/Motor	
Location	Cableway	Meas. Number	119
System Information	System Setup		Units
System Type	RS-M9	Tagline Azimuth (deg)	326.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	19.19
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO
Depth Reference	Vertical Beam	Depth	0.10% 0.51%
		Velocity	0.13% 3.37%
		Width	0.10% 0.10%
		# Cells	0.12% --
		# Stations	1.76% --
		Instrument	0.25% 0.25%
		Overall	1.79% 3.42%
Discharge Results			
Total Area	61.351		
Mean Velocity	0.330		
Total Width	28.500		
Total Q	20.254		
Maximum Measured Depth(m)	2.926		
Maximum Measured Velocity(m/s)	0.569		
Mean Flow Angle	4.161		
Rated Discharge	19.190		
% difference Q	5.547		
Water Temperature (Independent)	9.500		
Mean Water Temperature	8.853		
Mean Weighted Gauge Height	2.664		

Discharge Measurement Summary

Date Measured: Wednesday, September 30, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt OT	Party	SF
Station Number	410129	Boat/Motor	
Location	Cableway	Meas. Number	120
System Information	System Setup		Units
System Type	RS-M9	Tagline Azimuth (deg)	329.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	9.77
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO
Depth Reference	Vertical Beam	Depth	0.11% 0.55%
		Velocity	0.09% 1.71%
		Width	0.11% 0.11%
		# Cells	0.11% --
		# Stations	1.76% --
		Instrument	0.25% 0.25%
		Overall	1.79% 1.81%
Discharge Results			
Total Area	63.111		
Mean Velocity	0.146		
Total Width	28.500		
Total Q	9.220		
Maximum Measured Depth(m)	3.066		
Maximum Measured Velocity(m/s)	0.203		
Mean Flow Angle	0.278		
Rated Discharge	9.770		
% difference Q	-5.626		
Water Temperature (Independent)	15.200		
Mean Water Temperature	15.282		
Mean Weighted Gauge Height	2.750		

Discharge Measurement Summary

Date Measured: Wednesday, September 30, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt OT	Party	SF
Station Number	410129	Boat/Motor	
Location	Cableway	Meas. Number	121
System Information	System Setup		Units
System Type	RS-M9	Tagline Azimuth (deg)	329.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	9.78
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO
Depth Reference	Vertical Beam	Depth	0.11% 0.68%
		Velocity	0.09% 1.04%
		Width	0.11% 0.11%
		# Cells	0.11% --
		# Stations	1.70% --
		Instrument	0.25% 0.25%
		Overall	1.74% 1.27%
Discharge Results			
Total Area	63.257		
Mean Velocity	0.148		
Total Width	28.500		
Total Q	9.375		
Maximum Measured Depth(m)	3.068		
Maximum Measured Velocity(m/s)	0.211		
Mean Flow Angle	-1.646		
Rated Discharge	9.780		
% difference Q	-4.138		
Water Temperature (Independent)	15.200		
Mean Water Temperature	15.671		
Mean Weighted Gauge Height	2.745		

Discharge Measurement Summary

Date Measured: Wednesday, December 16, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt Offtake	Party	SF
Station Number	410129	Boat/Motor	
Location	Endless Wire	Meas. Number	124
System Information	System Setup		Units
System Type	RS-M9	Tagline Azimuth (deg)	329.0
Serial Number	2169	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	15.55
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO
Depth Reference	Vertical Beam	Depth	0.10% 0.56%
		Velocity	0.08% 1.73%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.70% --
		Instrument	0.25% 0.25%
		Overall	1.73% 1.84%
Discharge Results			
Total Area	61.267		
Mean Velocity	0.283		
Total Width	28.000		
Total Q	17.330		
Maximum Measured Depth(m)	2.986		
Maximum Measured Velocity(m/s)	0.409		
Mean Flow Angle	-2.434		
Rated Discharge	15.550		
% difference Q	11.446		
Water Temperature (Independent)	24.000		
Mean Water Temperature	26.591		
Mean Weighted Gauge Height	0.000		

Discharge Measurement Summary

Date Measured: Wednesday, December 16, 2020

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt OT	Party	SF
Station Number	410129	Boat/Motor	
Location	Cableway	Meas. Number	125
System Information	System Setup		Units
System Type RS-M9	Tagline Azimuth (deg)	329.0	Distance m
Serial Number 2169	Salinity (ppt)	0.0	Velocity m/s
Firmware Version 4.10	Rated Discharge (m3/s)	15.49	Area m2
	Discharge Method	Mid-Section	Discharge m3/s
	Measurement Quality	--	Temperature degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.72%
Discharge Results		Velocity	0.08% 1.06%
Total Area	61.534	Width	0.10% 0.10%
Mean Velocity	0.285	# Cells	0.10% --
Total Width	28.000	# Stations	1.76% --
Total Q	17.536	Instrument	0.25% 0.25%
Maximum Measured Depth(m)	2.996	Overall	1.79% 1.31%
Maximum Measured Velocity(m/s)	0.410		
Mean Flow Angle	-1.418		
Rated Discharge	15.490		
% difference Q	13.207		
Water Temperature (Independent)	24.000		
Mean Water Temperature	24.883		
Mean Weighted Gauge Height	2.670		

Discharge Measurement Summary

Date Measured: Wednesday, February 24, 2021

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt Offtake	Party	SF
Station Number	410129	Boat/Motor	
Location	Cableway	Meas. Number	126
System Information	System Setup		Units
System Type RS-M9	Tagline Azimuth (deg)	328.7	Distance m
Serial Number 2169	Salinity (ppt)	0.0	Velocity m/s
Firmware Version 4.10	Rated Discharge (m3/s)	12.49	Area m2
	Discharge Method	Mid-Section	Discharge m3/s
	Measurement Quality	--	Temperature degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.53%
Discharge Results		Velocity	0.11% 1.18%
Total Area	63.262	Width	0.10% 0.10%
Mean Velocity	0.200	# Cells	0.10% --
Total Width	27.500	# Stations	1.65% --
Total Q	12.650	Instrument	0.25% 0.25%
Maximum Measured Depth(m)	3.070	Overall	1.68% 1.32%
Maximum Measured Velocity(m/s)	0.274		
Mean Flow Angle	-2.444		
Rated Discharge	12.495		
% difference Q	1.243		
Water Temperature (Independent)	24.900		
Mean Water Temperature	25.649		
Mean Weighted Gauge Height	2.705		

Discharge Measurement Summary

Date Measured: Tuesday, March 30, 2021

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Site Information		Measurement Information	
Site Name	Sturt Offtake	Party	MS
Station Number	4101029	Boat/Motor	
Location	Cableway	Meas. Number	127
System Information		System Setup	Units
System Type	RS-M9	Tagline Azimuth (deg)	328.7
Serial Number	2457	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	1.16
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.14% 1.70%
		Velocity	1.05% 14.75%
		Width	0.14% 0.14%
		# Cells	0.14% --
		# Stations	2.11% --
		Instrument	0.25% 0.25%
		Overall	2.38% 14.85%
Discharge Results			
Total Area	64.246		
Mean Velocity	0.014		
Total Width	28.500		
Total Q	0.892		
Maximum Measured Depth(m)	3.144		
Maximum Measured Velocity(m/s)	0.057		
Mean Flow Angle	-5.748		
Rated Discharge	1.157		
% difference Q	-22.899		
Water Temperature (Independent)	21.100		
Mean Water Temperature	21.149		
Mean Weighted Gauge Height	2.775		

Discharge Measurement Summary

Date Measured: Wednesday, April 28, 2021

Recorded file is located under My Documents\SonTek Data\YYYY_MM_DD\StationaryDataFiles

Site Information		Measurement Information	
Site Name	Sturt Offtake	Party	MS
Station Number	410129	Boat/Motor	
Location	Cableway	Meas. Number	128
System Information		System Setup	Units
System Type	RS-M9	Tagline Azimuth (deg)	328.7
Serial Number	2457	Salinity (ppt)	0.0
Firmware Version	4.10	Rated Discharge (m3/s)	8.28
		Discharge Method	Mid-Section
		Measurement Quality	--
		Distance	m
		Velocity	m/s
		Area	m2
		Discharge	m3/s
		Temperature	degC
Discharge Calculation Settings		Discharge Uncertainty	
Track Reference	System (default)	Category	ISO Stats
Depth Reference	Vertical Beam	Depth	0.10% 0.46%
		Velocity	0.07% 1.21%
		Width	0.10% 0.10%
		# Cells	0.10% --
		# Stations	1.65% --
		Instrument	0.25% 0.25%
		Overall	1.68% 1.32%
Discharge Results			
Total Area	59.090		
Mean Velocity	0.136		
Total Width	27.900		
Total Q	8.062		
Maximum Measured Depth(m)	2.929		
Maximum Measured Velocity(m/s)	0.194		
Mean Flow Angle	1.225		
Rated Discharge	8.280		
% difference Q	-2.630		
Water Temperature (Independent)	15.600		
Mean Water Temperature	16.006		
Mean Weighted Gauge Height	2.600		