

Drought Management Plan

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Note: Document Control continued at Appendix A

General Manager

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1. EXECUTIVE SUMMARY

This document outlines the procedures to be implemented in the event of drought occurring within the Glen Innes and Deepwater areas.

1.1 Security of Water Supply

Until the recent 2019/2020 drought, the longest recorded period of restrictions occurred in 1987 and lasted 146 days (nominally five months). In 2014 a similar period of restrictions was implemented lasting just one day less. The level within the Beardy Weir dropped to 1200 mm below top water level during the 2014 drought.

On 17th of January 2020 the Beardy Weir was at an all time low of greater than 3.5m below top water level and was unreachable with our current infrastructure. At this time water was being carted from other sources to maintain levels in the South Pond, the North Pond was empty, and Glenn Innes was relying largely on the Red Range Road Bores and the new Eerindii Ponds Bore for two thirds of its water consumption.

In times of nil rainfall occurring during the hottest months of summer, it was predicted that the Beardy Reservoir would fall to a level 1500mm below the weir in as short as three months. That scenario occurred and Level One (1) Restrictions were imposed on the 11th of January 2019, where extreme heat and nil runoff events combined to provide the worst-case scenario.

In that scenario the off-stream storage then became the town supply, in conjunction with the two Red Range Road bores. Level Two (2) Restrictions were applied on the 24th July 19 with Level Three (3) following closely on the 1st August, as a special council resolution. In accordance with the Drought Management Plan the process of constructing the new Eerindii Ponds Bore was set in motion and was commissioned on the 5th November 2019. Levels four (4) and (5) followed on the 1st November 2019 and 1st January 2020 respectively.

Good rain falls in January and February 2020 saw water ingress to the Beardy Weir start on the 17th January 2020 and the weir reached the 100% full on the 29th of the same month. However, the weir had been near empty for many months and large amounts of vegetation had grown in the fertile soils. This vegetation started to rot and water quality plummeted preventing pumping to the ponds. This issue continues to inhibit pumping when the weir stops overflowing and inadequate flushing causes a reduction in quality.

The development of the Glen Innes Aggregates off stream storage facility with a capacity of 565ML, combined with a supply from the Red Range Rd bore offered an estimated 24 months of water security under average consumptions rates.

The addition of Eerindii Ponds Bore in conjunction with the changes made to the DRP during this review will offer approximately 29 month's supply, under the same conditions, from the time that water becomes inaccessible in Beardy Weir. This calculation assumes 90% usability, constant 1ML/day flows from the bores and does not include leakage, evaporation or the development of further bores on reaching Level Three (3) Restriction Levels.

The remaining drought reserve capacity of 29 months, assuming no rainfall occurring in the catchment over the entire period, is therefore at least 12 months greater than the current drought to the date of writing. This provides a significant buffer, which will increase further as the off stream storage continues to develop.

2. BACKGROUND

2.1 Existing Water Supply System

2.1.1 Glen Innes

The Glen Innes area is serviced by a network of reticulation water mains from the three (3) clear water storage tanks (6.4 ML) at the Glen Innes Water Treatment Plant located at Martins Lookout with a treatment capacity of 10 ML/day. Water is sourced from the Beardy Waters Reservoir located east of Glen Innes and is pumped approximately 3.2 km along a DN 375 MSCL / DICL rising main to the Eerindii Ponds.

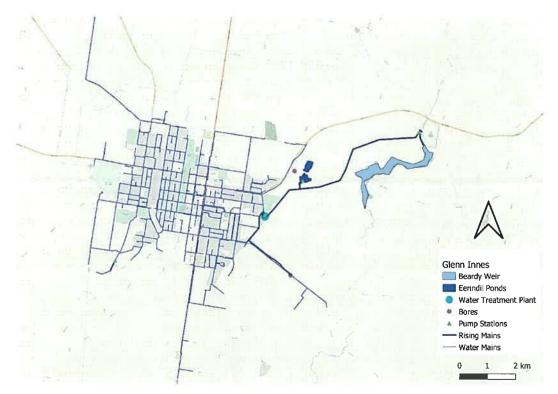
An off-stream storage facility (Eerindii Ponds), created in 2012 adjacent to the rising main, as the Glen Innes Aggregates Quarry ceases operations within progressive pits. Stage 1 capacity of this storage is 200ML, stage 2 added 300ML providing a current combined storage of 500ML.

Water is pumped from this storage daily to the Glen Innes water treatment plant at Martins Lookout. A 90kW solar array provides energy to three pumps (plus one standby) on a floating pontoon in the southern storage. The southern storage is maintained at 100% full by pumping weekly from the Beardy Weir, and the 365 ML northern storage when pumping is discontinued from the Beardy Weir at the 3500mm below top water level. This arrangement is in place to ensure that water is able to be well aerated in the southern storage to address quality issues, and to utilise the solar power for the 70 meters of vertical lift to the treatment plant.

During non-drought periods the Eeirindii ponds are maintained at 100% full.

Three (3) bores have been commissioned, two (2) on the Red Range Road and one (1) at the entrance to the Glenn Innes Quarry to the east of Glen Innes. These bores can deliver a combined flow of approximately one (1) ML per day via 150mm diameter PVC rising mains.

The old Mann River system (not included in the map below) has been decommissioned, however the extraction licence has been retained.



Weir 488 MLWater Treatment Plant 10 ML/day

Clear Water Storage 3 (6.4ML combined)

Service Reservoirs 1 (0.91ML)

• Pumping Stations 2 (135L/s combined)

Reticulation Mains 85.6 km

• Bore 3 (1ML/day combined)

Off Stream Storage 565ML

2.1.2 Deepwater

Water for the Deepwater area is sourced from the Deepwater Weir located Northwest of Deepwater. Water passes through a DAFF treatment plant with a capacity of 0.7 ML/day. A second reservoir has been constructed at the Deepwater Treatment to assist with the management of water quality during high turbidity events resulting from storm activity in the catchment.

Weir 1
DAFF treatment plant 1
Reservoirs 2
Pumping Stations 1
Reticulation Mains 8.7 km

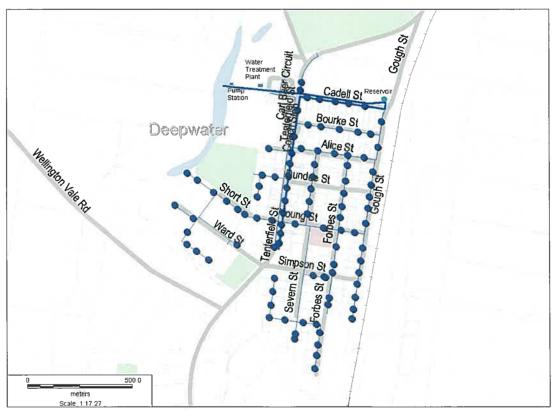


Figure 2-2 - Deepwater Existing Water Supply System

2.1.3 Other Villages

Emmaville, Red Range, Glencoe, Wellingrove, Dundee and Tent Hill have no reticulated water supply system.

2.2 Drought History

2.2.1 Glen Innes

In 2019 Level one (1) restrictions were implemented on 11 April following an extremely hot and dry summer. At this point the Beardy Waters Weir had reached the trigger threshold of 1500mm below top water level, and as per the DMP in place pumping ceased from the Beardy Waters and the Eerindii Ponds were utilised, with support from the Red Range Road bores. The Eerindii Ponds bore was commissioned at the implementation of stage three restrictions in late 2019.

Res	Restriction Level 2019/20						
Restriction Level	Date Initiated	Duration (Days)	Cumulative Total (Days)				
One (1)	11-Apr-19	104	104				
Two (2)	24-Jul-19	8	112				
Three (3)	01-Aug-19	92	204				
Four (4)	01-Nov-19	61	265				
Five (5)	01-Jan-20	64	329				
Four (4)		0	329				
Three (3)	05-Mar-20	78	407				
Two (2)	22-May-20	34	: 441				
One (1)	25-Jun-20	Permanent	: : :				

Fig. 2.1 Restrictions implemented during 2019/2020 Drought

In January 2020 the weir reached 3500mm below top water level and the North Eerindii Pond was completely depleted. Trucking of water from holes downstream of the weir had commenced to maintain the South Pond levels at above 80% to protect infrastructure and allow the Solar Array and PAC dosing to be used.

Major periods of water restrictions have been implemented in the following years:

- 2019 to 2020 severe water restrictions 441 days
- 2014 severe water restrictions 145 days;
- 2005 severe water restrictions 90 days;
- 1995 severe water restrictions 94 days;
- 1994 severe water restrictions for 146 days;
- 1993 severe water restrictions for 49 days;
- 1992; 1990; 1989; and 1985 drought years where water restrictions were applied.

The Beardy Waters Weir was increased to its current storage capacity in 1987.

2.2.2 Deepwater

The following restrictions have been enforced for the Deepwater area, however it should be noted that the Deepwater weir was constructed in 1994/5, alleviating the village's immediate water shortage problems:

- 2019 to 2020 severe water restrictions 298 days;
- 2003– water restrictions for approximately 73 days;
- 2002 water restrictions October;
- 1995 water restrictions for approximately 70 days;
- 1994 severe water shortage and water was pumped from deep holes within the common area of the river upstream of Deepwater in order to replenish supply for the villages immediate needs:
- 1993 water restrictions for approximately 57 days;
- 1992 water restrictions for approximately 35 days;
- 1991 water restrictions for approximately 48 days;
- 1990 water restrictions December;
- 1987 water restrictions for approximately 150 days;
- 1986 water restrictions for approximately 130 days;
- 1984 water restrictions for approximately 47 days;
- 1983 water restrictions for approximately 56 days;
- 1980 water restrictions for approximately 112 days;

3. OBJECTIVES

3.1 Key Objectives

To maintain necessary restricted water supply to all consumers, with consideration of the associated risks:

- Economic:
 - Water dependent industries;
 - o Cost of new infrastructure to secure water sources;
 - Cost of water cartage;
 - o Exposure to fire;
 - Reduced income during water restrictions due to users pays policy.
- Infrastructure:
 - Exposure of infrastructure due to low water levels;
 - Effects on parks and gardens;
 - o Effect on Council works programme;
 - System leakage and pressure.
- Environmental:
 - o Water Quality;
 - o Disease;
- Social:
 - Education of the community of water saving initiatives;
 - o Confrontation and conflict from consumers i.e. loss of business etc.;
 - o Mental and physical stress within the community.

3.2 Strategic Planning

Glen Innes and Deepwater townships have been considered separately when comprising the Drought Management Action Plans to ensure their relevance to their water supply area. However, when Glen Innes is on water restrictions, Deepwater will be placed on at least the same level. This is because Deepwater's water supply will be supplemented by Glen Innes during extended periods of drought.

3.3 Implementation

The purpose of a Drought Management Plan is to ensure that the community does not completely run out of water in any circumstance, for example due to climate change and unknown future impacts relating to those changes. Implementation of the Drought Management Action Plans and associated water restrictions are vital to reduce this risk for Council and the community.

4. DATA

4.1 Existing Consumers

- Residential:
 - Glen Innes

6,800

Deepwater

400

- Commercial:
- Hospital;
- Schools;
- Sale Yard;
- Nurseries;
- Retirement Homes;
- Sports Grounds;
- Licensed Club;
- · Ready Mixed Concrete;
- Steel Fabricators.

4.2 Others seeking water in times of drought

Properties adjacent to Beardy Waters within the catchment area with permission to draw under harvestable rights

Rural Properties - town water supply cartage

Potential businesses that may require exemptions to water restrictions during drought include, but not limited to the following:

- Horticulture;
- Funeral Homes;
- Butchers;
- Kennels;
- Car detailers:
- Saleyards

4.3 Water Requirements

Normal potable water usage for the Glen Innes Township is approximately 1.8 ML/day. Minimum volume potable water required for household use is in the order of 130 L/person/day, this equates to approximately 0.91 ML/day for an estimated peak population of 7,000 persons. The largest maximum day recorded is 6.5 ML/day. The minimum daily recorded water consumption in recent years is 1.0 ML. Typical consumption during level 5 restrictions is 1.4ML/day. This indicates that there are some non-essential (or non-potable) uses of water during times of severe restrictions. Deepwater potable water minimum usage is calculated at 43 kL/day. In the village of Emmaville, a non-potable water supply is provided to the school, caravan park and swimming pool.

4.4 Water Dependent consumers

- Nurseries and commercial flower gardens
- Ready Mixed Concrete
- Hospital
- Schools
- Licensed Clubs
- Bowling Green (Glen Innes Bowling Club)

4.5 Water Supply Schemes

The Glen Innes Township is serviced by town water supply and has minimal use of irrigation systems within public parks. The Glen Innes Golf Course is irrigated reusing effluent from the nearby Sewage Treatment Plant (STP). Due to the current grade of effluent produced at the STP, large capital expenditure outlay for pipelines, and relatively high rainfall levels, other areas of the town are not irrigated with effluent.

4.6 Existing Storage

4.6.1 Beardy Waters Weir

- Actual storage approximately 494ML; (noting removal of approximately 6ML of silt occurred in 2019)
- Weir crest 1059.09m AHD;
- Catchment area 227 km²;
- Surface Area when full 39 ha.

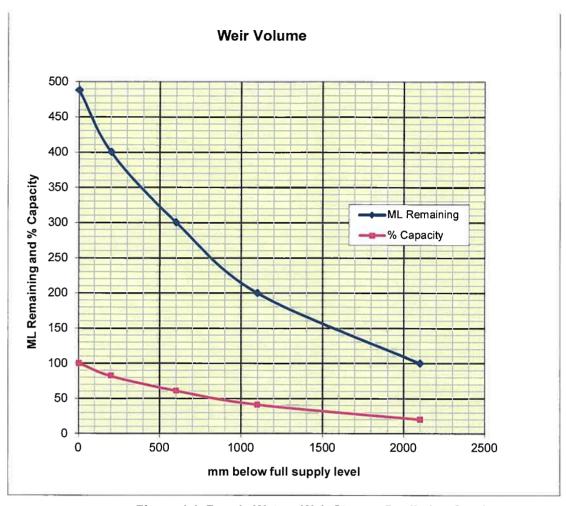


Figure 4-1 Beardy Waters Weir Storage Prediction Graph

4.6.2 Deepwater Weir

- Storage volume 62 ML;
- Weir crest 956.8m AHD;
- Catchment area 217 km²
- Surface Area when full 3.4 ha.

4.7 Rainfall and Evaporation

Mean monthly rainfall and daily evaporation for Glen Innes area:

Month	Mean Monthly Rainfall (mm)	Mean Daily Evap. (mm)
January	101	5.5
February	101	4.8
March	78	4.2
April	37	3.2
May	35	2.0
June	35	1.6
July	43	1.7
August	46	2.4
September	55	3.6
October	86	4.4
November	105	5.1
December	106	5.6
Total	828	3.7

5. DROUGHT MANAGEMENT PLAN

5.1 Demand Management Options

The following options are discussed in detail throughout this section:

- · Restrictions Strategies;
- Alternative Water Sources:
 - o Red Range Rd Bore
 - o Eerindii Ponds Bore
 - o Glen Innes Aggregates Off Stream Storage (Eerindii Ponds)

Ongoing Actions for Council:

- Increase public awareness of water saving initiatives;
- Reduce volumes of unaccounted for water (UFW);
- Review / implement policies / procedures for the following:
 - Implementation of water restrictions (media releases, policing restrictions, authorisation to increase level of restrictions, cartage of water);
 - Blue-green algae outbreak;
 - Emergency response procedures for fire-fighting requirements during major system failure.

Table 5.1 GLEN INNES - DROUGHT MANAGEMENT ACTION PLAN TRIGGER LEVELS

Level	Trigger	Actions
1 (Low	Ongoing – this level will be a permanent restriction	 Increase public awareness of water saving initiatives and current restrictions; Monitor/minimise unaccounted for water;
2 Low - Moderate	Beardy Weir 500mm below full (320ML) Eerindii Ponds, North and South Pond 100% full (500ML)	 Increase public awareness of water saving initiatives and current restrictions; Use alternative water sources (not reticulated) for roadworks Review emergency procedures.
3 Moderate	Beardy Weir 1000mm below full (210ML) Eerindii Ponds, North and South Pond 100% full (500ML)	Increase public awareness of water saving initiatives and current restrictions.
4 Moderate – High	Beardy Weir 2000mm below full (110ML) Eerindii Ponds, North and South Pond 100% full (500ML)	 Community consultation and increase public awareness of water saving initiatives and current restrictions; Utilise accessible water to increase Eerindii Ponds to 100% full.
5 High – Extreme	Beardy Weir 3500mm below full Eerindii Ponds, North and South Pond 100% full (500ML) 29 Months Remaining	 Community consultation and increase public awareness of water saving initiatives and current restrictions; Initiate pumping from Red Range Road and Eerindii Ponds Bores; Implement emergency fire-fighting procedures; Cease weekly pumping from the Beardy Waters Weir, commence weekly pumping from North Pit to South Pit to maintain South Pit at 90% capacity (180 ML).

Note: Figures quoting remaining months of supply are average figures. The actual length of time will vary depending on the time of year at which storage levels are falling. For example, seven months remaining water over winter may only be 3 months (or less) over summer.

5.1.1 Recovering from Extreme Drought (Level Five)

When flow in the Beardy waters again overflows the weir after extreme drought, the Eerindii Ponds will be pumped until full. This may take some time as water quality recovers in the Beardy Waters. Restriction levels will be reduced to level three (3) when North Pond reaches 50% full, level two (2) when North Pond reaches 70% full, and level one (1) when reaching 90% full.

Table 5.2 DEEPWATER - DROUGHT MANAGEMENT ACTION PLAN TRIGGER LEVELS

Level	Trigger	Actions
1 Low	Ongoing – this level will be a permanent	 Increase public awareness of water saving initiatives and current restrictions;
	restriction	Review alternative water source availability.
2 Low -	Weir level 300mm below top water level	 Increase public awareness of water saving initiatives and current restrictions;
Moderate		 Review emergency procedures;
		Use alternate water (non-potable) for road works.
3 Moderate	Weir level 600mm below top water level	 Increase public awareness of water saving initiatives and current restrictions;
4 Moderate	Weir level 800mm below top water level	 Community consultation and increase public awareness of water saving initiatives and current restrictions;
– High		 Initiate procedures for water from alternative sources.
6 Extreme	Weir level 1000mm below top water level	 Community consultation and increase public awareness of water saving initiatives and current restrictions;
	or	 Implement emergency fire-fighting procedures;
	 MAJOR SYSTEM FAILURE 	Water carted in from Glen Innes or best available source.
	 CONTAMINATION OF WATER SUPPLY 	

Table 5.3 Restriction Strategies for Glen Innes and Deepwater

Restriction Level	1	2	3	4	5
DOMESTIC				<u> </u>	
Garden Watering	Not during the heat of the date Note 1	Handheld Hose or Drippers 2hrs/d Note (1)	Buckets restricted to 2 hrs/d	Reused water only	Reused water only
Swimming Pools Private	No restriction	Permit required for filling pools over 2,000l	No filling of pools over 2,000l. Top up only with buckets	Filling and topping up on pools prohibited	Filling and topping up of pools prohibited
Wash paved areas and roof	No restriction	Buckets only except as required by law	Buckets only except as required by law	Banned only except as required by law	Banned only except as required by law

PUBLIC / CO	MMERCIAL				
Public Gardens	No restriction	Sprinklers 2 hrs/d Note (2)	Reused water only	Reused water only	Reused water only
Sports Grounds	No restriction	Sprinklers 2 hrs/d Note (2)	Reused water only	Reused water only	Reused water only
Market Gardens and Orchards	No restriction	Sprinklers 6 hrs/d	Sprinklers 4 hrs/d <i>Note (3)</i>	Sprinklers 4 hrs/d Note (3)	With Council permit only
Nurseries and Commercial Flower Gardens	No restriction	Sprinklers 2 hrs/d Note (2)	Handheld hoses 4 hrs/d Note (3)	Handheld hoses 2 hrs/d Note (2)	With Council permit only
Washing Motor Vehicles	No restriction	No restriction	Manual buckets only maching recirculation only	Manual buckets only maching recirculation only	Banned only except as required by law
Bowling Greens	No restriction	Sprinklers 2 hrs/d Note (2)	Handheld hoses 2 hrs/d Note (2)	Handheld hoses 1 hr/d (Note 4)	Reused water only
Fountains	Not during the heat of the date Note (1)	Hose can only	Banned	Banned	Banned
Household Water Cartage from Town Water Supply	No restriction	No restriction	No restriction	No restriction	With Council permit only

Automatic	No restriction	No restriction	Banned	Banned	Banned	
flush toilets						

Ready Mixed Concrete	No restriction	No restriction	No restriction	With Council permit only	With Council permit only
Livestock Truck Wash	No restriction	No restriction	With Council permit only	With Council permit only	With Council permit only
Others	No restriction	No restriction	With Council permit only	With Council permit only	With Council permit only

Note (1) not between 10am and 4pm during daylight savings

Note (2) between 6-8 pm in daylight saving period, 4-6pm otherwise

Note (3) between 6-8 am and 6-8 pm in daylight saving period, 4-6pm otherwise

Note (4) between 6pm and 7 pm in Daylight saving, 4.30-5.30 otherwise.

5.2 Alternative Water Sources

The most likely reliable option for alternate water supply in times of severe drought is the development of an additional bore field on the western side of Glen Innes.

The primary alternative source for Deepwater is to truck water from the Glen Innes supply.

5.3 Water Cartage Options

Water may be available from sources including water holes, brick pits, private dams and old mine sites. Unless approved under a water carting plan by the minister, Council will require an extraction licence and works approval at each site.

Treated effluent from the Glen Innes Sewerage Treatment Works may be a source of water for fire-fighting, roadworks and emergency watering of public gardens to prevent losses.

5.4 Legislation, Laws and Council Policies

- NSW Local Government Act 1993;
- NSW Water Management Act 2000;
- Australian Drinking Water Guidelines 2011.

5.5 Related Documentation and Sources

- SKM (2005), Glen Innes Water Supply Preliminary Hydrogeological Assessment for a Potential Groundwater Supply.
- Department of Energy, Utilities and Sustainability (2004), Best Practice Management of Water Supply and Sewerage Guidelines.
- Water Directorate (2003), Drought Management Guidelines.
- Department of Public Works and Services (1997), Glen Innes Water Supply Headworks Strategy Report 96078.
- Department of Public Works and Services (1996), Glen Innes Water Supply Augmentation Yield Study DPWS96076.
- National Health and Medical Research Council (2011), Australian Drinking Water Guidelines Version 3.4 Updated October 2017

5.6 Stakeholder Impacts

Consideration should be given to the impact any drought management strategies will have on:

- o **businesses**
- residential customers
- o emergency services including aerial firefighting operations

5.7 Environmental Impacts

Under the current arrangements environmental flows are not required from either the Beardy Waters or Deepwater River Weir.

5.8 Resources

- Council staff:
 - o Enforce water restrictions;
 - Daily monitoring of water supply status;
 - o Media releases;
 - o Approvals for water restrictions, and associated co-ordination;
 - o Assessment of water restriction exemption applications;
 - o Investigations into alternative water supply sources.
- Additional contract staff may be required;
- Emergency water cartage operator for intra-town supplies and fire-fighting support.

5.9 Associated Costs

- Administration;
- Media releases;
- · Inspections for policing of water restrictions;
- Pumping costs;
- Monitoring;
- Water cartage;
- Water quality;
- · Potential new infrastructure to secure water supply.

6. MONITORING DURING DROUGHT

6.1 Water Supply Sources

Levels in the Beardy Waters Weir and Deepwater Weir will be monitored daily during times of drought to ensure due planning if water restrictions are to be increased / decreased to the next level, refer to Section 5.

6.2 Restriction Impacts

Town water consumption is to be monitored daily in conjunction with an assessment of the impacts current water restrictions are having.

Enforcement of restrictions may be required through Council staff patrols and implementation of policies for warnings / fines for property owners / businesses found breaching the current restrictions.

6.3 Water Quality

Continuous testing and monitoring of water quality is required to ensure its acceptance for human consumption, refer to Australian Drinking Water Guidelines.

It is the responsibility of Council to alert consumers if the town water supply becomes unfit for human consumption.

6.4 Sewage System

During periods of restricted water usage, the towns sewage system will be closely monitored to ensure early detection of low flow problems i.e. blockages, odours etc.

7. CONSULTATION

7.1 Public Awareness

The announcement of water restrictions with be advertised through the following Media avenues:

· Newspapers Glen Innes Examiner;

On line Council's web page and Facebook page

Radio 2NZ, Gem FM;

• Letter box drop (Restriction Levels 4 and 5 only)

All media announcements should clearly state the level and details of water restrictions to be imposed and the date restrictions commence / cease.

Public awareness should be raised of the current water shortage situation, critical Dam levels etc. and be advised on water saving initiatives.

7.2 Government Agencies

Regular update reports to be issued to the NSW Department of Primary Industries (Water).

8. OPERATION OF DROUGHT MANAGEMENT PLAN

8.1 Impacts

In order for Council to assess the effectiveness of this Drought Management Plan, detailed records must be kept of all future drought events. Information collated should include, but not be limited to the following:

- · Demand:
- Dam levels;
- Water Quality;
- Rainfall and evaporation;
- Dates for each level of water restrictions;
- Breaches of water restrictions;
- Leaks / breaks;
- Impacts of restrictions on consumption;
- Operational problems due to low flows i.e. sewage blockages, odour etc.

8.2 Procedures

Procedures are to be developed for the following:

- Implementation of water restrictions (media releases, policing restrictions, authorisation to increase level of restrictions, cartage of water);
- · Blue-green algae outbreak;
- Emergency response procedures for fire-fighting requirements during major system failure.

9. VARIATION AND REVIEW

The Drought Management Plan will be reviewed every 3 years, or earlier if deemed necessary, to ensure that it meets the requirements of legislation and the needs of Council. The term of the Policy does not expire on the review date, but will continue in force until superseded, rescinded or varied either by legislation or a new resolution of Council.

10. Appendix A

10.1 Document Control Continued

PREVIOUS VERSIONS:	DATE:	RESOLUTION NO:	DESCRIPTION OF AMENDMENTS:	AUTHOR / EDITOR:	/ SIGN OFF:
5	25/06/2020	34.03/20	Post Drought Review	TSE	Council
4a	02/04/2019	39.03/19	Modified in accordance with Council resolution	DIS	Council
4	20/03/2019	39.03/19	Update during 2019 Drought for review for Councillors	DIS	Council
3	20/8/2015	31.09/15	Update following implementation of Stage 2 Off-Stream Storage	EO	Council
2a	01/12/2012		Update following implementation of Red Range Rd Bore and Off Stream Storage	MIWS	Council
1	03/08/2007		Incorporate comments by Dept. of Water and Energy	DIS	Council