



Murray Irrigation

# Annual Compliance Report

2014/15

31 October 2015

All the data presented in the Annual Compliance Report is available in electronic format by contacting:

Penny Sloane  
Compliance Supervisor  
Phone: 03 5888 3015  
Fax: 03 5888 3001  
Mobile: 0429 839 115  
E-mail: penny.sloane@murrayirrigation.com.au

The GIS maps are available in electronic format as GIS layers by contacting:

Jason Tasker  
GIS Officer  
Phone: 03 5898 3350  
Fax: 03 5898 3301  
Mobile: 0429 819 312  
E-mail: jason.tasker@murrayirrigation.com.au

An electronic copy of the report is available on the Murray Irrigation website under *Corporate* then *Annual Reports* - [www.murrayirrigation.com.au](http://www.murrayirrigation.com.au).

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## 1 PREFACE

The Annual Compliance Report 2014/15 is written to meet the reporting requirements of the licences Murray Irrigation holds with NSW DPI Water and the NSW Environment Protection Authority (EPA). NSW DPI Water administers the two Combined Water Supply Work Approval and Water Use Approvals (50CA501687 and 50CA512282). The EPA administers the Environment Protection Licence (5014).

### 1.1 Statement of Compliance

Murray Irrigation considers it has complied with all the conditions in the Combined Water Supply Work Approval and Water Use Approval (50CA501687), dated 10 October 2013.

Murray Irrigation considers it has complied with all the conditions in the Combined Water Supply Work Approval and Water Use Approval for salinity and watertable management tube-wells (50CA512282), dated 10 October 2013.

Murray Irrigation did not change or modify the condition of the authorised water supply works listed in the Combined Water Supply Work Approval and Water Use Approval (50CA501687) during 2014/15.

Murray Irrigation did not change or modify the condition of the existing authorised discharge works listed in the Combined Water Supply Work Approval and Water Use Approval (50CA501687) or construct new works that discharge from the Area of Operations during 2014/15.

Murray Irrigation did not change or modify the condition of the existing authorised discharge works listed in the Combined Water Supply Work Approval and Water Use Approval for salinity and watertable management tube-wells (50CA5012282) during 2014/15.

## 2 PLAN OF OPERATIONS AND WORKS

The Murray Irrigation Area of Operations Authorised Water Supply Works and supply system is presented in Figure 1. It also identifies the location of the supply channel escape discharge sites and the flood control works. Figure 2 presents the stormwater escape system and identifies the location of discharge monitoring sites from the stormwater escape system. It also identifies the location of the Wakool Tullakool Sub-Surface Drainage Scheme (WTSSDS).

### 2.1 Operational Background

Murray Irrigation extracts water from two Authorised Water Supply Works:

- Mulwala Canal Offtake from the Murray River at Lake Mulwala
- Wakool Canal Offtake from the Colligen Creek from the Edwards River

The Mulwala Canal supplies water to the area east of the Edward River (formerly known as the Berriquin and Denimein Irrigation Districts) and the area west of the Edward River and south of the Wakool River (formerly known as the Deniboota Irrigation District). Lawson's Syphon enables the Mulwala Canal to supply water to the area west of the Edward River. The Wakool Canal supplies water to the area north of the Wakool River and south of the Edward River (formerly known as the Wakool Irrigation District and Tullakool Irrigation Area).

Murray Irrigation has an agreement with Water NSW to convey water through the Murray Irrigation supply channel system on its behalf. The authorised works used to convey water on behalf of Water NSW are referred to as supply channel escape discharge sites.

#### Finley Escape: BIFE (409077)

The Finley Escape (BIFE) has a dual role. The Finley Escape primarily acts as a supply channel escape discharge site, but it also has a role as a stormwater discharge site.

The Finley Escape is listed in the Approval as a supply channel escape discharge site in Schedule 1 – Attachment 2 and the Environment Protection Licence lists the Finley Escape as a licensed discharge point. The Finley Escape (BIFE) is identified on both the supply and drainage Area of Operations maps.



Figure 1: Area of Operations: supply

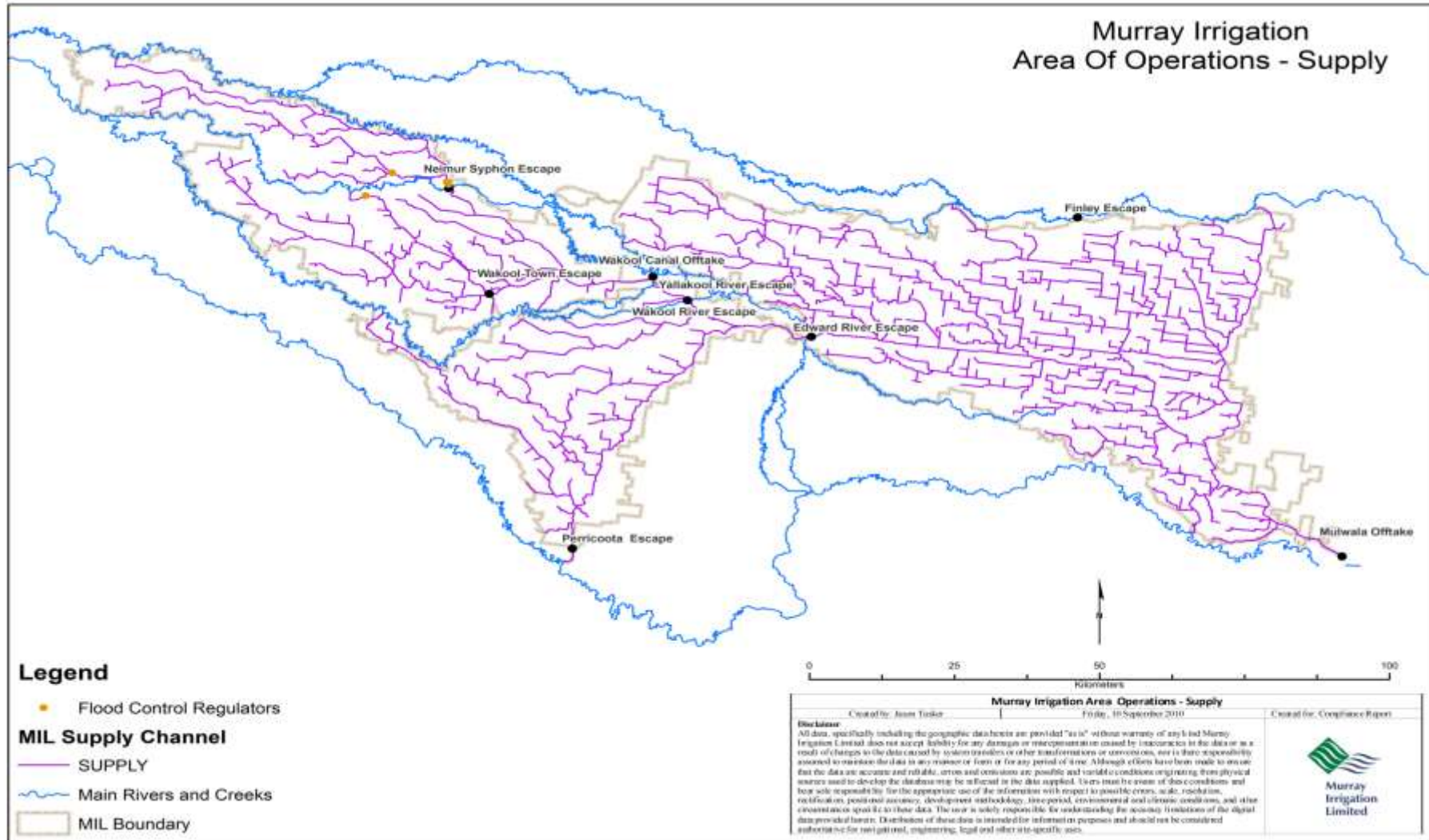
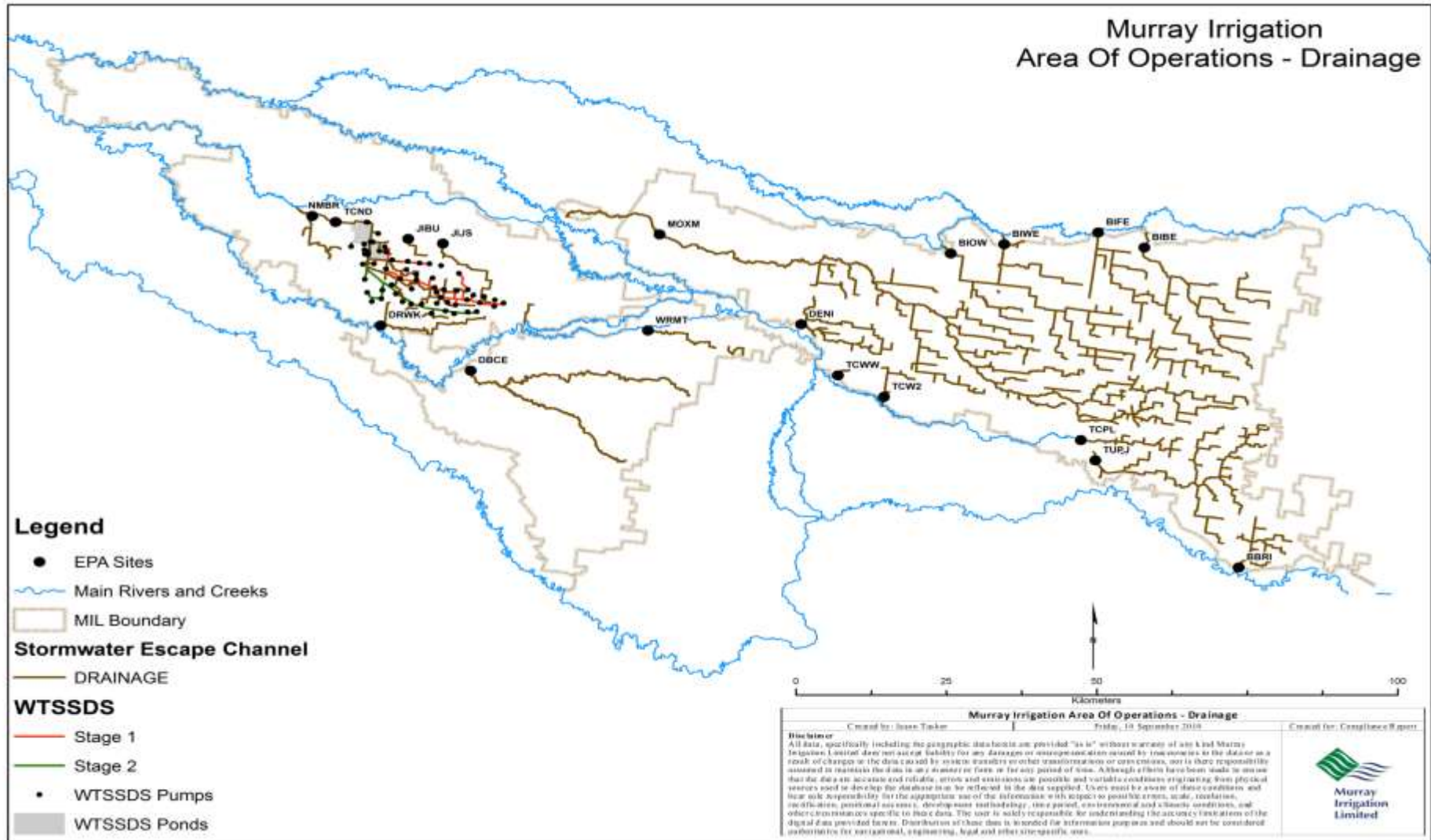


Figure 2: Area of Operations: drainage



## 2.2 Inclusion/Exclusion of lands from the Area of Operations

The lands published in the NSW Government Gazette for inclusion within Murray Irrigation's Area of Operations are presented in Table 1.

**Table 1: Inclusions of land into Area of Operations**

Date of NSW Government Gazette	Land details of inclusions
2 April 2015	<ol style="list-style-type: none"> <li>1. Lot 1 DP115965, Parish of Mundiwa, County of Townsend</li> <li>2. Lot 72 DP756301, Parish of Mundiwa, County of Townsend</li> <li>3. Lot 1 DP184982, Parish of Gereldery, County of Denison</li> </ol>

These areas have not been identified on a map as they are all small areas that would not be visible on the map.

### 3 SUMMARY

The climatic conditions in the area influence every aspect of this report. The climate determines the volume of water available for irrigation, the volume of water used for irrigation, the volume of water discharged from the area and the rate of evaporation.

The water allocation for the New South Wales Murray and Lower Darling Water Sharing Plan was 61% for general security water entitlements in 2014/15.

During 2014/15 Tullakool recorded rainfall 27% lower than average and evapotranspiration levels close to average. At Finley, the climatic conditions during 2014/15 were close to average.

Murray Irrigation delivered water on behalf of the NSW Office of Environment and Heritage (OEH) for environmental purposes. The water was transferred onto Murray Irrigation's general security water access licence and delivered through customer outlets and supply channel escapes. The water was used to supply environment flows to the Tuppal Creek and Yarrein Creeks.

The volume of water delivered via the supply channel escapes under agreement was significantly higher than previous years.

Murray Irrigation's delivery efficiency was 91%, this is the highest delivery efficiency compared to previous years.

The flows in the drainage system were significantly reduced during 2014/15 compared to previous years, reflecting different rainfall patterns and reduced runoff following rainfall.

Rice was once again the major crop grown during 2014/15, 40% of the water delivered to customers was used on rice, a decrease on previous years. The volume of water used on pasture and cereals were similar to previous years, representing 26% of the water delivered.

The area within the Murray Irrigation Area of Operations affected by watertable within two metres of the surface increased to 7,174ha in August 2014, but the area affected remains small (1% of the Area of Operations). The area affected by watertable within four metres of the surface increased, but remains at historic low levels (11% of the Area of Operations).

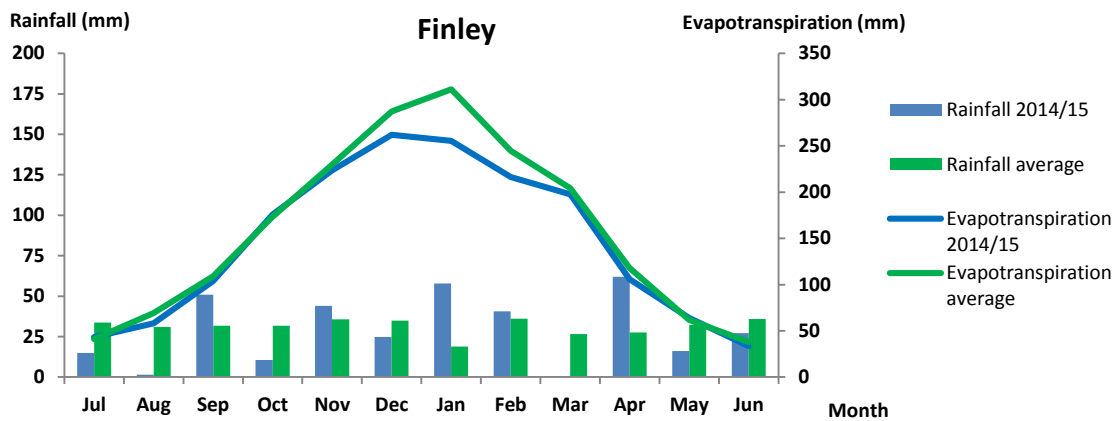
**4 CLIMATIC CONDITIONS**

The climatic data for the Murray Irrigation Area of Operations is monitored at two weather stations operated by the CSIRO in Finley and Tullakool. These stations measure rainfall and evapotranspiration on a daily basis. A summary of the yearly data for July 2014 to June 2015 is presented in Table 2. The monthly data is presented in Figure 3 and Figure 4.

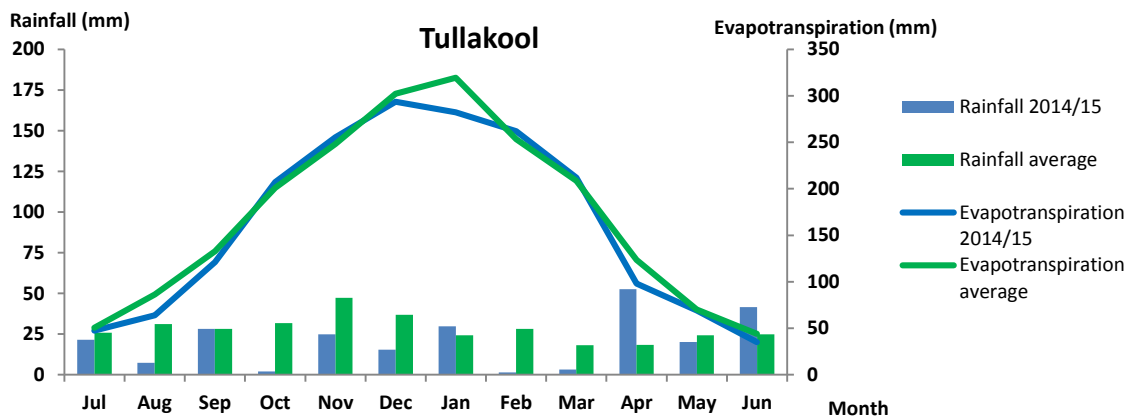
**Table 2: Summary of Climatic Data (July 2014 – June 2015)**

	Total rainfall (mm)	Average rainfall (mm)	%	Total evapotranspiration (mm)	Average evapotranspiration (mm)	%	Long term data
<b>Finley</b>	350.7	376.2	93	1,738.9	1,887.9	92	1986 - 2014
<b>Tullakool</b>	248.2	339.2	73	1,948.0	2,040.5	95	1997- 2014

**Figure 3: Climatic Data: Finley**



**Figure 4: Climatic Data: Tullakool**



## 5 NEW MEASURES TO LIMIT GROUNDWATER RECHARGE AND DISCHARGE OF SALT

On 1 July 2013, Murray Irrigation introduced a new Environment Policy that combined the previous Rice Growing Policy, Total Farm Water Balance Policy and Stormwater Disposal Policy into one policy. The implementation of the Environment Policy assists Murray Irrigation in limiting groundwater recharge within the Murray Irrigation Area of Operations and the discharge of salt downstream from the Murray Irrigation Area of Operations.

## 6 REPORTING ON WATER MANAGEMENT

### 6.1 Water Allocation and Extraction

#### 6.1.1 Water Allocation

The water allocation for the New South Wales Murray and Lower Darling Regulated Rivers Water Source is presented in Table 3.

**Table 3: Water allocation (%)**

Year	General Security Water Allocation (%)
2014/15	61
2013/14	100
2012/13	100
2009/10	27

#### 6.1.2 Extraction

The volume of water extracted by Murray Irrigation under its Water Access Licences (WAL) is summarised in Table 4.

**Table 4: Water Access Licence Extraction (ML)**

Licence No.	Water Access Licence category	Volume extracted (ML)
50AL503817	Regulated River – General Security	624,865
50AL503532	Regulated River – Conveyance	220,534
50AL503529	Regulated River – High Security	114
50AL503530	Regulated River – High Security (town supply)	3,170
50AL503533	Supplementary Water	7,451
<b>TOTAL (2014/15)</b>		<b>856,134</b>

The volume of water extracted at the Authorised Water Supply Works is summarised in Table 5. The table includes extractions under agreement with State Water.

Table 5: Extraction Volume 2014/15 (ML)

	Extractions (diversions)						Credits (Transmission loss credits) (ML)	Net extractions under licence (ML)
	Mulwala Canal Offtake extractions (licence) (ML)	Wakool Canal Offtake extractions (licence) (ML)	Floodway extractions (licence) (ML)	Total Extractions under licence (ML)	Extraction supply channel escapes under agreement (ML)	Total Extractions under licence and under agreement (ML)		
	A	B	C	A+B+C	D	A+B+C+D	E	A+B+C-E
Jul 14	1,470	1,725	0	3,195	0	3,195	0	3,195
Aug 14	79,274	19,478	0	98,752	8,871	107,623	149	98,603
Sep 14	38,633	10,237	0	48,870	13,203	62,073	520	48,350
Oct 14	107,425	35,143	0	142,568	50,925	193,493	2,309	140,259
Nov 14	55,975	21,237	0	77,212	73,505	150,717	5,096	72,116
Dec 14	92,071	31,674	0	123,745	72,769	196,514	4,175	119,570
Jan 15	87,872	31,486	0	119,358	62,998	182,356	2,894	116,464
Feb 15	66,415	21,886	0	88,301	61,555	149,856	3,588	84,713
Mar 15	96,646	24,747	0	121,393	69,854	191,247	4,238	117,155
Apr 15	37,884	15,945	0	53,829	44,793	98,622	2,455	51,374
May 15	314	4,019	0	4,333	14,498	18,831	-2	4,335
Jun 15	0	0	0	0	0	0	0	0
<b>TOTAL 14/15</b>	<b>663,979</b>	<b>217,577</b>	<b>0</b>	<b>881,556</b>	<b>472,971</b>	<b>1,354,527</b>	<b>25,422</b>	<b>856,134</b>



A comparison of the total extractions compared to previous years is presented in Table 6.

**Table 6: Total extractions compared to previous years (ML)**

Year	Extracted under licence (ML)	Extracted under agreement (ML)	Total extracted (ML)
2014/15	881,556	472,971	1,354,527
2013/14	1,131,767	190,775	1,322,542
2012/13	1,548,211	288,676	1,836,887
2009/10	278,604	194,428	473,032

## 6.2 Deliveries

### 6.2.1 Deliveries to customers on-farm

The volume of water delivered to Murray Irrigation customers' on-farm is summarised in Table 7.

**Table 7: Deliveries to customers on-farm: 2014/15 (ML)**

	Mulwala Canal Offtake (ML)	Wakool Canal Offtake (ML)	Total deliveries to customers on-farm (ML)
Jul 14	133	43	176
Aug 14	43,836	13,746	57,582
Sep 14	35,133	8,697	43,830
Oct 14	85,222	30,000	115,222
Nov 14	50,141	17,380	67,521
Dec 14	72,201	24,851	97,052
Jan 15	75,886	27,045	102,931
Feb 15	58,656	18,510	77,166
Mar 15	78,037	19,079	97,116
Apr 15	40,265	14,033	54,298
May 15	19,114	6,897	26,011
Jun 15	84	21	105
<b>TOTAL 14/15</b>	<b>558,708</b>	<b>180,302</b>	<b>739,010</b>

A comparison of the total volume delivered on-farm compared to previous years is presented in Table 8.

**Table 8: On-farm deliveries compared to previous years (ML)**

<b>Year</b>	<b>On-farm deliveries (ML)</b>
<b>2014/15</b>	739,010
<b>2013/14</b>	924,570
<b>2012/13</b>	1,263,594
<b>2009/10</b>	161,473

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### 6.2.2 Deliveries for environmental purposes

Murray Irrigation delivered water for environmental purposes on behalf of the NSW Office of Environment and Heritage (OEH). OEH transferred the water onto Murray Irrigation's General Security Water Access Licence for delivery via customer outlets or supply channel escapes.

The environmental water delivered via customer outlets was arranged by OEH and the individual customers. The volume of water delivered was recorded in the water ordering system as 'wetlands water'. Refer to section 5.4 Water Use.

Environmental water delivered using Murray Irrigation's supply channel escapes is presented in Table 9.

Table 9: Delivery of environmental water via channel supply escapes (ML)

Supply Channel Escape	Tocumwal Escape (ML)	Mulwala 1 Escape (ML)	Yarraman Escape (ML)	Northern 7 Extension Escape (ML)	Northern 8 Escape (ML)	Northern Branch Escape (ML)	Mallan Escape (ML)	Total environmental water delivered via supply channel escapes (ML)
Receiving waters	Tuppal Creek	Murray River wetlands	Thule Creek	Yarrein Creek				
Jul 14	0	0	0	0	0	0	0	0
Aug 14	0	0	0	0	0	0	0	0
Sep 14	810	79	0	0	0	0	0	889
Oct 14	1,749	271	244	0	0	0	0	2,264
Nov 14	920	0	61	0	0	0	0	981
Dec 14	0	0	0	0	0	0	0	0
Jan 15	0	0	0	0	0	0	0	0
Feb 15	0	0	0	0	0	0	0	0
Mar 15	353	0	0	70	154	10	57	644
Apr 15	1,397	0	0	249	615	595	893	3,749
May 15	180	0	0	181	154	15	30	560
Jun 15	0	0	0	0	0	0	0	0
<b>TOTAL 14/15</b>	<b>5,409</b>	<b>350</b>	<b>305</b>	<b>500</b>	<b>923</b>	<b>620</b>	<b>980</b>	<b>9,087</b>

## 6.3 Discharges

### 6.3.1 Discharges from supply channel escapes under agreement

The volume of water discharged through the supply channel escape discharge sites under agreement is presented in Table 11.

A comparison of the supply channel escape discharge sites under agreement compared to previous years is presented in Table 10.

**Table 10: Total discharges from supply channel escapes under agreement for 2014/15 compared to previous years (ML)**

Year	Discharges from supply channel escapes under agreement (ML)
2014/15	472,971
2013/14	190,775
2012/13	288,676
2009/10	194,428

Table 11: Discharges from supply channel escapes under agreement for 2014/15 (ML)

	Edward River Escape	Finley Escape	Wakool River Escape	Yallakool Creek Escape	Perricoota Escape	Wakool Town Escape	Niemur Syphon Escape	TOTAL
<b>Jul 14</b>	0	0	0	0	0	0	0	0
<b>Aug 14</b>	6,172	1,900	742	0	57	0	0	8,871
<b>Sep 14</b>	8,771	3,149	1,109	0	174	0	0	13,203
<b>Oct 14</b>	43,604	5,081	888	0	1,352	0	0	50,925
<b>Nov 14</b>	69,170	967	937	0	2,431	0	0	73,505
<b>Dec 14</b>	67,605	2,331	533	0	2,300	0	0	72,769
<b>Jan 15</b>	58,458	1,675	492	0	2,373	0	0	62,998
<b>Feb 15</b>	57,784	1,409	399	0	1,963	0	0	61,555
<b>Mar 15</b>	61,580	3,865	3,453	0	956	0	0	69,854
<b>Apr 15</b>	36,422	1,365	5,819	0	1,187	0	0	44,793
<b>May 15</b>	10,667	1,235	1,285	0	1,311	0	0	14,498
<b>Jun 15</b>	0	0	0	0	0	0	0	0
<b>TOTAL 14/15</b>	<b>420,234</b>	<b>22,977</b>	<b>15,657</b>	<b>0</b>	<b>14,104</b>	<b>0</b>	<b>0</b>	<b>472,971</b>

### 6.3.2 Discharges from supply channel escapes without credit

Discharges from supply channel escapes without credit is presented in Table 12.

**Table 12: Discharge from supply channel escapes without credit for 2014/15 (ML)**

	<b>Discharges from supply channel escapes without credit (ML)</b>
<b>Jul 14</b>	0
<b>Aug 14</b>	493
<b>Sep 14</b>	617
<b>Oct 14</b>	699
<b>Nov 14</b>	320
<b>Dec 14</b>	212
<b>Jan 15</b>	846
<b>Feb 15</b>	550
<b>Mar 15</b>	550
<b>Apr 15</b>	677
<b>May 15</b>	1,455
<b>Jun 15</b>	671
<b>TOTAL 14/15</b>	<b>7,090</b>

A comparison of the discharges from the supply channel escapes without credit compared to previous years is presented in Table 13.

**Table 13: Discharge from the supply channel escapes without credit compared to previous years (ML)**

<b>Year</b>	<b>Discharges from supply channel escapes without credit (ML)</b>
<b>2014/15</b>	7,090
<b>2013/14</b>	9,919
<b>2013/12</b>	12,379
<b>2009/10</b>	1,203

### 6.3.3 Discharges from the stormwater escape channels

The volume of water discharged from stormwater escape channel discharge sites is presented in Table 15.

A comparison of the discharges from stormwater escape channels compared to previous years is presented in Table 14.

**Table 14: Total discharges from the stormwater escape discharge sites compared to previous years (ML)**

Year	Discharges from the stormwater escape discharge sites (ML)
2014/15	4,895
2013/14	16,690
2012/13	11,360
2009/10	1,522

Table 15: Discharges from the stormwater escape discharge sites for 2014/15 (ML)

	Back Barooga SEC: BBR1 (409092)	Berrigan Creek Escape: BIBE (41010396)	Box Creek: MOXM (409090)	Burraboai SEC: JIBU (40910125)	Burragorrimma SEC: NMBR (40910026)	DC 2500 East: JIJS (40910117)	Deniboota Canal Escape: DBCE (409067)
Jul 14	1.0	9.1	254	0	0 (B)	0	187.2
Aug 14	1.4	36.1	39	0	0 (B)	0	13.7
Sep 14	33.1	87.5	M	0	24.1	0	0(B)
Oct 14	2.8	18.0	M	0	29.6	0	17.9
Nov 14	0	44.8	30	0	41.9	0	556.0
Dec 14	0	41.8	30	0	20.0	0	40.3
Jan 15	9.9	29.5	160	0	0	0	30.2
Feb 15	6.7	23.5	2.9	0	11.3	0	9.1
Mar 15	0	53.8	0(B)	0	43.2	0	59.2
Apr 15	0	296	270	0	61.8	0	12.9
May 15	25.6	1023	176	0	52.0	0	32.5
Jun 15	19.2	0	82	0	50.1	0	5.0
<b>TOTAL 14/15</b>	<b>99.7</b>	<b>1663.1</b>	<b>528</b>	<b>0</b>	<b>334</b>	<b>0</b>	<b>763.1</b>
	Lalaly SEC: TUPJ (40910007)	Murphys Timber SEC: WRMT (40910131)	Neimur SEC: TCND (40910116)	North Deniliquin SEC: DENI (409060)	Pinelea SEC: TCPL (40910011)	Wakool SEC: DRWK (409073)	West Warragoona SEC: TCWW (40910130)
Jul 14	24.5	0	0 (B)	0	0	3.7	0
Aug 14	42.0	0	3.7	22	0	42.3	0
Sep 14	94.4	0	3.6	74	1.0	25.6	0
Oct 14	12.3	0	0	17.3	5.6	9.4	0
Nov 14	0	0	0	0	0	7.6	0
Dec 14	0	0	0	0	0	3.3	0
Jan 15	106	0	0	1.0	0	1.0	0
Feb 15	0	0	1.0	0	0	1.0	0
Mar 15	0	0	0	0	1.0	2.1	0
Apr 15	361	0	0	88	3.2	6.0	0
May 15	33.7	0	75.2	35	1.3	6.0	0
Jun 15	0	0	48.2	4.4	0	4.0	0
<b>TOTAL 14/15</b>	<b>673.9</b>	<b>0</b>	<b>131.7</b>	<b>241.7</b>	<b>12.1</b>	<b>112</b>	<b>0</b>
	Warragoona Stage : TCW2 (41000253)	Wollamai East Escape: BIWE (409089)	Wollamai Escape: BIOW (409076B)				
Jul 14	0	7.4	37.4				
Aug 14	0	12.0	14.0				
Sep 14	0	1.1	29.2				
Oct 14	0	1.0	14.4				
Nov 14	0	0	10.1				
Dec 14	0	7.2	14.6				
Jan 15	0	0	26.5				
Feb 15	0	0	28.3				
Mar 15	0	0	30.0				
Apr 15	0	0	19.8				
May 15	0	1.7	52.8				
Jun 15	0	4.5	23.9				
<b>TOTAL 14/15</b>	<b>0</b>	<b>34.9</b>	<b>301</b>				

M: equipment malfunction

0 (B): backed up: no flow, receiving waters flooded

**Total stormwater escape discharges (2014/15): 4,895ML**



## 6.4 Water Balance

A water balance for the Murray Irrigation Area of Operations is presented in Table 16.

**Table 16: Water Balance for 2014/15 (ML)**

	Mulwala Canal Offtake (ML)	Wakool Canal Offtake (ML)	Total (ML)
<b>Extraction</b>			
Gross Diversions	1,136,950	217,577	<b>1,354,527</b>
<b>Deliveries</b>			
On- farm Deliveries	558,708	180,302	<b>739,010</b>
Supply channel escapes under agreement	443,211	29,760	<b>472,971</b>
<b>Total Deliveries</b>			
<b>Losses</b>			
Net Evaporation <sup>1</sup>	23,994	7,189	<b>31,183</b>
Seepage <sup>2</sup>	31,616	7,296	<b>38,912</b>
Supply channel escapes without credit	5,318	1,772	<b>7,090</b>
Unattributed losses	55,356	3,391	<b>58,747</b>
<b>Total Losses</b>	<b>116,284</b>	<b>19,648</b>	<b>135,932</b>
<b>Delivery Efficiency</b>	<b>90%</b>	<b>91%</b>	<b>90%</b>

<sup>1</sup>: Net evaporation is calculated from evapotranspiration minus rainfall

<sup>2</sup>: Indicative only

Note: Murray Irrigation does not have an off line storage

The unattributed losses include unintentional flows from operational margins, measurement error and errors not accounted for elsewhere.

## 6.5 Water use

Proposed water use data is recorded each time customers order water using the water ordering system. The customer is required to allocate the water order to a particular crop type for every order. The data presented in Table 17 is a summary of the data recorded for 2014/15. Meter readings are then recorded against the water order.

Murray Irrigation considers (with the exception of rice) the data presented for the total area of crop reported in Table 17 is indicative only and will be impacted by timing of rainfall and customers' irrigation practices. The crop water usage figures provided by the NSW DPI are based on seasons of 'normal' allocation. For instance, the crop water usage figure of 2 ML/ha for winter crops is based on two irrigations, one prior to sowing and a second irrigation in spring.

Table 17: Crop Water Usage for 2014/15 (ML)

	Mulwala Canal Offtake (ML)	Wakool Canal Offtake (ML)	Total (ML)	Total area (ha)
<b>Annual Pasture</b>	119,510	30,178	149,688	74,844 <sup>1</sup>
<b>Cotton</b>	7,816	0	7,816	868 <sup>1</sup>
<b>Horticulture</b>	10,381	71	10,452	
<b>Permanent Pasture</b>	36,579	5,177	41,756	3,212 <sup>1</sup>
<b>Rice</b>	226,722	106,448	333,170	27,803
<b>Stock and domestic</b>	6,686	2,303	8,989	
<b>Storage</b>	5,835	240	6,075	
<b>Summer crops</b>	40,600	4,464	45,064	5,633 <sup>1</sup>
<b>Wetlands<sup>2</sup></b>	6,064	3,832	9,896	
<b>Winter crops</b>	97,191	25,894	123,085	61,542 <sup>1</sup>
<b>UnkDPI Watern</b>	2,646	373	3,019	
<b>Total delivered (on-farm) (ML)</b>	<b>560,030</b>	<b>178,980</b>	<b>739,010</b>	

<sup>1</sup>: Calculated from crop usage figures obtained from the NSW DPI Farm Enterprise Budgets:

- 2ML/ha for annual pasture
- 13ML/ha for perennial pasture
- 2ML/ha for winter crops
- 9ML/ha for cotton
- 8ML/ha for summer crop (maize)

<sup>2</sup>: Environmental water delivered by arrangement with OEH.

A comparison of the crop water use compared to previous years is presented in Table 18.

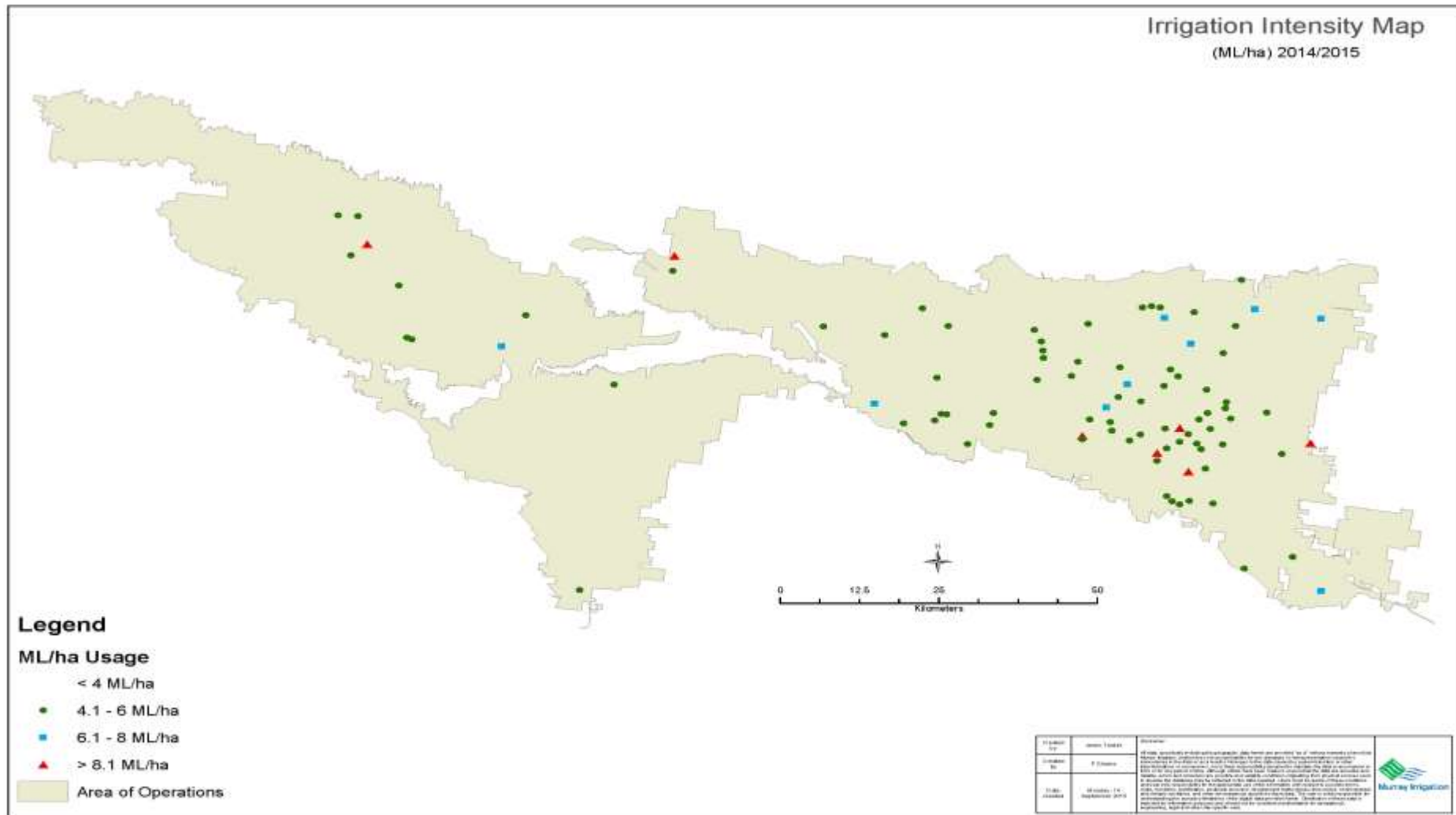
Table 18: Comparison of crop type water use compared to previous years (ML)

	2014/15	2013/14	2012/13		2009/10
<b>Rice (ML)</b>	333,170	484,936	686,412		41,831
<b>Annual Pasture (ML)</b>	149,688	142,214	218,725		56,729
<b>Permanent Pasture (ML)</b>	41,756	43,642	90,086		11,352
<b>Cereals (ML)</b>	123,085	130,229	188,426		25,836
<b>Other (ML)</b>	66,351	92,713	52,659		11,962
<b>Stock &amp; Domestic (ML)</b>	8,989	5,727	14,096		8,675
<b>Storage (ML)</b>	6,075	19,564	10,894		3,688
<b>Wetlands (ML)</b>	9,896	5,545	2,295		1,402
<b>Total delivered (on-farm) (ML)</b>	<b>739,010</b>	<b>924,570</b>	<b>1,263,593</b>		<b>161,473</b>

## 6.6 Irrigation intensity

The distribution of irrigation intensity above 4ML/ha is reported in Figure 5. This map identifies the location of the landholdings using between 4 and 6ML/ha and landholdings using more than 6ML/ha.

Figure 5: Irrigation intensity (ML/ha)



## 7 REPORTING ON SALINITY AND SALTLOAD

### 7.1 Extracted salt load

The salt load for the Mulwala Canal Offtake is calculated using the salinity data from the monitoring site on the Murray River downstream of Yarrawonga Weir (409025).

The salt load for the Wakool Canal Offtake is calculated using the salinity data from the monitoring site on the Edwards River downstream of Stevens Weir (409023).

Both sets of salinity data were downloaded from the Murray Darling Basin Authority Live River Data site ([www.mdba.gov.au/river-data/live-river-data](http://www.mdba.gov.au/river-data/live-river-data)).

The extracted salt load is presented in Table 19.

**Table 19: Extracted salt load for 2014/15 (t)**

	Mulwala Canal Offtake (t)	Wakool Canal Offtake (t)	Total saltload extracted (t)
Jul 14	49	61	111
Aug 14	2,924	655	3,873
Sep 14	1,841	371	2,680
Oct 14	5,591	1,467	8,856
Nov 14	3,792	804	6,749
Dec 14	4,227	1,198	7,290
Jan 15	3,199	1,152	5,687
Feb 15	2,638	815	4,722
Mar 15	3,721	915	6,197
Apr 15	1,661	597	3,158
May 15	325	156	799
Jun 15	0	0	0
<b>TOTAL 14/15</b>	<b>29,967</b>	<b>8,191</b>	<b>50,121</b>

A comparison of the total saltload extracted compared to previous years is presented in Table 20.

**Table 20: Extracted salt load compared to previous years (t)**

Year	Extracted salt load(t)
2014/15	50,121
2013/14	51,221
2012/13	71,997
2009/10	13,078

## 7.2 Discharged salt load

### 7.2.1 Discharged salt load from supply channel escapes under agreement

The discharged salt load from the supply channel escapes under agreement is presented in Table 22.

A comparison of the salt load discharged from the supply channel escapes under agreement compared to previous years is presented in Table 21.

**Table 21: Discharged salt load from the supply channel escapes under agreement compared to previous years (t)**

Year	Discharged salt load from supply channel escapes under agreement (t)
2014/15	12,365
2013/14	7,602
2012/13	9,642
2009/10	5,833

Table 22: Discharged salt load from the supply channel escapes under agreement (t)

	Edward River Escape (t)	Finley Escape (t)	Wakool River Escape (t)	Yallakool Creek Escape (t)	Perricoota Escape (t)	Wakool Town Escape (t)	Niemur Syphon Escape (t)	TOTAL (t)
Jul 14	0	0	0	0	0	0	0	0
Aug 14	205	63	25	0	2	0	0	295
Sep 14	311	112	40	0	6	0	0	470
Oct 14	1,540	179	37	0	56	0	0	1,813
Nov 14	2,026	28	35	0	92	0	0	2,181
Dec 14	1,733	60	20	0	87	0	0	1,900
Jan 15	1,240	36	18	0	87	0	0	1,380
Feb 15	1,191	29	15	0	73	0	0	1,308
Mar 15	1,376	86	128	0	35	0	0	1,625
Apr 15	732	27	218	0	44	0	0	1,021
May 15	234	27	50	0	51	0	0	362
Jun 15	0	0	0	0	0	0	0	0
<b>TOTAL 14/15</b>	<b>10,588</b>	<b>648</b>	<b>594</b>	<b>0</b>	<b>535</b>	<b>0</b>	<b>0</b>	<b>12,365</b>

### 7.2.2 Discharged salt load from supply channel escapes without credit

The discharged salt load from the supply channel escapes without credit is presented in Table 23.

**Table 23: Discharged salt load from supply channel escapes without credit for 2014/15 (t)**

	Discharged salt load from supply channel escapes without credit (t)
Jul 14	0
Aug 14	16
Sep 14	22
Oct 14	25
Nov 14	9
Dec 14	5
Jan 15	18
Feb 15	11
Mar 15	12
Apr 15	14
May 15	32
Jun 15	16
<b>TOTAL 14/15</b>	<b>180</b>

A comparison of the discharged salt load from the supply channel escapes without credit is presented in Table 24.

**Table 24: Discharged salt load from the supply channel escapes without credit compared to previous years (t)**

Year	Discharged salt load from supply channel escapes without credit (t)
2014/15	180
2013/14	393
2012/13	433
2009/10	36

### 7.2.3 Discharged salinity and salt load from the stormwater escape channels

The salinity and discharged salt load from the stormwater escape channel is presented in Table 26.

A comparison of the salt load discharged from the stormwater escape channels compared to previous years is presented in Table 25.

**Table 25: Total salt load from the stormwater escape discharge sites compared to previous years (t)**

Year	Discharges salt load from the stormwater escape discharge sites (t)
2014/15	1,651
2013/14	4,492
2012/13	3,063
2009/10	114



Table 26: Stormwater Escape Channels salinity ( $\mu\text{S}/\text{cm}$ ) and salt load (t)

	Back Barooga SEC: BBR1 (409092)				Berrigan Creek Escape: BIBE (41010396)			
	Min. daily EC ( $\mu\text{S}/\text{cm}$ )	Max. daily EC ( $\mu\text{S}/\text{cm}$ )	Mean daily EC ( $\mu\text{S}/\text{cm}$ )	Salt load (t)	Min. daily EC ( $\mu\text{S}/\text{cm}$ )	Max. daily EC ( $\mu\text{S}/\text{cm}$ )	Mean daily EC ( $\mu\text{S}/\text{cm}$ )	Salt load (t)
Jul 14	188	359	234	0	183	218	201	1
Aug 14	67	505	217	0	111	337	212	4
Sep 14	121	499	303	4	76	255	183	8
Oct 14	168	484	304	0	65	240	137	2
Nov 14	240	448	346	0	69	167	113	3
Dec 14	264	498	388	0	64	175	110	3
Jan 15	52	208	117	0	D	D	D	D
Feb 15	176	552	338	1	78	207	126	1
Mar 15	N/A	N/A	N/A	0	68	163	124	4
Apr 15	88	534	368	0	63	247	190	36
May 15	136	750	497	3	60	184	131	8
Jun 15	205	318	267	3	N/A	N/A	N/A	0
<b>TOTAL 14/15</b>				11				62
	Box Creek: MOXM (409090)				Burraboi SEC: JIBU (40910125)			
	Min. daily EC ( $\mu\text{S}/\text{cm}$ )	Max. daily EC ( $\mu\text{S}/\text{cm}$ )	Mean daily EC ( $\mu\text{S}/\text{cm}$ )	Salt load (t)	Min. daily EC ( $\mu\text{S}/\text{cm}$ )	Max. daily EC ( $\mu\text{S}/\text{cm}$ )	Mean daily EC ( $\mu\text{S}/\text{cm}$ )	Salt load (t)
Jul 14	1,590	4,790	2,790	360	N/A	N/A	N/A	0
Aug 14	1,200	8,110	5,750	125	N/A	N/A	N/A	0
Sep 14	684	3,100	1,530	M	24	282	200	0
Oct 14	364	2,300	930	M	290	361	331	0
Nov 14	367	4,020	1,270	23	360	388	373	0
Dec 14	56	1,480	824	18	391	420	404	0
Jan 15	588	2,520	1,570	130	424	492	462	0
Feb 15	96	1,570	1,120	2	488	563	522	0
Mar 15	N/A	N/A	N/A	0 (B)	513	589	553	0
Apr 15	283	4,370	1,290	262	N/A	N/A	N/A	0
May 15	708	1,870	1,190	122	N/A	N/A	N/A	0
Jun 15	857	1,870	1,390	68	N/A	N/A	N/A	0
<b>TOTAL 14/15</b>				1,110				0
	Burragorrimma SEC: NMBR (409010026)				DC 2500 East: JIJS (40910117)			
	Min. daily EC ( $\mu\text{S}/\text{cm}$ )	Max. daily EC ( $\mu\text{S}/\text{cm}$ )	Mean daily EC ( $\mu\text{S}/\text{cm}$ )	Salt load (t)	Min. daily EC ( $\mu\text{S}/\text{cm}$ )	Max. daily EC ( $\mu\text{S}/\text{cm}$ )	Mean daily EC ( $\mu\text{S}/\text{cm}$ )	Salt load (t)
Jul 14	61	326	117	0 (B)	643	861	816	0
Aug 14	65	264	107	0 (B)	840	866	853	0
Sep 14	83	317	217	3	N/A	N/A	N/A	0
Oct 14	78	280	132	2	N/A	N/A	N/A	0
Nov 14	60	174	113	3	N/A	N/A	N/A	0
Dec 14	76	101	82	1	N/A	N/A	N/A	0
Jan 15	N/A	N/A	N/A	0	N/A	N/A	N/A	0
Feb 15	308	334	322	2	N/A	N/A	N/A	0
Mar 15	106	161	126	3	N/A	N/A	NA/	0
Apr 15	134	206	177	7	N/A	N/A	N/A	0
May 15	60	262	139	5	N/A	N/A	N/A	0
Jun 15	108	216	139	4	635	701	679	0
<b>TOTAL 14/15</b>				30				0

	Denibootea Canal Escape: DBCE (409067)				Lalaly SEC: TUPJ (40910007)			
	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)
Jul 14	260	299	282	32	1,670	3,720	3,060	41
Aug 14	158	293	243	2	1,410	4,540	2,110	31
Sep 14	125	168	153	0 (B)	1,270	3,290	2,040	95
Oct 14	122	233	173	2	260	2,570	1,450	8
Nov 14	126	200	151	5	489	554	513	0
Dec 14	113	383	235	4	N/A	N/A	N/A	0
Jan 15	212	311	245	4	102	370	231	10
Feb 15	119	319	222	1	N/A	N/A	N/A	0
Mar 15	86	156	115	4	N/A	N/A	N/A	0
Apr 15	76	193	120	1	127	1,520	376	84
May 15	106	198	144	2	284	2,330	1,110	34
Jun 15	80	394	178	0	N/A	N/A	N/A	0
<b>TOTAL 14/15</b>				23				303
	Murphys Timber SEC: WRMT (40910131)				Neimur SEC: TCND (40910116)			
	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)
Jul 14	282	311	294	0	94	173	135	0 (B)
Aug 14	308	328	317	0	83	2,070	411	1
Sep 14	324	337	330	0	265	451	363	0
ct 14	330	348	338	0	N/A	N/A	N/A	0
Nov 14	348	435	383	0	N/A	N/A	N/A	0
Dec 14	434	463	451	0	N/A	N/A	N/A	0
Jan 15	463	489	475	0	294	340	309	0
Feb 15	478	498	489	0	294	340	309	0
Mar 15	496	508	502	0	250	292	265	0
Apr 15	503	509	505	0	128	563	247	0 (B)
May 15	443	515	482	0	109	571	231	9
Jun 15	411	441	426	0	238	1,060	367	11
<b>TOTAL 14/15</b>				0				21
	North Deniliquin SEC: DENI (409060)				Pinelea SEC: TCPL (40910011)			
	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)
Jul 14	363	376	370	0	289	354	328	0
Aug 14	104	186	144	2	355	359	358	0
Sep 14	128	372	182	9	251	277	263	1
Oct 14	188	268	250	2	242	332	277	5.6
Nov 14	N/A	N/A	N/A	0	N/A	N/A	N/A	0
Dec 14	389	409	399	0	N/A	N/A	N/A	0
Jan 15	193	235	212	0	220	236	228	0
Feb 15	N/A	N/A	N/A	0	N/A	N/A	N/A	0
Mar 15	N/A	N/A	N/A	0	N/A	N/A	N/A	1.0
Apr 15	130	211	160	8	161	334	259	3.2
May 15	88	949	342	5	287	403	343	1.4
Jun 15	80	116	97	0	317	287	317	0
<b>TOTAL 14/15</b>				26				12.2

	Wakool SEC: DRWK (409073)				West Warragoon SEC: TCWW (40910130)			
	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)
Jul 14	147	195	174	0	527	571	544	0
Aug 14	104	200	148	4	567	610	587	0
Sep 14	135	198	158	3	596	609	600	0
Oct 14	174	231	204	1	605	650	632	0
Nov 14	203	290	244	1	605	627	621	0
Dec 14	279	334	305	1	221	622	349	0
Jan 15	372	406	388	0	176	323	263	0
Feb 15	405	518	459	0	238	340	303	0
Mar 15	237	528	327	0	254	355	279	0
Apr 15	151	270	189	1	319	1,010	568	0
May 15	93	225	187	1	877	1,090	1,040	0
Jun 15	96	177	125	0	601	929	785	0 (B)
<b>TOTAL 14/15</b>				12				0
	Warragoon Stage 2: TCW2 (41000253)				Wollamai East Escape: BIWE (409089)			
	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)
Jul 14	603	636	624	0	190	354	262	1
Aug 14	638	672	656	0	133	266	166	1
Sep 14	675	700	688	0	147	241	192	0
Oct 14	702	739	720	0	198	211	207	0
Nov 14	742	808	778	0	N/A	N/A	N/A	0
Dec 14	812	935	858	0	82	142	120	0
Jan 15	936	1,020	964	0	N/A	N/A	N/A	0
Feb 15	1,030	1,150	1,090	0	N/A	N/A	N/A	0
Mar 15	1,160	1,390	1,270	0	N/A	N/A	N/A	0
Apr 15	M	M	M	M	N/A	N/A	N/A	0
May 15	M	M	M	M	127	128	127	0
Jun 15	M	M	M	M	68	170	140	0
<b>TOTAL 14/15</b>				0				2
	Wollamai Escape: BLOW (409076B)							
	Min. daily EC (µS/cm)	Max. daily EC (µS/cm)	Mean daily EC (µS/cm)	Salt load (t)				
Jul 14	272	533	357	8				
Aug 14	170	679	395	3				
Sep 14	119	321	174	3				
Oct 14	144	379	228	2				
Nov 14	183	686	331	1				
Dec 14	134	296	223	2				
Jan 15	126	501	267	4				
Feb 15	169	388	218	4				
Mar 15	126	281	190	4				
Apr 15	140	225	183	2				
May 15	329	97	170	4				
Jun 15	280	103	145	2				
<b>TOTAL 14/15</b>				39				

*D: debris affecting sensor*  
*Note: Sites with ponded water show salinity measurement with zero saltload calculated due to no flow*  
*N/A: dry or probe out of water*  
*M: equipment malfunction*  
*0 (B): backed up, no flow, receiving waters flooded*

**Total stormwater escape salt load 2014/15: 1,651t**

### 7.3 Salt balance

A salt balance for the Murray Irrigation Area of Operations is presented in Table 27.

**Table 27: Salt Balance for 2014/15 (t)**

	<b>Salt load (t)</b>
<b>Total extraction</b>	<b>50,121</b>
<b>Discharges</b>	
Supply channel escapes under agreement	12,365
Supply channel escapes without credit	180
Stormwater Escapes	1,651
<b>Total discharged</b>	<b>14,196</b>
<b>Balance (2014/15)</b>	<b>-35,925t (imported)</b>

## 8 REPORTING ON GROUNDWATER CONDITIONS

A total of 1,449 piezometers are listed in Schedule 5-A of the Combined Approval. In August 2014, the results from 1,355 (94%) piezometers were used in the data analysis of the depth to watertable. The data for August 2014 was audited according to the procedures outlined in the Murray Irrigation Piezometer Manual 2009.

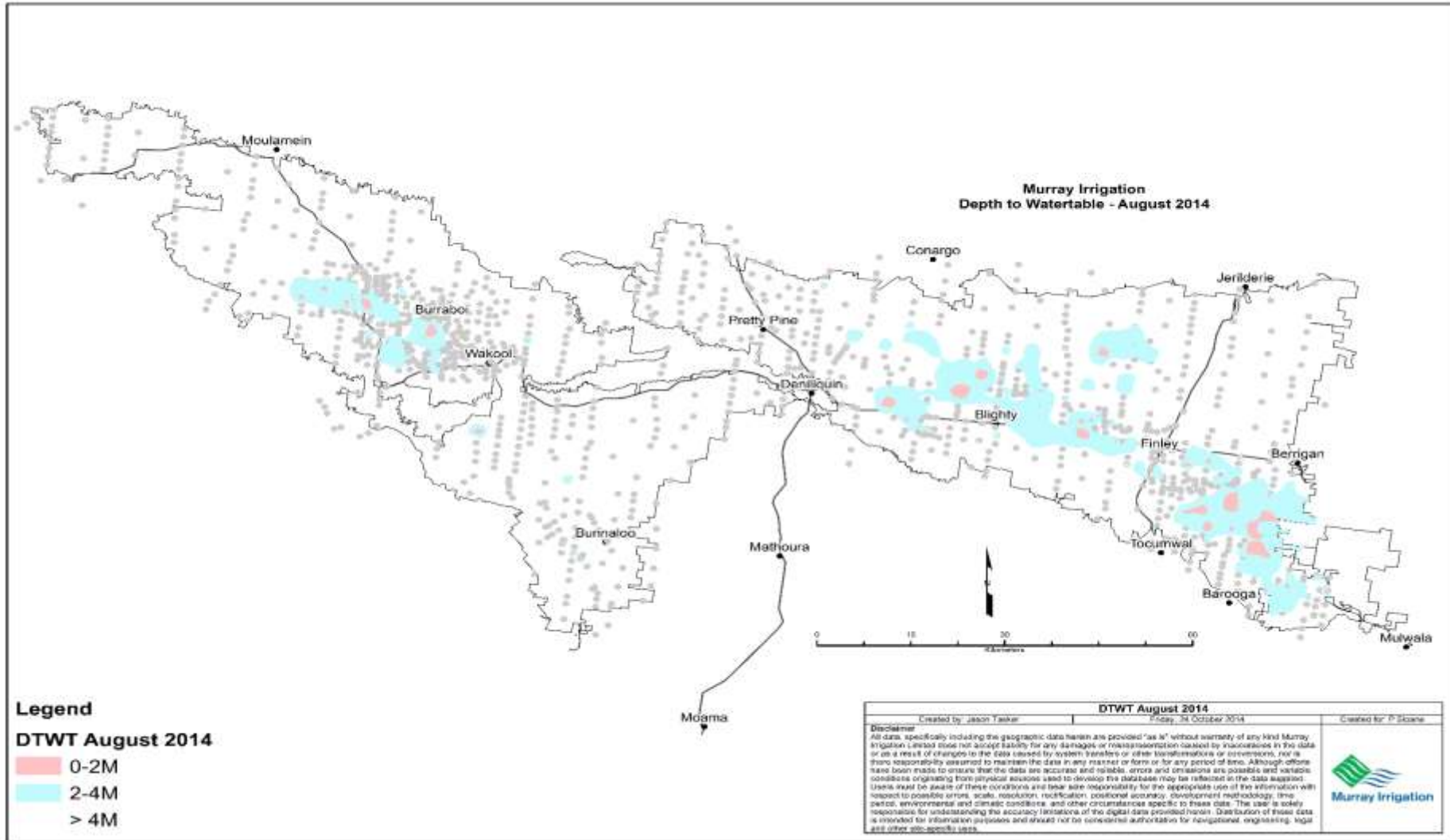
The depth to watertable data for August 2014 is presented in Table 28. The map of the depth to watertable for August 2014 is presented in Figure 6.

**Table 28: Depth to watertable area (ha)**

	0-2 m (ha)	2-4 m (ha)	>4 m (ha)	Total Boundary (ha)
<b>Aug 14</b>	7,194	78,501	707,633	793,328
<b>Aug 13</b>	5,642	62,305	725,381	793,328
<b>Aug 12</b>	5,041	50,268	738,019	793,328
<b>Aug 09</b>	11	4,606	788,711	793,328

The Area of Operations affected by watertable within 2m remains extremely low. Murray Irrigation considers the rise in the watertable in the 2-4m range is attributed to the combination of the rainfall events and increased irrigation usage on-farm.

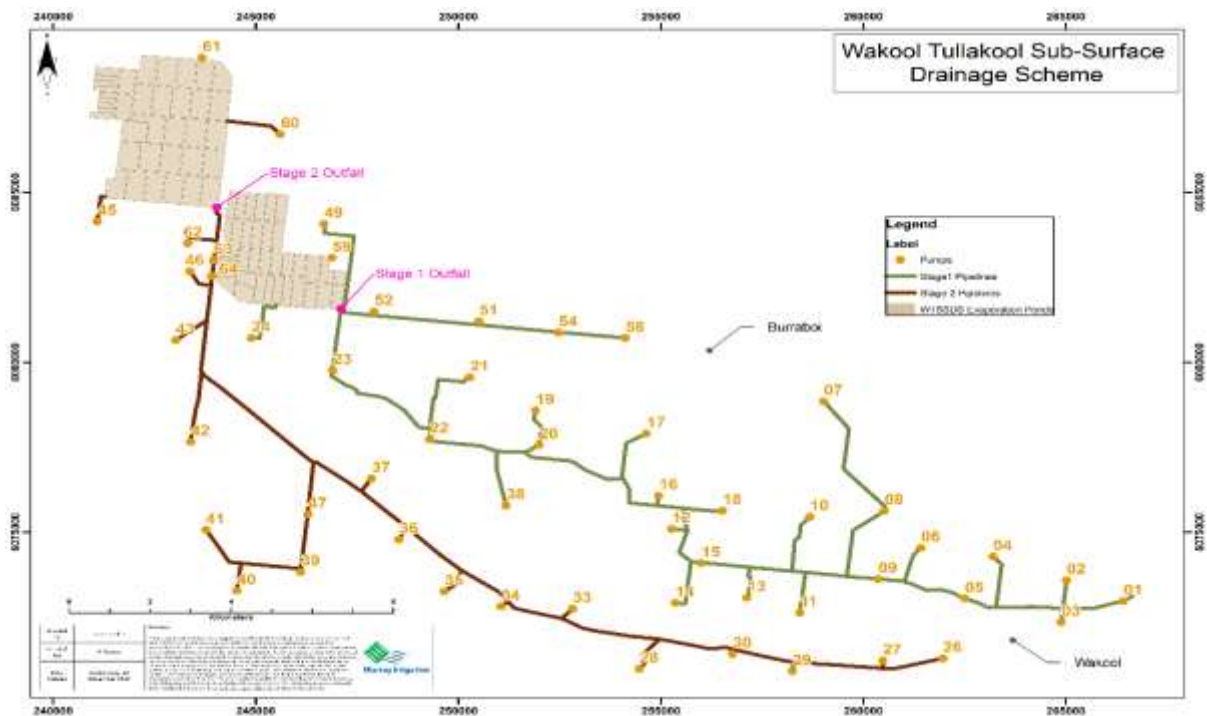
Figure 6: Depth to watertable (August 2014)



## 9 REPORTING ON SALINITY AND WATERTABLE MANAGEMENT TUBEWELLS

This section covers the reporting requirements for the Combined Water Supply Work Approval and Water Use Approval for salinity and watertable management tube wells, Approval number 50CA512282.

**Figure 7: Wakool Tullakool Subsurface Drainage Scheme map**



In August 2014, 833ha of the 75,499ha area influenced directly by the Wakool Tullakool Sub-Surface Drainage Scheme (WTSSDS) had watertables within 2m of the surface. A summary of the area affected by watertable within 2m of the surface in the WTSSDS area of influence compared to previous years is presented in Table 29.

**Table 29: Area of WTSSDS with watertable within 2m of the surface (ha)**

	Area of WTSSDS with watertable < 2 m (ha)
2014/15 (Aug 14)	833
2013/14 (Aug 13)	885
2012/13 (Aug 12)	845
2009/10 (Aug 09)	11

During 2014/15 pumping rates from the WTSSDS bores were reduced to minimal levels due to the low watertables in the area. The total volume pumped from the WTSSDS scheme is presented in Table 30.

**Table 30: Volume pumped monthly into WTSSDS basins for 2014/15 (ML)**

	Stage 1	Stage 2
Jul 14	0	0
Aug 14	0	0
Sep 14	0	0
Oct 14	0	0
Nov 14	0	0
Dec 14	0	0
Jan 15	0	0
Feb 15	0	0
Mar 15	2	0
Apr 15	2	0
May 15	2	0
Jun 15	2	0
<b>TOTAL 14/15</b>	<b>8</b>	<b>0</b>

Total volume pumped WTSSDS 2014/15: 8ML

The salinity at each of the pump sites within the WTSSDS is presented in Table 31.

**Table 31: Salinity at WTSSDS pump sites**

Pump site Number	Salinity Sep 2014 (uS/cm)	Salinity Dec 2014 (uS/cm)	Salinity Jan 2015 (uS/cm)	Salinity June 2015 (uS/cm)
1	4,460	4,420	4,560	4,120
2	2,840	2,900	2,880	2,690
3	9,070	9,230	9,320	9,160
4	20,700	20,500	20,500	20,300
5	30,800	30,300	30,300	30,400
6	28,100	34,400	33,100	36,900
7	38,400	38,300	50,700	38,400
8	27,900	28,500	28,600	28,500
9	4,050	4,080	4,290	4,350
10	34,000	34,800	34,400	34,200
11	11,380	11,750	11,920	11,440
12	936	830	1,075	1,005
13	4,760	4,810	5,000	5,030
14	18,260	17,790	17,840	15,080
15	13,310	16,650	18,340	21,500
16	16,690	14,940	16,660	16,750
17	8,960	6,330	6,030	12,600
18	18,740	20,600	28,600	32,600
19	5,390	5,580	5,720	5,920
20	6,540	6,510	6,600	6,560



Pump site Number	Salinity Sep 2014 (uS/cm)	Salinity Dec 2014 (uS/cm)	Salinity Jan 2015 (uS/cm)	Salinity June 2015 (uS/cm)
21	27,400	27,900	27,700	28,000
22	27,600	29,000	30,600	31,800
23	10,290	10,530	10,650	11,860
24	46,600	46,200	46,700	46,900
26	19,780	16,320	16,490	
27	8,540	8,520	8,670	8,820
28	24,600	24,500	24,600	24,600
29	5,490	5,630	5,760	5,820
30	2,010	1,543	2,200	2,060
33	6,230	5,970	6,020	
34	3,550	5,220	5,260	5,350
35	3,270	3,530	3,360	3,300
36	4,250	4,220	4,380	4,670
37	40,300	55,600	41,800	41,000
38	29,300	29,300	29,100	29,500
39	7,040	7,160	7,270	7,370
40	23,400	25,400	24,700	24,500
41	7,410	7,840	10,220	8,260
42	27,600	43,900	46,700	53,500
43	35,900	36,000	36,100	36,300
45	62,300	59,900	61,100	58,800
46	53,800	54,400	54,800	55,600
47	3,220	2,440	3,030	2,550
49	1,478	1,649	1,652	2,970
51	620	380	612	15,140
52	1,372	1,492	1,613	2,030
54	38,500	37,600	37,600	6,760
58	40,200	40,100	40,300	40,300
59	3,470	3,710	3,820	12,020
60	3,200	2,420	3,020	2,380
61	2,230	2,910	2,610	2,140
62	73,800	73,700	73,900	74,200
63	198,100	200,000	201,000	204,000
64	47,600	63,200	62,500	80,100
Stage 1 outfall	15,960	15,720	15,860	
Stage 2 outfall	147,400	146,900	141,000	

A simple salt balance for the WTSSDS is presented in Table 32. There was no salt harvested from the WTSSDS basins in 2014/15. The tonnes of salt pumped is calculated using the average salinity for Stage 1 outfall and the total volume pumped into the basins in 2014/15.

**Table 32: Simple salt balance for the WTSSDS**

	<b>Salt load (t)</b>
<b>Total Extraction (pumped)</b>	<b>80</b>
<b>Total Discharged (harvested)</b>	<b>0</b>
<b>Balance (2014/15)</b>	<b>80 (imported)</b>

## 10 DATA REPORT

### 10.1 Stormwater discharge sites

A summary of the data omissions for 2014/15 is presented in Table 33.

**Table 33: Data omissions for the stormwater discharge sites**

Site name	Type of data loss	Dates	Comment
<b>Deniboota Canal Escape: DBCE (409067)</b>	discharge	9 Apr – 6 May	Level sensor failure
<b>Box Creek: MOXM (409090)</b>	discharge	28 Aug – 5 Nov	Level sensor failure
<b>Finley Escape: BIFE (409077)</b>	discharge	3 Jun – 30 Jun	Equipment malfunction
<b>Berrigan Creek Escape: BIBE (41010396)</b>	discharge salinity	23 Feb – 5 Mar	Debris effecting sensor
	salinity	8 Jun – 5 Aug	Equipment malfunction
<b>Murphy's Timber SEC: WRMT (40910131)</b>	discharge	2 Jun – 30 Jun	Equipment malfunction
<b>Warragoon Stage 2: TCW2 (41000253)</b>	discharge	4 Mar – 7 May	Equipment malfunction
	salinity	1 Apr -30 Jun	Equipment malfunction

Routine practice is that sites are visited by Murray Irrigation staff weekly and water samples are collected as required. The field data is used to complement recorded data, particularly at times when sensors malfunction.

## 10.2 Piezometers

A summary of the piezometers that are no longer operational are listed in Table 34.

**Table 34: Piezometers no longer functional August 2014**

<b>Site ID</b>	<b>Comment</b>
BQ3143	destroyed
BQ3156	destroyed
WAK1587	destroyed
WAK1589	destroyed
WAK1686	destroyed
WAK506	blocked

### 10.3 Calibration report for the Mulwala Canal and Wakool Canal AFFRA units.

The calibration report for the Mulwala Canal and Wakool Canal AFFRA units has been provided by the Thiess Hydrographic Services as part of the contract with Murray Irrigation to provide qualified hydrographic services. Refer to Table 35 for the Mulwala Canal AFFRA calibration report and Table 36 for the Wakool Canal AFFRA calibration report.

**Table 35: Mulwala Main Channel @ Offtake (409026) calibration report**

Date	Time	Calibration Measurements: Q, Measured Discharge ML/day	AFFRA Sensor: Q, Mean Weighted ML/day	Deviation
26/08/2014	9:55	5277	5468	-3.50%
16/09/2014	14:47	1388	1363	1.82%
6/11/2014	9:45	4802	4746	1.18%
6/11/2014	10:20	4802	4775	0.57%
9/02/2015	13:07	5414	5732	-5.55%

**Table 36: Wakool Main Channel @ Offtake (409022) calibration report**

Date	Time	Calibration Measurements: Q, Measured Discharge (ML/day)	AFFRA Sensor: Q, Mean Weighted (ML/day)	Deviation
6/05/2014	10:13	252	257	-2.14%*
5/08/2014	8:22	500	493	1.43%
2/12/2014	7:00	874	854	2.32%
29/01/2015	11:30	1180	1205	-2.07%
4/03/2015	13:39	625	651	-4.02%

\*: AFFRA not working properly. Flow figures taken from MIL SCADA readings, rather than sensor readings. This value should be excluded for flow comparison.

## 11 ENVIRONMENT PROTECTION LICENCE REPORTING

This report is based on the Environment Protection Licence number 5014 dated 31 March 2011 issued by the Environment Protection Authority (EPA)

There were no reports of non-compliance by Murray Irrigation with the EPA licence during 2014/15. Murray Irrigation considers all clauses of the EPA licence were complied with during 2014/15.

### 11.1 Nutrient Monitoring

Nutrient monitoring is triggered when flows in the stormwater escape channels exceed 5ML/day. The results are reported in Table 37.

**Table 37: Nutrient monitoring for 2014/15**

Date	Turbidity (NTU)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)
<b>Berrigan Creek Escape: BIBE (41010396)</b>			
2-Sep-14	46	0.798	0.9
13-Jan-15	64	0.03	<0.5
21-Apr-15	62	0.886	2.1
12-May 15	62	0.152	<0.5
<b>Box Creek: MOXM (409090)</b>			
20-Jan-15	13	0.034	0.5
21-Apr-15	94	0.098	1.3
19-May-15	6	0.036	<0.5
<b>Lalaly SEC: TUPJ (40910007)</b>			
9-Sep-14	9	0.041	0.9
13-Jan-15	30	0.112	1.5
21-Apr-15	357	0.231	0.8
<b>North Deniliquin SEC: DENI (409060)</b>			
21-Apr-15	49	0.647	1.9
<b>Wollamai East Escape: BIWE (409089)</b>			
26-Aug-14	28	0.036	<0.5

## 11.2 Pesticide Monitoring

During 2014/15 the requirements for pesticide testing were not triggered due to the low flows in the drainage system during spring. There were no water samples tested for pesticides during 2014/15.

## 11.3 Chemical Usage Report

An indication of the chemicals used by landholders in the Murray Irrigation Area of Operations has been sourced from the following NSW DPI Management Guidelines:

- Weed Control in Lucerne and Pastures
- Weed Control in Winter Crops
- Weed Control in Rice

The list of chemicals has been based on the premise that landholders will use the cheapest option in weed control. Landholders' decisions on the choice of chemicals used are also based on the decrease in the price of the product when patents on the active ingredient expire. Refer to Table 38.

**Table 38: Chemicals used by landholders**

glyphosate	triclopyr	MCPA	chlorsulfuron
atrazine	trifluralin	bromoxynil	oxyfluorfen
metsulfuron- methyl	2,4-D ester	dicamba	triasulfuron
simazine	2,4-D amine	s-metachlor	molinat
thiobencard	benzofenap	clomazone	cyhalofop
bensulfuron methyl	chlorpyrifos	maldison	

## 12 OTHER MONITORING

Council development consent conditions on some Stormwater Escape Channels required the installation of flow and salinity monitoring equipment. These are;

- DC18 Lalaly SEC (LAL18)
- Warragoon North SEC (BCMS)
- Pinelea SEC (TUP1)

Monitoring at the council development consent condition sites ceased on 30 June 2015. The councils concerned were notified in May 2015 that the monitoring would be discontinued.

The data for the council condition sites is presented in Table 39.

**Table 39: Flow and salt load at the council consent conditions sites (2014/15)**

Site	Total Flow (ML)	Min daily EC ( $\mu\text{S/cm}$ )	Max. daily EC ( $\mu\text{S/cm}$ )	Mean daily EC ( $\mu\text{S/cm}$ )	Total salt load (t)
<b>DC18 Lalaly: LAL18 (40910034)</b>	18	130	696	396	4
<b>Moonee Swamp outfall: BCMS (40910033)</b>	391	70	959	438	379
<b>Tuppal Creek U/S Pinelea SEC: TUP1 (40910025)</b>	N/A	45	5,652	645	N/A

A site has been established on the Tuppal Creek downstream of the Tocumwal supply channel escape to enable Murray Irrigation to closely monitor the water quality in the Tuppal Creek (TULAL) after the discharge from the Lalaly SEC has been diluted with supply water.

The data for the internal monitoring described above is presented in Table 40.

**Table 40: Salinity at the internal monitoring sites (2014/15)**

Site	Min daily EC ( $\mu\text{S/cm}$ )	Max. daily EC ( $\mu\text{S/cm}$ )	Mean daily EC ( $\mu\text{S/cm}$ )
<b>Tuppal Creek D/S Toc Esc: TULAL (40910129)</b>	20	5,108	676