**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 | Soft | SO\_dH\_SOFT\_1 | 20 mm |
| ΔH (rate of fall) > 60 mm/hour  Note: Use hourly data | Soft | SO\_dH\_SOFT\_2 | 60 mm |
| ΔH (rate of fall) > 720 mm/24 hours rolling  Note: Use hourly data | Soft | SO\_dH\_SOFT\_3 | 720 mm |
| When H < 1.25 m, ΔH (rate of rise) > 150 mm/hour  Note: Use hourly data | Soft | SO\_dH\_SOFT\_4 | 150 mm |
| When 1.25 <= H <= 1.75 m, ΔH (rate of rise) > 100 mm/hour  Note: Use hourly data | Soft | SO\_dH\_SOFT\_5 | 100 mm |
| When H > 1.75 m, ΔH (rate of rise) > 50 mm/hour  Note: Use hourly data | Soft | SO\_dH\_SOFT\_6 | 50 mm |
| Q | Q < 200 ML/d | Hard | SO\_Q\_ HARD\_1 | 200 |
| When 60% < V (401224A) <= 70%, Q (Weekly rolling average) < 300 ML/d | Soft | SO\_Q\_SOFT\_2 | 300 |
| When 70% < V (401224A) <= 80%, Q (Weekly rolling average) < 400 ML/d | Soft | SO\_Q\_SOFT\_3 | 400 |
| When V (401224A) > 80%, Q (Weekly rolling average) < 500 ML/d | Soft | SO\_Q\_SOFT\_5 | 500 |
| 401027 | Hume storage | H | H > 192.0 m | FSL | RO\_H\_FSL | 192 |
| 401027 | Hume storage | V | 2619015 < V < 2974949 ML | Soft | RO\_V\_SOFT\_1 | 2619015 |
| V | V > 2974950 ML | Hard | RO\_V\_ HARD\_1 | 2974950 |

**Reach 2: Hume to Yarrawonga**

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| --- | --- | --- | --- | --- | --- | --- |
| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata Column** | **Column Value** |
| 409016 | Murray @ Heywoods | H | ΔH (rate of fall)> 0.2 m | Soft | SO\_dH\_SOFT\_1 | 0.2 |
| Q | Q < 600 ML/d | Hard | SO\_Q\_HARD\_1 | 600 |
| 409017 | Murray @ Doctors Point | H | ΔH (rate of fall) > 0.15 m | Soft | SO\_dH\_SOFT\_1 | 0.15 |
| Q | Q <1,200 ML/d | Hard | SO\_Q\_HARD\_1 | 1200 |
| Q > 25,000 ML/day | Hard | SO\_Q\_HARD\_2 | 2500 |
| WCORPUM | West Corurgan diversion | Q | Q – QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| 409026 | Mulwala Canal diversion (off Yarrawonga Weir) | Q | Q – QORD > 1000 ML | Soft | RO\_Q\_SOFT\_1 | 1000 |
| If Q (409026) > related water @ 409216A  (See note 1 below) | Hard | RO\_Q\_HARD\_1 |  |
| 409722A | Yarrawonga Main Canal diversion | Q | Q – QORD > 500 ML | 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 < 124.2m | Hard | SO\_H\_HARD\_1 | 124.2 |
| 124.2 < H < 124.6 | Soft | SO\_H\_SOFT\_1  SO\_H\_SOFT\_2 | 124.2  124.6 |
| H >= 124.9m | FSL | SO\_H\_ FSL | 124.9 |
| 409025 | Murray @ Downstream of Yarrawonga | H | ΔH (rate of fall) > 0.3 m | Soft | SO\_dH\_SOFT\_1 | 0.3 |
| 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** |

**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 | Soft | SO\_H\_SOFT\_1 | 2.46 |
| Q | Q < 100 ML/d | Soft | SO\_Q\_SOFT\_1 | 100 |
| 409030 | Gulpa Creek @ Gulpa Offtake | H | H > 2.5m | Soft | SO\_H\_SOFT\_1 | 2.5 |
| Q | Q < 80 ML/d | Soft | SO\_Q\_SOFT\_1 | 80 |
| 409029 | Edward Escape | Q | Q > Q (409103) | Soft | RO\_Q\_SOFT\_1 |  |
| 409023 | Edward River @ downstream Stevens Weir | Q | Q >= 2,700 ML/d | Hard | SO\_Q\_HARD\_1 | 2700 |
| 409014 | Edward River @ Moulamein | Q | Q <= 650 ML/d | Soft | RO\_Q\_SOFT\_1 | 650 |
| 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 |
| 409005 | Murray @Barham | DO% | DO% <= 50% | DO% | RO\_DO%\_DO | 50 |
| 409701E | National Channel diversion | Q | Q – QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| 409219 | Torrumbarry storage | H | 85.65 m < H < 85.90 m | Soft | RO\_H\_SOFT\_1 | 85.9 |
| H <= 85.65 m | Hard | RO\_H\_HARD\_1 | 85.65 |
| 409207B | Murray @ Downstream Torrumbarry | Q | Q < 2,000 ML/d | Soft | RO\_Q\_HARD\_1 | 2000 |
| 409204C | Murray @ Swan Hill | H | 0.6 m < H < 0.69 m | Soft | SO\_H\_SOFT\_1 | 0.69 |
| H <= 0.6 m | Hard | SO\_H\_HARD\_1 | 0.6 |
| SWHPUMP | Swan Hill Pumps diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| 414200A | Murray @ below Wakool Junction | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| 414201B | Murray @ Boundary Bend | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| 414203C | Murray @ Euston Weir | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| 414209 | Euston Weir storage | H | H <47.60 m or H > 47.80 m | Soft | RO\_ H\_SOFT\_1  RO\_ H\_SOFT\_2 | 47.6  47.8 |

**Reach 4: Euston to SA border**

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| **ROWS\_ID** | **Site** | **Parameter** | **Rule** | **Warning** | **Metadata**  **Column** | **Column Value** |
| 414207A | Murray @ Colignan | H | 1.2 m < H < 1.35 m | Soft | RO\_H\_SOFT\_1 | 1.2 |
| H <= 1.2 m | Hard | RO\_H\_HARD\_1 | 1.35 |
| REDCPUM | Redcliffs Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| FMITPUM | FMIT Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| BURPUMP | Buronga Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| MILDINF  (Parent site 414210A) | Mildura Weir Inflow | Q | Q < 1,200 ML/d | Hard | RO\_Q\_SOFT\_1 | 1200 |
| MERBPUM | Merbein Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| COOMPUM | Coomealla Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| CURLPUM | Curlwaa Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| WENTINF  (parent site  WENTUS) | Wentworth Weir Inflow | Q | Q < 1,500 ML/d | Hard | RO\_Q\_HARD\_1 | 1500 |
| WENTMR (parent site WENTUS) | Wentworth Weir – Murray Component of Inflow | Q | Q < 700 ML/d | Hard | SO\_Q\_HARD\_1 | 700 |
| 425010 | Murray @ Wentworth | Q | Q <1,500 ML/d | Hard | RO\_Q\_HARD\_1 | 1500 |
| MILLPUM | Millewa Diversions | Q | Q - QORD > 100 ML | Soft | RO\_Q\_SOFT\_1 | 100 |
| A4260505 | Murray @ Lock 9 | Q | Q < Q (414211A) | Hard | RO\_Q\_HARD\_1 |  |
| Q < 500 ML/d | Soft | RO\_Q\_SOFT\_1 | 500 |
| A4260501 | Murray @ Lock 9 | EC | EC > 400 | Salinity | RO\_EC\_SAL\_1 | 400 |
| A4260506 | Murray @ Lock 8 | EC | EC > 400 | Salinity | RO\_EC\_SAL | 400 |
| A4260508 | Murray @ Lock 7 | EC | EC > 400 | Salinity | RO\_EC\_ SAL | 400 |
| A4260500 | Frenchmans Creek @ Inlet regulator | Q | 7,000 ML/d < Q < 10,000 ML/d | Soft | SO\_Q\_SOFT\_1 | 7000 |
| Q <200 ML/d OR Q >= 10,000 ML/d | Hard | SO\_Q\_HARD\_1  SO\_Q\_HARD\_2 | 200  10000 |
| A4261093 (use LVIC data) | Lake Victoria storage | H | H >= 26.95 m | Soft | SO\_H\_SOFT\_1 | 26.95 |
| 24.45 m < H < 24.55 m | Hard | 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 |
| V (outlet capacity) – Q < 0 | Hard | SO\_Q\_HARD\_1 | 0 |
| V (outlet capacity) – Q < 1,000 ML/d | Soft | SO\_Q\_SOFT\_1 | 1000 |
| A4260641 | Rufus River | EC | EC > 750 | Salinity | RO\_EC\_SAL | 750 |
| 426200A | Murray @ downstream Rufus River | EC | EC > 750 | Salinity | RO\_EC\_SAL | 750 |

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| MENINDE | Menindee Lake | V | V >= 1,730,000 ML | Hard | SO\_V\_HARD\_1 | 1730000 |
| V >= 2,050,000 ML | FSL | 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 | V | V >= 192,910 ML | Hard | RO\_V\_HARD\_1 | 192910 |
| V >= 262,150 ML | FSL | RO\_V\_ FSL | 262150 |
| 425021 | Lake Pamamaroo | V | V >= 269,610 ML | Hard | RO\_V\_HARD\_1 | 269610 |
| V >= 345,330 ML | FSL | RO\_V\_FSL | 345330 |
| 425040 | Lake Menindee + Cawndilla | V | V >= 1,141,130 ML | Hard | RO\_V\_HARD\_1 | 1141130 |
| V >= 1,308,120 ML | FSL | RO\_V\_FSL | 1308120 |
| 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 |
| 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**