

**MEMORANDUM**

DATE: August 27, 2020  
TO: Ted Corrigan, CEO and General Manager  
FROM: Michael J. McCurnin, P.E., Director of Engineering Services  
SUBJECT: Review of DMWW Water Shortage Plan

Following the record customer demand events of 2012, DMWW formalized its Water Shortage Plan (attached) and then integrated the plan into the DMWW Rules and Regulations. The plan contains four distinct stages and effectively prioritizes water to be used for human consumption, cooking, bathing, laundering, cooling systems, and firefighting as more important than turf irrigation, decorative water features, car washing, and other similar uses of water.

While the plan is centric to controlling irrigation and outdoor water use during the traditional peak demand times of the year, the plan also contains provisions to invoke the various stages of the plan if there are water supply, water quality, or mechanical system issues that are effectively limiting the amount of water that can be acquired, treated, and delivered. A summary of the plan is as follows:

Stage I: Voluntary 25% Reduction in Turf Irrigation  
Stage II: Voluntary 50% Reduction in Turf Irrigation  
Stage III: Turf Irrigation Prohibited and no use of Automatic Irrigation Systems  
Stage IV: Water Rationing

Normal execution of the plan occurs when projected customer demand reaches 90% of estimated treatment capacity. An evaluation of this relationship is to be done daily when operations personnel feel the 90% trigger may be reached. There is clearly some subjectivity to the calculations and DMWW uses the plan as a guideline to invoke the steps of the plan with caution.

Since formalizing the plan after the 2012 events, the plan has been considered numerous times. Drought conditions in portions of '13 and '14, nitrate conditions in '15, and cyanotoxin issues in '16 and '17 are previous times the plan has been considered. The '15 nitrate event did result in customers effectively being asked to follow Stage 1 guidelines. In August of 2020, with elevated temperatures and customer demand near 80 mgd, Water Production is managing drought conditions on the Raccoon River (Van Meter flows are less than 190 cfs) and excessive cyanotoxins in the Des Moines River (microcystin at 10 times the drinking water standard). Staff is again monitoring the situation closely and will implement the early stages of the plan if needed.

## 515 WATER SHORTAGE PLAN

### 515.1 INTRODUCTION

This plan will apply to all direct retail customers of Des Moines Water Works. Municipal water systems and rural water systems that purchase water for resale are not subject to this plan, however, it is anticipated that all such municipal and rural systems will implement parallel water shortage plans which will result in reductions in demand similar to those described in this plan.

The intent of Des Moines Water Works' Water Shortage Plan is to manage system demand so customers do not experience pressure, quality, or availability issues during periods of extreme water demand or during other times when water availability may be limited due to other events, such as raw water shortage, water quality events, or mechanical failures.

The goal at each stage in the plan is to reduce system demands to 85% or less of the "Current Capacity" to produce safe drinking water, as defined in this plan.

Nominal capacity of the Des Moines Water Works system is 100 MGD. Winter demand in a typical year averages approximately 40 MGD as shown in Figure A. Seasonal outdoor water use including moderate irrigation, increases demand to an average of approximately 60 MGD during the summer months as shown in Figure A. The majority of demand above 60 MGD is attributed to be irrigation. Heavy irrigation causes spikes in demand which can reach more than 95 MGD.

Based on historic consumption patterns, irrigation, primarily turf irrigation, accounts for as much as 40 MGD of demand during heavy irrigation periods. Thus, a 25% reduction in irrigation should result in a 10 MGD reduction in total demand to approximately 85 MGD, a reduction of more than 10% compared to peak demand otherwise expected. This is the premise of Stage I. Stage I may be skipped if a water shortage occurs during a time of year when irrigation demand is not significant.

Based on historic consumption patterns, total outdoor water use accounts for as much as 50 MGD of demand during heavy irrigation events. Thus, a 50% reduction in outdoor water use should result in a 25 MGD reduction in total demand to 70 MGD, a reduction of more than 25% compared to peak demand otherwise expected. This is the premise of Stage II. Stage II may be skipped if a water shortage occurs during a time of year when outdoor water use is not significant.

Based on the foregoing analysis, that irrigation accounts for as much as 40 MGD of the demand during heavy irrigation periods, and understanding that the vast majority of this is turf irrigation, prohibiting turf irrigation should result in a 40 MGD reduction in total demand to approximately 55 MGD, a reduction of more than 40% compared to peak demand otherwise expected. This is the premise of Stage III. Stage III may be skipped if a water shortage occurs during a time of year when irrigation demand is not significant.

Limiting consumption to a representative average of off peak months, plus or minus a small allowance, will result in a demand of approximately 40 MGD, a reduction of nearly 60% compared to peak consumption. This is the premise of Stage IV.

The stages of this plan are not necessarily consecutive. When a water shortage occurs the stage deemed most appropriate for the conditions will be implemented.

## 515.2 CURRENT CAPACITY TO PRODUCE SAFE DRINKING WATER AND EXPECTED PEAK DEMAND

### 515.2.1 CURRENT CAPACITY

The current capacity to produce safe drinking water on any day is referred to “Current Capacity” or  $C_{Total}$ . Current Capacity is defined as the amount of water Des Moines Water Works can produce and deliver on any day taking into consideration raw water availability and quality, seasonal treatment efficacy, and any mechanical or operational issues on that given day. The number will vary seasonally and may vary day to day depending on specific water quality and operational conditions. Current Capacity is computed as the sum of the daily capacities of the individual Des Moines Water Works treatment plants and may be expressed in the following formula:

$$C_{Total} = C_{Fleur} + C_{McMullen} + C_{Saylorville}$$

Current Capacity will be evaluated on a daily basis when there is potential for a water shortage. Des Moines Water Works Water Production staff will perform the daily evaluation and report the Current Capacity in Million Gallons per Day.

515.2.2 EXPECTED PEAK DEMAND

“Expected Peak Demand” is defined as the peak daily demand that is expected by the Des Moines Water Works without implementation of water shortage measures under this plan.

515.3 STAGE I: VOLUNTARY 25% REDUCTION IN TURF IRRIGATION

515.3.1 TRIGGER

During a period of substantial irrigation demand, when Expected Peak Demand reaches 90% of Current Capacity or system demand is generating a high number of areas with low pressure, or there are other indications that without wise usage of water, a shortage could occur.

515.3.2 ANTICIPATED IMPACT

It is anticipated that Stage I will most likely be triggered during peak irrigation season. In a typical year irrigation can account for as much as 40 MGD of demand on a peak day. If this is the case, a 25% reduction in irrigation will result in a 10 MGD reduction in total demand. At peak demand 10 MGD would be more than a 10% reduction.

515.3.3 GOAL

A 10% reduction in system demands as compared to Expected Peak Demand.

515.3.4 ACTION

515.3.4.1 Request a **metro wide** 25% reduction in lawn irrigation.

515.3.4.2 Encourage customers to optimize their irrigation systems so water is not directed onto impervious surfaces and turf is not overwatered.

- 515.3.4.3 Recommend customers irrigate on alternate days, by a system under which even numbered addresses water only on even days of the month, and odd-numbered addresses water only on odd-numbered days of the month.
- 515.3.4.4 Suspend Des Moines Water Works' hydrant flushing program except for water quality purposes.
- 515.3.4.5 Request that City officials minimize high water use activities such as street sweeping and watering golf course fairways.
- 515.3.4.6 Coordinate with wholesale customers to ensure they are relaying the same message.

515.3.5 ENFORCEMENT

There will be no enforcement at this stage.

515.4 STAGE II: VOLUNTARY 50% REDUCTION IN OUTDOOR WATER USE (INCLUDING TURF IRRIGATION)

515.4.1 TRIGGER

During a period of substantial irrigation demand, after Stage I has been implemented and failed to achieve an adequate reduction in consumption, when Expected Peak Demand exceeds 90% of Current Capacity, or system demand continues to generate areas of low pressure, or there are other indications that without further reductions in demand, a shortage could occur.

515.4.2 ANTICIPATED IMPACT

It is anticipated that Stage II will most likely be triggered during the peak outdoor water use season. In a typical year outdoor water use can account for as much as 50 MGD of demand on a peak day. If this is the case, a 50% reduction in outdoor water use will result in a 25 MGD reduction in total demand. At peak demand 25 MGD would be more than a 25% reduction.

515.4.3 GOAL

A 25% reduction in system demands as compared to Expected Peak Demand.

515.4.4 ACTION

515.4.4.1 Request customers further reduce water consumption by taking the following measures in addition to those implemented in Stage I:

515.4.4.1.1 Request a **metro wide** 50% reduction in outdoor water use.

515.4.4.1.2 Remind customers to optimize their irrigation systems so water is not directed onto impervious surfaces and turf is not overwatered.

515.4.4.1.3 Reinforce the recommendation for customers to irrigate on alternate days.

515.4.4.1.4 Encourage wise use of water during outdoor activities including washing cars, playing in the sprinkler, playing with water toys, and filling swimming pools.

515.4.4.1.5 Encourage wise use of water indoors including identifying and repairing leaking fixtures, washing only full loads in dishwashers and washing machines, shorter showers, etc.

515.4.4.2 Coordinate with wholesale customers to ensure they are relaying the same message.

515.4.4.3 Request that public agencies (City, County, or State) set an example by:

515.4.4.3.1 Closing recreational facilities with known water inefficiencies.

515.4.4.3.2 Suspend the operation of decorative fountains.

515.4.5 ENFORCEMENT

There will be no enforcement at this stage.

515.5 STAGE III: TURF IRRIGATION PROHIBITED AND NO USE OF AUTOMATIC IRRIGATION SYSTEMS

515.5.1 TRIGGER

During a period of substantial irrigation demand, after Stage I and Stage II have been implemented and failed to achieve an adequate reduction in consumption, when Expected Peak Demand exceeds 90% of Current Capacity, or system demand continues to generate areas of low pressure, or there are other indications that without further reductions in demand, a shortage could occur.

515.5.2 ANTICIPATED IMPACT

It is anticipated that Stage III will most likely be triggered during peak irrigation season. In a typical year irrigation, primarily turf irrigation, can account for as much as 40 MGD of demand on a peak day. If this is the case, prohibiting irrigation will result in a 40 MGD reduction in total demand. At peak demand 40 MGD would be almost a 40% reduction.

515.5.3 GOAL

A 40% reduction in system demands as compared to Expected Peak Demand.

515.5.4 ACTION

Require customers to further reduce water consumption by suspending **all** turf irrigation and the use of **all** automatic irrigation systems. This reduction is in addition to all steps implemented in Stage I and Stage II.

#### 515.5.5 ENFORCEMENT

Customers observed by DMWW irrigating in violation of this policy will be notified by a tag left at the property. If irrigation is not suspended within 48 hours, water service will be terminated and the published termination fee will apply. Water service will be restored only upon receipt, by the Des Moines Water Works, of an undertaking by the customer that the customer understands and will comply with the mandatory conservation measures. Any subsequent violation will result in further termination of service. In addition the use of water for irrigation in violation of this plan shall be deemed an unauthorized use of water and Section 511.12 “Charges for the Unauthorized Use of Water/Metering Tampering”, of these Rules and Regulations shall apply and must be paid before water service will be restored.

#### 515.6 STAGE IV: WATER RATIONING

##### 515.6.1 TRIGGER

During periods of substantial irrigation demand, after Stage I, Stage II, and Stage III have been implemented and failed to achieve an adequate reduction in consumption, when Expected Peak Demand exceeds 90% of Current Capacity, or system demand is generating a high number of areas with low pressure, or there are other indications that without wise usage of water, a shortage could occur.

Stage IV may also be invoked, without resort to Stages I through III, if Expected Peak Demand exceeds 90% of Current Capacity for any reason that cannot be addressed by the measures contemplated by Stages I through III.

##### 515.6.2 ANTICIPATED IMPACT

It is anticipated that Stage IV will only be triggered in the event of a significant and severe water shortage, or other event, which severely reduces capacity relative to demand. In this case a reduction in demand to the lowest level which will meet public health and safety standards will be sought.



515.6.3 GOAL

A reduction in system demands as compared to Expected Peak Demand sufficient to allow the Des Moines Water Works to meet public health and safety standards

515.6.4 ACTION

Water rationing measures will be implemented and enforced by application of an Emergency Water Shortage Rate. In order to implement such rate the Des Moines Water Works shall set a target level for demand consistent with its Current Capacity and shall use such target to establish a “Rationing Factor” as defined in this Plan. All customers will be asked to reduce their consumption to a level at or below a “Stage IV Monthly Water Ration”, and consumption above such level will be charged at the Emergency Water Shortage Rate intended to strongly discourage consumption above such level.

515.6.5 ENFORCEMENT

“Stage IV Monthly Water Ration” means for each customer the Typical Off-Peak Consumption of such customer multiplied by an announced Rationing Factor. “Typical Off-Peak Consumption” shall be computed as of the date that Stage IV is invoked as the mean monthly consumption of the customer for the immediately preceding months of March, April, and May. The Rationing Factor shall be a percentage, which may be above or below 100%, as announced by the Des Moines Water Works and designed to effectively reduce consumption to the level as required by the prevailing circumstances.

While Stage IV is in effect all water used beyond the Stage IV Monthly Water Ration for each customer will be billed at the “Emergency Water Shortage Rate”. The Emergency Water Shortage Rate shall be four times the rate otherwise applicable to such customer. Customers may appeal the Typical Off-Peak Consumption level determined for the customer as the basis for the customer’s bill as inaccurate or inequitable under the circumstances applicable to the customer. Appeals must be submitted in writing and will be considered on a case-by-case basis as provided under these Rules and Regulations.