**Reach 1: Upstream of Hume**

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| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata Column** | **Column Value** |
| 401224A | Dartmouth storage | H | H > 484.78 m Month = April, May or June | Soft | RO\_H\_SOFT\_1 | 484.78 |
| H > 484.93 m Month = July | Soft | RO\_H\_SOFT\_2 | 484.93 |
| H > 485.39 m | Soft | RO\_H\_SOFT\_3 | 485.39 |
| H > 486.0 m | FSL | RO\_H\_FSL | 486 |
| Dartmouth airspace | V | 3756381 < V < 3817439 ML | Soft | RO\_H\_SOFT\_1 | 3756381 |
| V > 3817440 ML | Hard | RO\_V\_HARD\_1 | 3817440 |
| 401204A | Mitta Mitta River @ Tallandoon | H | H > 3.4 m | Hard | SO\_H\_HARD\_1 | 3.4 |
| 401211A | Mitta Mitta River @ Colemans | H | When H > 1.75 m, ΔH (rate of fall) > 20 mm/hour  Note: Use hourly data | Hard | SO\_dH\_SOFT\_1 | 20 mm |
| When H <= 1.75 m, ΔH (rate of fall) > 60 mm/hour  Note: Use hourly data | Hard | SO\_dH\_SOFT\_2 | 60 mm |
| When H <= 1.75 m, ΔH (rate of fall) > 720 mm/24 hours rolling  Note: Use hourly data | Hard | SO\_dH\_SOFT\_3 | 720 mm |
| When H < 1.25 m, ΔH (rate of rise) > 150 mm/hour  Note: Use hourly data | Hard | SO\_dH\_SOFT\_4 | 150 mm |
| When 1.25 <= H <= 1.75 m, ΔH (rate of rise) > 100 mm/hour  Note: Use hourly data | Hard | SO\_dH\_SOFT\_5 | 100 mm |
| When H > 1.75 m, ΔH (rate of rise) > 50 mm/hour  Note: Use hourly data | Hard | SO\_dH\_SOFT\_6 | 50 mm |
| Q | Q < 200 ML/d | Hard | SO\_Q\_ HARD\_1 | 200 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| 401027 | Hume storage | H | H > 191.85 m | Hard | SO\_H\_HARD\_1 | 191.85 |
| 401027 | Hume storage | V | 2619015 < V < 2974949 ML | Soft | RO\_V\_SOFT\_1 | 2619015 |
|  |  |  |  |  |

**Reach 2: Hume to Yarrawonga**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata Column** | **Column Value** |
| 409016 | Murray @ Heywoods | H | When Q (at 409017) < 12,000 ML/day, ΔH (rate of fall)> 0.2 m | Soft | SO\_dH\_SOFT\_1 | 0.2 |
| When 12,000 ML/day <= Q (at 409017) < 25,000 ML/day, ΔH (rate of fall)> 0.225 m |  |  | 0.225 |
| When 12,000 ML/day <= Q (at 409017) < 25,000 ML/day, ΔH (rate of fall) (6 day rolling average)> 0.2m |  |  | 0.2 |
| Q | Q < 600 ML/d | Hard | SO\_Q\_HARD\_1 | 600 |
| 409017 | Murray @ Doctors Point | H | When Q < 12,000 ML/day, ΔH (rate of fall)> 0.15 m | Soft | SO\_dH\_SOFT\_1 | 0.15 |
|  | When 12,000 ML/day <= Q < 25,000 ML/day, ΔH (rate of fall)> 0.225 m |  |  | 0.225 |
|  | When 12,000 ML/day <= Q < 25,000 ML/day, ΔH (rate of fall) (6 day rolling average)> 0.15 m |  |  | 0.15 |
| Q | Q <1,200 ML/d | Hard | SO\_Q\_HARD\_1 | 1200 |
| Q > 25,000 ML/day | Hard | SO\_Q\_HARD\_2 | 25000 |
|  |  |  |  |  |  |  |
| 409026 | Mulwala Canal diversion (off Yarrawonga Weir) | Q | -500 ML/d > Q – QORD > 500 ML/d | Soft | RO\_Q\_SOFT\_1 | 500 |
| If Q (409026) > related water @ 409216A  (See note 1 below) | Hard | RO\_Q\_HARD\_1 |  |
| 409722A | Yarrawonga Main Canal diversion | Q | -500 ML/d > Q – QORD > 500 ML/d | Soft | RO\_Q\_SOFT\_1 | 500 |
| If Q (409722A) > related water @ 409216A  (See note 1 below) | Hard | RO\_Q\_HARD\_1 |  |
| 409216A | Yarrawonga storage | H |  |  |  |  |
|  |  |  |  |
| H < 124.7 m (between 26 December and 31 January) | Soft |  |  |
| H > 124.9m | FSL | RO\_H\_ FSL | 124.9 |
| 409025 | Murray @ Downstream of Yarrawonga | H | When Q <10,000 ML/day, ΔH (rate of fall) > 0.2 m/d | Soft | SO\_dH\_SOFT\_1 | 0.2 |
| Q | Q > 10,000 ML/d | soft |  | 10,000 |
| Q | Q < 1,800 ML/d | Hard | SO\_Q\_ HARD\_1 | 1800 |
| 403234A | Lake William Hovell storage | H | H >= 408.14 m | FSL | RO\_H\_FSL | 408.14 |

Note 1: Diversion into 409722A and 409026 is dependent on the level rating curve for the Yarrawonga storage (409216A) as shown below;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 409216A (H) | Flow/Order @ 409722A |  | 409216A (H) | Flow/Order @ 409026 |
| **122.52** | **0** |  | **122.12** | **0** |
| **123.42** | **500** |  | **122.52** | **500** |
| **123.86** | **1000** |  | **122.78** | **1000** |
| **124.16** | **1500** |  | **122.97** | **1500** |
| **124.38** | **2000** |  | **123.16** | **2000** |
| **124.57** | **2500** |  | **123.32** | **2500** |
| **124.74** | **3000** |  | **123.46** | **3000** |
|  |  |  | **123.6** | **3500** |
|  |  |  | **123.73** | **4000** |
|  |  |  | **??** | **Rest of flows?** |

**Reach 3: Yarrawonga to Euston**

| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata**  **Column** | **Column Value** |
| --- | --- | --- | --- | --- | --- | --- |
| 409008 | Edward River @ Edward Offtake | H | H > 2.46 m | Hard | SO\_H\_SOFT\_1 | 2.46 |
| When H <= 2.46 m, ΔH (rate of fall)> 0.15 m | soft |  |  |
| When H <= 2.46 m, ΔH (rate of rise)> 0.3 m | soft |  |  |
| Q | Q < 100 ML/d | Hard | SO\_Q\_SOFT\_1 | 100 |
| 409030 | Gulpa Creek @ Gulpa Offtake | H | H > 2.5m | Hard | SO\_H\_SOFT\_1 | 2.5 |
| When H <= 2.5 m, ΔH (rate of fall)> 0.15 m | soft |  |  |
| When H <= 2.5 m, ΔH (rate of rise)> 0.3 m | soft |  |  |
| Q | Q < 80 ML/d | Hard | SO\_Q\_SOFT\_1 | 80 |
| 409047 | Edward River at Toonalook | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409003 | Edward River at Deniliquin | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
|  |  |  |  |  |  |  |
| 409023 | Edward River @ downstream Stevens Weir | Q | Q > 2,700 ML/d | Hard | SO\_Q\_HARD\_1 | 2700 |
|  |  |  |  |  |  |  |
| 409014 | Edward River at Moulamein | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409006 | Murray @ Gulpa (picnic point) | H | 2.50 m < H < 2.6 m | Soft | SO\_H\_SOFT\_1 | 2.5 |
| H >= 2.60 m | Hard | SO\_H\_HARD\_1 | 2.6 |
| 409013 | Wakool @ Stoney Crossing | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409048 | Niemur @ Barham-Moulamein | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409086 | Niemur @ Mallan School | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409044 | Merran @ Franklins Bridge | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409036 | Merran @ U/S Wakool Junction | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409062 | Wakool @ Gee Gee Bridge | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409005 | Murray @Barham | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 405232 | Goulburn River @ McCoys Bridge | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409701E | National Channel diversion | Q | -500 ML/d > Q – QORD > 500 ML | Soft | RO\_Q\_SOFT\_1 | 500 |
|  |  |  |  |  |  |  |
|  |  |  |  |
| 409207B | Murray @ Downstream Torrumbarry | Q | Q < 2,000 ML/d | Soft | RO\_Q\_SOFT\_1 | 2000 |
| 409204C | Murray @ Swan Hill | H |  |  |  |  |
| H < 0.6 m | Hard | SO\_H\_HARD\_1 | 0.6 |
|  |  |  |  |  |  |  |
| 414200A | Murray @ below Wakool Junction | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| 410130 | Murrumbidgee River @ Balranald Weir D/S | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 414201B | Murray @ Boundary Bend | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| 414203C | Murray @ Euston Weir | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
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**Reach 4: Euston to SA border**

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| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata**  **Column** | **Column Value** |
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|  |  |  |  |  |  |  |
| 414202 | Murray River @ d/S Mildura Weir | H | H<= sill level + 1.4 m | Hard |  |  |
| 414206 | Murray River @ Merbein | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 425007 | Darling @ Burtundy | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
|  |  |  |  |  |  |  |
| WENTMR (parent site WENTUS) | Wentworth Weir – Murray Component of Inflow | Q | Q < 700 ML/d | Hard | SO\_Q\_HARD\_1 | 700 |
|  |  |  |  |  |  |  |
| 425010 | Murray River @ d/S Wentworth Weir | H | H<= sill level + 1.4 m | Hard |  |  |
|  |  |  |  |  |  |  |
| A4260505 | Murray @ Lock 9 | Q |  |  |  |  |
| Q < 500 ML/d | Soft | RO\_Q\_SOFT\_1 | 500 |
| A4260501 | Murray @ Lock 9 | EC | EC > 400 | Salinity | RO\_EC\_SAL\_1 | 400 |
| A4260505 | Murray @ Downstream Lock 9 | H | H<= 23.17 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260506 | Murray @ Lock 8 | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| A4260507 | Murray @ Downstream Lock 8 | H | H<= 20.86 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260508 | Murray @ Lock 7 | EC | EC > 400 | Salinity | RO\_EC\_ SAL | 400 |
| A4260509 | Murray @ Downstream Lock 7 | H | H<= 18.35 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260500 | Frenchmans Creek @ Inlet regulator | Q | 7,000 ML/d < Q <= 10,000 ML/d | Soft | SO\_Q\_SOFT\_1 | 7000 |
| Q >10,000 ML/d | Hard | SO\_Q\_HARD\_1 | 10000 |
| Q <200 ML/d | Soft | SO\_Q\_Soft\_1 | 200 |
| A4261093 (use LVIC data) | Lake Victoria storage | H | H > 26.95 m | Hard | SO\_H\_SOFT\_1 | 26.95 |
| 24.45 m < H < 24.55 m | soft | SO\_H\_HARD\_1  SO\_H\_HARD\_2 | 24.45  24.55 |
| When 26 m < H < 27 m, ΔH (rate of rise) > 0.05 m | Hard | SO\_dH\_HARD\_3 | 0.05 |
| EC | EC > 400 | Salinity | SO\_EC\_SAL | 400 |
| A4260502 | Lake Victoria @ outlet regulator | Q | Q < 700 ML/d OR > 10,000 ML/day | Hard | SO\_Q\_HARD\_1  SO\_Q\_HARD\_2 | 700  10000 |
|  |  |  |  |
|  |  |  |  |
| A4260641 | Rufus River | EC | EC > 400 | Salinity | RO\_EC\_SAL | 750 |
| 426200A | Murray @ downstream Rufus River | EC | EC > 450 | Salinity | RO\_EC\_SAL | 500 |

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| MENINDE | Menindee Lake | V | V > 1,730,000 ML Month = November, December, January and February | soft | SO\_V\_HARD\_1 | 1730000 |
| V >= 2,050,000 ML | Hard | SO\_V\_FSL | 2050000 |
| 425012 | Lower Darling @ Weir 32 | Q | When Q <=5000 ML/d, ΔQ (rate of fall) > 250 ML/d | Hard | SO\_dQ\_HARD\_1 | 250 |
| When 5000 < Q <= 9000 ML/d, , ΔQ (rate of fall) > 500 ML/d | Hard | SO\_dQ\_HARD\_2 | 500 |
| When Q <= 1000 ML/d, ΔQ (rate of rise) > 500 ML/d | Hard | SO\_dQ\_HARD\_3 | 500 |
| When 1000 < Q <= 5000 ML/d, ΔQ (rate of rise) > 1000 ML/d | Hard | SO\_dQ\_HARD\_4 | 1000 |
| When 5000 < Q <= 9000 ML/d, ΔQ (rate of rise) > 2000 ML/d | Hard | SO\_dQ\_HARD\_5 | 2000 |
| 425020 | Lake Wetherell | H | H >= 62.3 m | Hard | RO\_V\_HARD\_1 | 62.3 |
| H > 61.67 m Month = November, December, January and February | soft | RO\_V\_ FSL | 61.67 |
| 425021 | Lake Pamamaroo | H | H >= 61.5 m | Hard | RO\_V\_HARD\_1 | 61.5 |
| H >= 60.45 m Month = November, December, January and February | soft | RO\_V\_FSL | 60.45 |
| 425040 | Lake Menindee + Cawndilla | H | H >= 60.45 m | Hard | RO\_V\_HARD\_1 | 60.45 |
| H >= 59.84 m Month = November, December, January and February | soft | RO\_V\_FSL | 59.84 |
| 425012 | Lower Darling @ Weir 32 | H | H > 3.3 m | Hard | SO\_H\_HARD\_1 | 3.3 |
| Q | Q < 350 ML/d Month = Jan, Feb and Mar | Hard | SO\_Q\_HARD\_1 | 350 |
| Q < 300 ML/d Month = Apr, Nov and Dec | Hard | SO\_Q\_HARD\_2 | 300 |
| Q < 200 ML/d Month = May, Jun, Jul, Aug, Sep and Oct | Hard | SO\_Q\_HARD\_3 | 200 |
| Q < 500 ML/d when H > FSL (59.84 m) | Hard | SO\_Q\_HARD\_4 | 500 |
| 425007 | Lower Darling @ Burtundy | EC | EC > 830 | Salinity | RO\_EC\_SAL | 830 |

**Reach 5: SA border to Murray Mouth**

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| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata**  **Column** | **Column Value** |
| A4260510 | Murray @ Lock 6 | EC | EC > 580 | Salinity | RO\_EC\_SAL | 580 |
| A4260511 | River Murray @ Lock 6 Downstream | H | H<= 15.32 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260513 | River Murray @ Lock 5 Downstream | H | H<= 12.02 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260515 | River Murray @ Lock 4 Downstream | H | H<= 8.99 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260517 | River Murray @ Lock 3 Downstream | H | H<= 5.21 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260519 | River Murray @ Lock 2 Downstream | H | H<= 1.89 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260903 | River Murray @ Lock 1 Downstream | H | H<= -1.05 m (lock sill level + 1.4 m) | Navigation |  |  |
| A4260554 | Murray @ Morgan | EC | EC > 800 | Salinity | RO\_EC\_SAL | 800 |
| A4261162 | Murray @ Murray Bridge | EC | EC > 830 | Salinity | RO\_EC\_SAL | 830 |
| A4260524 | Milang Jetty | EC | EC > 1,000 | Salinity | RO\_EC\_SAL | 1000 |

**References**

**Objectives and Outcomes for River Operations in the River Murray System. http://www.mdba.gov.au/media-pubs/publications/objectives-and-Outcomes-for-River-Operations**