OPTION	Description of work	Pros and Cons	Life	Cost to Implement 6 MGD Capacity	Cost to Implemer 3 MGD Capacity
Eddleman Temporary	Rent a pump and place a poly line into a deeper part of the lake, then over the Eddleman dam and extend that line to the plant	Quick implementation, 2 months. Could impact traffic to power plant. Would need to restrict more of lake from boat traffic.	Could place inlet at approximately 1045-1050 elevation. This would last into the summer of 2016.	$ 300,000	$275,000
Graham Temporary	Rent a pump and place a poly line over the Graham Dam and then into the lake and to the plant.	Quick implementation, 2 months. Would need to restrict boat traffic. This would be a long line into the lake, over the dam and to the plant. .	Could place inlet at approximately 1045-1050 elevation. This would last into the summer of 2016.	$ 500,000	$450,000
Eddleman Permanent	Build a bridge and platform into a deeper section of Lake Eddleman and place a pump house on the platform and extend pipe to the water plant	Implementation would take 6 months more. Would add structures into the lake and restrict boating.	Could place inlet at approximately 1045 elevation. This would last into the summer of 2016.	$2,000,000	N/A
Graham Permanent	Build a bridge and platform into a deeper section of Lake Graham and place a pump house on the platform and extend pipe to the water plant	Implementation would take 6 months more. Would add structures into the lake and restrict boating.	Could place inlet at approximately 1045 elevation. This would last into the summer of 2016.	$2,250,000	N/A
Graham Tie-In	Tie a Poly line into a 24" pipe that goes through the dam for overflow and pump from there to the water plant	Quick implementation, 2 months. Would need to restrict boating around inlet. Makes use of existing infrastructure. Can be made into a permanent redundant system to the existing system.	The existing raw water inlet has not been found by divers looking for it on three occasions. Condition and elevation are not known.	$400,000	$350,000
Channel Dam	Place a dam in the channel between the two lakes and as the power plant operates move water from Lake Graham to Lake Eddleman and raise the level of Lake Eddleman	Rapid construction. Unknown length of time for review by regulatory agencies. Makes use of existing bridge abutments. Makes of existing raw water inlet, but that inlet is 60 years old. Would restrict boat traffic between the lakes.	Can set the dam elevation at 1064 and keep elevation of Eddleman constant. This allows the existing inlet to stay operational through summer of 2016.	$100,000	N/A
Excavate to the Existing raw water House	Excavate rock, silt and soil to allow water in the deeper part of the lake to get to the existing raw water house	Rapid implementation, 2-3 months. Debris could damage existing raw intake if it were operational during the excavation..	Could excavate to just below 1055 and allow for use into summer 2015 without channel dam.	$100,000-$400,000 depending upon rock	N/A

ISSUE:

The Lake level is continuing to drop due to the extreme drought.

The current lake elevation is approximately 1062.5 above mean sea level.

Six months ago the lake elevation was 1064.9.

A year ago the lake elevation was 1068.4.

A hydrology consultant has forecast that if we stay at dry or even normal conditions, the lake elevation will drop below 1060 in the late summer of this year; and drop to elevation 1058 by next spring. The forecast is also that we may reach elevation 1055 is the late summer or fall of 2015; and we may drop to elevation 1050 in the summer of 2016.

The existing raw water inlet is at elevation 1055. Water must be maintained above the inlet for the pumps to function and draw water.

There is a ridge of soil, silt and potentially rock just outside the inlet at elevation 1058. At elevation 1060 we run the risk of not being able to get adequate flow over the ridge into the inlet to keep the pumps operational.

Unless it rains significantly very soon, the existing raw water intake system may be inoperable by the late summer or early fall of this year due to the ridge just outside the existing inlet. The existing inlet may only be operational for less than 12 months, even with the removal of the rock ridge.

Recommendation:

It is recommended that an alternate raw water intake system be implemented to be operational by August 1, 2014.

It is recommended the city immediately begin development of a temporary inlet in Lake Eddleman with the inlet at elevation as low as possible. Based on state conducted volumetric surveys from 1998 it appears that the temporary inlet could be set below elevation 1050. Surveys will be needed to determine the exact location and elevation for the temporary inlet, but it is anticipated to be set between the existing raw water house and the outlet from the power plant. The temporary inlet would be connected to a rented pump and through a poly line to the plant at a cost of approximately $ 300,000. The goal is to have the temporary inlet operational by August 1, 2014.

Additionally, once the temporary inlet is operational, it is recommended that the ridge near the existing raw water house be excavated at a cost of $100,000. This cost could be significantly more if the ridge is hard rock. This work should be completed by April 2015. This will allow the raw water house to function to an elevation 3-4 feet lower than it will currently for future drought conditions.

Also, it is recommended that engineering and permit acquisition begin in order to build a temporary dam in the channel between the lakes to an elevation of 1064. This dam would keep the elevation of Lake Eddleman at 1064 and allow Lake Graham to decline if the drought continues. It is recommended that the City be in a position to place this dam in the summer of 2015, if needed. The cost of the dam would be $100,000. The power plant pumps water between the lakes for plant purposes. This action would not allow pumped by the plant from Lake Graham into Lake Eddleman to return to Lake Graham until Eddleman is at an elevation of 1064 or greater.

There is a cost savings to the existing water plant project by constructing the temporary Lake Eddleman Inlet or any of the alternate location options. The water plan project plans call for the rehabilitation of the existing raw water house and installation of new motors and pumps. This work was to require a temporary bypass system. If an alternate raw water connection were made, then the temporary bypass system would not be needed. This would result in a cost savings of $20-40,000 that can be applied to the tie in.

Action Requested:

Staff requests the following in a council motion:

A. Authorization to develop and execute a change order with the plant contractor, Gracon, to install a temporary pump on Lake Eddleman and tie it to the plant at an estimated cost of $300,000 which will include 12 months of pump rental.

B. Authorization to develop and execute a change order with the plant contractor, Gracon, to excavate silt, soil and rock at the inlet to the existing raw water house to an elevation of 1055 or less. This authorization is for up to $200,000.

C. Authorization to develop plans and secure permits to build a dam structure in the channel of between Lake Graham and Lake Eddleman, the cost of the engineering and permits is estimated at $20,000. This work would be with Dean Hinton P.E. as an extension to his work with the water treatment and distribution project. Construction would be authorized at a later date, if needed.