



AGENDA

**PRESCOTT CITY COUNCIL
SPECIAL WORKSHOP MEETING
Tuesday, October 13, 2015
10:00 AM**

**Council Chambers
201 South Cortez Street
Prescott, Arizona 86303
(928) 777-1100**

The following Agenda will be considered by the Prescott City Council at its **Special Workshop Meeting** pursuant to the Prescott City Charter, Article II, Section 13. Notice of this meeting is given pursuant to Arizona Revised Statutes, Section 38-431.02. One or more members of the Council may be attending this meeting through the use of a technological device.

◆ **CALL TO ORDER**

◆ **ROLL CALL**

MAYOR AND CITY COUNCIL

Mayor Kuykendall

Mayor Pro Tem Kuknyo

Councilman Arnold

Councilman Blair

Councilman Lamerson

Councilman Lazzell

Councilwoman Wilcox

I. DISCUSSION ITEMS

- A. Presentation on history of Watson and Willow Lakes, and discussion of the ADEQ settlement agreement for the Watson Lake TMDL

II. ADJOURNMENT

EXECUTIVE SESSION

Upon a public majority vote of a quorum of the City Council, the Council may hold an executive session, which will not be open to the public, regarding any item listed on the agenda but only for the following purposes:

- (i) Discussion or consideration of personnel matters (A.R.S. §38-431.03(A)(1));
- (ii) Discussion or consideration of records exempt by law (A.R.S. §38-431.03(A)(2));
- (iii) Discussion or consultation for legal advice with the city's attorneys (A.R.S. §38-431.03(A)(3));
- (iv) Discussion or consultation with the city's attorneys regarding the city's position regarding contracts that are the subject of negotiations, in pending or

- contemplated litigation, or in settlement discussions conducted in order to avoid litigation (A.R.S. §38-431.03(A)(4));
- (v) Discussion or consultation with designated representatives of the city to consider its position and instruct its representatives regarding negotiations with employee organizations (A.R.S. §38-431.03(A)(5));
 - (vi) Discussion, consultation or consideration for negotiations by the city or its designated representatives with members of a tribal council, or its designated representatives, of an Indian reservation located within or adjacent to the city (A.R.S. §38-431.03(A)(6));
 - (vii) Discussion or consultation with designated representatives of the city to consider its position and instruct its representatives regarding negotiations for the purchase, sale or lease of real property (A.R.S. §38-431.03(A)(7)).

Confidentiality

Arizona statute precludes any person receiving executive session information from disclosing that information except as allowed by law. A.R.S. §38-431.03(F). Each violation of this statute is subject to a civil penalty not to exceed \$500, plus court costs and attorneys' fees. This penalty is assessed against the person who violates this statute or who knowingly aids, agrees to aid or attempts to aid another person in violating this article. The city is precluded from expending any public monies to employ or retain legal counsel to provide legal services or representation to the public body or any of its officers in any legal action commenced for violation of the statute unless City Council takes a legal action at a properly noticed open meeting to approve of such expenditures prior to incurring any such obligation or indebtedness. A.R.S. §38-431.07(A)(B).

CERTIFICATION OF POSTING OF NOTICE

The undersigned hereby certifies that a copy of the foregoing notice was duly posted at Prescott City Hall on _____ at _____ m. in accordance with the statement filed by the Prescott City Council with the City Clerk.

Dana R. DeLong, CMC, City Clerk

MEETING DATE/TYPES: SPECIAL MEETING 10-13-15

DEPARTMENT: Public Works

AGENDA ITEM: Presentation on history of Watson and Willow Lakes, and discussion of the ADEQ settlement agreement for the Watson Lake TMDL

Approved By:

Date:

Director:	Hash, Henry	10/07/2015
City Attorney:	Paladini, Jon	10/07/2015
City Manager:	McConnell, Craig	10/08/2015

Item Summary

This presentation will provide additional information of the history of Watson and Willow Lakes, including when they were built, design capacities, how they were operated, when the City purchased them, and key points of the CVID-City purchase agreement.

History/background of the filing of the City's appeal of the Watson Lake TMDL, and drafting of the settlement agreement will also be addressed.

Attachments

1. CVID History by Helen Wells
2. CVID History - Sharlot Hall Article
3. Resolution 3033 - Ballot for Bonds to Purchase Watson and Willow Lakes
4. History of Lake Studies and Plan
5. Timeline for Watson Reservoir TMDL with Supporting Documents
6. Lakes Sub-Committee Final Report
7. Proposal for Watson Lakes Improvements (Lakes Sub-Committee)

Recommended Action: Presentation for Council information and discussion. Two action items have been placed on the agenda of the regular voting meeting of October 13, 2015, for approval: (1) TMDL Settlement Agreement with ADEQ; and (2) City Contract No. 2016-184 with AMEC Foster-Wheeler for associated technical services.

CHINO VALLEY IRRIGATION DISTRICT

P.O. BOX 105

CHINO VALLEY, ARIZONA 86323

PHONE (928)636-4535

FAX (928) 636-2361

cvirrigation@cablone.net

Connie Murphy, Board President
Herm Federwisch, Board Member
Jerry Frey, Board Member
Chris Trinko, Water Master
Karen Halford, Clerk of Board

April 19, 2012

Leslie Graser
City of Prescott
VIA FAX 777-1255

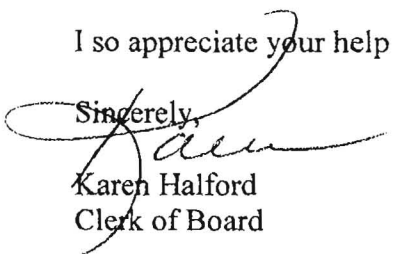
Leslie:

Sorry for the delay! Here is Helen Wells' history of CVID.

[REDACTED]

I so appreciate your help with this.

Sincerely,


Karen Halford
Clerk of Board

(1)

THE CHINO VALLEY IRRIGATION DISTRICT

HISTORIC

As early as 1900 the railroads had been deeded every other section of land as an inducement to bring them into the area. It was from the railroads that the Arizona Land and Irrigation Company, with George Thayer as their agent, acquired much of the land in our area. Most of the water rights on Granite Creek, Lynx Creek and Willow Creek were applied for by George Thayer. There are two prior water right holders, as early as 1854, being the Granite Dells Ranches and Morris Payne.

The Arizona Land and Irrigation Company had Senator James Watson of Indiana as President of the Company, and a prime investor, as well as Fred Smith. They directed land promotion to sell lands for farming in the little Chino Valley; about 4000 acres with deeded water rights. The lack of enough water made the 4000 acres unfeasible and records indicate that 2538 acres were designated by one share of water for each acre.

In 1914, the Arizona Land and Irrigation Company transferred all rights, title and interest to The Hassayampa Alfalfa Farms. Though the Company name changed, the direction was retained by the same individuals. The Chino Mutual Water Users Association was an outgrowth of the Hassayampa Alfalfa Farms and in 1925 they became the Chino Valley Irrigation District. In October of 1926 the Chino Valley Irrigation District became a municipal corporation duly organized under the statutes of the State of Arizona, Title 45. The affairs of the District are managed by three elected directors, an appointed Secretary and a Zan Jero, (ditch rider or water release master.)

GRANITE CREEK DAM

Though there are no drawings, plats or other construction numbers on file, there is evidence that these documents were released to the Land Department for applications or study, or dam statistics and were never retrieved. The dam was built by William Rosecrans under the existing laws and regulations of the time. Records indicate that it was built in 1914 yet there is other evidence that application was filed in 1912 with the U.S. Land Office for a reservoir and about 13 miles of canal easement of indefinite status. The site of the dam is a 40 acre patent from the U.S. Land Office.

The dam is a concrete arch structure with a maximum structural height of 98 Feet, a crest width of 8.5 Feet, a crest length of 187 Feet. The crest elevation is purported to be 5173.5 Feet. To quote William Rosecrans, "The foundation is embedded in solid granite its entire width of the stream bed. the foundation was put down under a plan of gravity dam and is much broader than required for the arch dam. The arch dam is dovetailed into this base and heavy dowel pins connect the arch and the foundations."

The principal spillway consists of two concrete arches separated by a concrete buttress located at the left abutment of the dam. There is an Auxiliary Spillway about 1500 Feet east of the dam about 35 Feet in length and is cut in natural rock between two concrete piers.

There are two outlets; one being a low-level outlet pipe, 48 inches in diameter located at the base of the left abutment of the dam. A second outlet pipe was a 36 inch diameter pipe located at mid-height of the dam near the right abutment. The outlet works consist of hand operated gate valves. The 36 inch valve was replaced a few years ago by a 12 inch valve using an adapted, the design of which was approved by the State Dam Inspectors. A helicopter was used for the installation since access to Granite Creek dam is through a canyon by a footpath. The smaller valve has been proven to be easier to open, by one man, and a good deal faster to open and release waters in any given emergency requiring the release of water. The dam is at the head of a canyon in Granite Dells. The downstream channel of the dam is a steep gradient; with walls of rock and the bottom of the channel is covered with trees, brush and grasses; about one half mile of canyon.

WATSON LAKE RESERVOIR

Watson Lake Reservoir is located about six miles northeast of the City of Prescott and adjacent to Highway 89 about one half mile from Granite Dells. It is used to impound the waters of Granite Creek Dam for irrigation of farmland in the little Chino Valley. The lake is posted for "NO SWIMMING" but some boating is allowed through the generosity of the shareholders during the early months of summer. The reservoir starts filling in the winter and spring. Releases begin in April and end in October, or when the reservoir is empty, except for dead storage. The capacity to the top of the dam was designed for 4900 acre feet, of storage. There is approximately six miles of shoreline and about 187 acres inundated with waters. The watershed is a 45.5 square mile area extending southward from the reservoir. The reservoir filled for the first time in 1915 and the first official irrigation occurred in 1916.

In the 1920's all the land and more that comprised Watson Lake Reservoir was known as the John Duke Ranch. The City of Prescott had been discharging sludge and sewage upstream into Granite Creek even then, and as early as 1900. This generated the law suit of Duke vs. City of Prescott. The judgement rendered for John Duke, and the city experienced an involuntary purchase of the Duke Ranch which they named "The City Ranch." CVID leased this ranch by agreement in 1927.

In the early 1930's the City began construction of Goldwater Dam and CVID commenced legal proceedings over the water rights on Granite Creek, citing Goldwater Basin areas as their watershed and infringement of their water rights. In 1935 a judgement favored CVID in the City Ranch as well as not to interpose objection to the construction of Willow Creek Dam and reservoir; further, not oppose the construction of a cross-cut canal or by-pass connecting Watson Reservoir with Willow Creek Reservoir. The City stalled for 35 years before deeding the property in 1965.

WILLOW CREEK DAM

Willow Creek Dam is located 5 miles north of the City of Prescott at the head of a canyon in the Granite Dells area. The dam is a variable radius concrete arch structure, 297 feet long and 85 feet high. A 4.25 foot wide walkway and a 9 inch wide, 2.5 foot high parapet wall extends along the length of the crest. In addition to the main arch is a buttressed wall at the left abutment, which also forms part of the dam. The wall is 48 feet long and 20 feet high.

The Spillway is a concrete arch located in a side channel in the left abutment. It has a crest length of 188 feet and a width of 12 inches. There is an additional 10.5 foot long by 6.2 foot wide slab at the right end of the spillway. Water falls into a natural rock stilling basin formed by an 82 foot long weir, downstream side. Below the stilling basin water flows down a natural rock channel to join Willow Creek several hundred feet downstream. The spillway channel meets the main channel of Willow Creek about $\frac{1}{4}$ mile downstream of the dam. There is thick growth of trees in the channel. There are several houses about $\frac{1}{4}$ miles downstream. Since the 1983 flood CVID did considerable work by building a road to the outlet valve. The first time a vehicle could reach the dam. That was late summer of 1984.

The outlet works consist of a 12 inch diameter steel pipe operated by a gate valve located about 45 feet below the crest of the dam. Flow is directed through a 12 inch cast iron pipe about 100 foot long into the channel. A lock with a chain has been installed on the valve for security purposes. This valve was newly installed that same year.

This dam was designed by John Girand, a Phoenix engineer with Pearson and Dickerson as contractors. The first set of plans were rejected by the State Engineer and objections were also raised by the Santa Fe Railroad engineers. The new design was approved and work began. The dam was completed in 1935. In the progress of the construction a flood hampered excavation, and later, one fatality, Clive Scott.

WILLOW LAKE RESERVOIR

The watershed is a 25.5 square mile area extending southwestward from the reservoir. Willow Creek is the major source of inflow. There was an earthen canal controlled by a 48 inch by 54 inch concrete culvert that diverts the top 4 feet of Granite Creek Reservoir into Willow Creek Reservoir. The canal was started about 1935 and was tabled for lack of funds. The excavation resumed in the 1960's and the first water ran through this cross-cut canal in 1965. Since that run the canal walls sloughed off; was very deep and treacherous. Difficulties were encountered in cleaning out the canal as well as the cost factor. In 1986-87 CVID did install conduit the entire length of the cross-cut canal and water did transfer from Watson Reservoir upon completion.

Originally, Willow Creek Reservoir and adjacent lands totaled approximately 780 acres. It had been known as the Dolly Ranch prior to CVID's acquisition.

An interesting fact of historic note is that the narrow gauge railroad ran across what is now the Willow Creek Lake bed, about the late 1800's. CVID experienced 4 law suits with regard to or concerning their ownership of Willow Creek Lake and dam. The 1st being on their option to purchase the Dolby Ranch; the Bianconi vs CVID en re. water rights, Erickson vs CVID, encroachment on water rights. These three adjudged for CVID. The 4th resulted in the involuntary sale of about 7 acres to Bureau of Reclamation for the power lines. Other voluntary sales of small parcels went to APS, City Ball Park, Mountain Bell and recently 11 acres to a subdivision and 2 acres to Tim's Buick.

Today, there is no public access to Willow Lake area. We have allowed a grazing lease and a materials lease both, in the best interest of CVID. The grazing lease keeps the vegetation down and the materials lease keeps the Willow Creek channel open, and both generate income.

BOTTLENECK DAM AND CANALS

Bottleneck dam is an earthen structure located northeasterly and adjacent to the Prescott Airport and north of Bottleneck draw. When the 1st irrigation ran in 1916, it ran through redwood flumes, which would continually wash out. Hassayampa Alfalfa Farms purchased the Massing Ranch at Bottleneck and built the dam in the early 1920's. They used 20 teams with fresnos that they leased from George Ruffner. They built it as a flood control dam. It had a 48 inch valve installed. They did away with the flumes and put in the open canals, using teams to dig the canal from the diversion dam at the junction of Hiway 89 to 89A to Chino Valley, about 13 miles of meandering canal. There are about 14 miles of canal within the Chino Valley town. The main canal enters Chino Valley District boundaries and splits into the highline ditch that irrigates the lands on the west, the middle canal that waters the central part of the District and the lower canal that reaches the lands on the eastern boundaries of the District. The District has a recorded historic, perpetual easement dating from 1916, that claims 20 feet on each side of all section and half section lines within the District boundaries.

The Bottleneck dam washed out in the 1983 flood but was restored and improved, however the valve was not placed back. The canals are cleaned by each season in March prior to the release of water in the spring. Two tractors are used to pull a Briscoe ditcher, as well as a backhoe to clean out what the ditcher leaves when it has to pull out of a canal because of bridges or headgates, etc. Manpower is also used to clean out weed guards and weed obstructions. During the end of July a second cleaning takes place due to weeds, volunteer tree growth; and moss is a major problem. Operation generally shuts down for about a week each summer for this purpose. A small Vee is used to clean the ditches within the District boundaries, or private ditches. Private ditches are not a responsibility of CVID but the small Vee is available for shareholders to use.

Each spring, notices are placed in local newspaper urging residents and shareholders to not dump refuse in ditches and keep their children from playing in water or tampering with weirs. Caution is published with "at your own risk" connotation as well as fines imposed if practice of abuse of regulations are observed and reported.

In the past 3 years, CVID has improved operations on ditches

In the past 3 years, CVID has improved operations on ditches, headgates; purchased hundreds of feet of new culverts; restored ditches with change to some; and have eliminated many critical areas of operation within the boundaries of the District.

In summation, CVID has established an emergency warning plan to monitor any future flood disasters, and or seismic as well. We have also awarded a contract for a Hydrology study to be accomplished in early 1989; all in an effort to become more responsible and aware of restorative needs of our operations. We also recognize that our properties are unique and should generate income for the District through leases for industrial, commercial and recreation purposes, as well as continuing our primary business of irrigation.

Sharlot Hall Library & Archives

115 S. McCormick St., Prescott, AZ 86303

Phone: 928.445.3122 x14

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Willow and Watson Lakes reflect a beautiful history

Posted on [April 5, 1998](#)

By J.J. McCormack

An artist's inspiration, a sportsman's paradise, a mountain gem and Prescott's playground. Take your pick of the assorted descriptions writers have bestowed on Watson Lake in the 84 years since the turquoise body of water began lapping at the sloping walls of the Granite Dells. The same romantic prose was ascribed to Willow Lake when it appeared west of the Dells 21 years after Watson. Both scenic lakes have provided ample fodder for writers and photographers throughout their separate, but related histories, with most early journalistic attention focusing on their unique beauty and the recreational amenities the two lakes afforded Prescott residents and visitors. The fact that the lakes were engineered for a singular purpose – providing irrigation water for grazing and farm land in Chino Valley – got scant notice in the local press. "A New Play Ground Developed for Prescott by the Big Dam" heralds a headline in Yavapai Magazine in 1915, the first year Watson Lake graced the local landscape.

The article announcing the speedy rise of Watson Lake behind the newly completed Granite Creek Dam focuses on the beauty and the recreational promise of the expanding reservoir. "One of the greatest sports for Prescott and its visitors from now on will certainly be boating on Lake Watson. The surroundings are incomparably romantic", states the magazine article, which is accompanied by three black and white photographs showcasing the "many rocky promontories" breaking the shoreline, and the "spires of granite" that wall the lake. The article does note the lake's purpose – storage for irrigation. It and other post-Granite Creek Dam newspaper and magazine articles offer few glimpses of the origins of Willow and Watson lakes.

Perhaps the most detailed historical account available was written by longtime Chino Valley Irrigation District Board member Helen Wells. The two lakes and the dams that harness them have been something of a labor of love for Wells for nearly three decades. A former CVID secretary, Wells, a small farm owner and horsewoman was elected to the three-member CVID board in 1982. She often hosted meetings at a dress shop she operated on her farm. Wells, who harbors a deep pride in the gritty, hard-working and thrifty irrigation district board members and shareholders, authored the irrigation district's history some 10 years ago at the request of attorneys seeking to secure insurance for the district. "I read old minutes. I talked to old-timers that are still here and knew a lot. I read files," she said. Efforts to insure the district failed.

Wells' history proved useful in negotiations paving the way for the City of Prescott to purchase Willow and Watson Lakes real estate and retain water rights from the CVID. The proposed \$15 million purchase will be put to Prescott voters on May 19. Wells, who would just as soon see CVID retain control of the lakes but deferred to the majority of shareholders in negotiations, noted in an interview the historical significance of the CVID. "It's unique. There are lots of other irrigation districts, but they don't have dams," she said.

The CVID's dams and irrigation water rights originated with the vast Chino Valley area land holdings of the Arizona Land and Irrigation Co. The company purchased the land from the railroads after the turn of the century and later applied for water rights on Granite, Lynx and Willow Creeks. The land and accompanying water rights were promoted and sold as farm land. In 1914, the same year Granite Creek Dam was built, the Arizona Land and Irrigation Co. became the Hassayampa Alfalfa Farms. Watson Lake was named after Sen. James Watson of Indiana, a principal investor in the Arizona Land and Irrigation Co. The irrigation district's name changed to Chino Mutual Water Users Association after Granite Creek Dam was built and again in 1925 – to CVID. The district incorporated a year later.

Wells' history provides Granite Creek Dam storage, spillway and gate-valve specifications, as well as other insights, such as the fact that a helicopter had to be employed several years ago to install a new 36-inch hand-operated gate valve because the dam is accessible, even today, only by boat or on foot. Watson

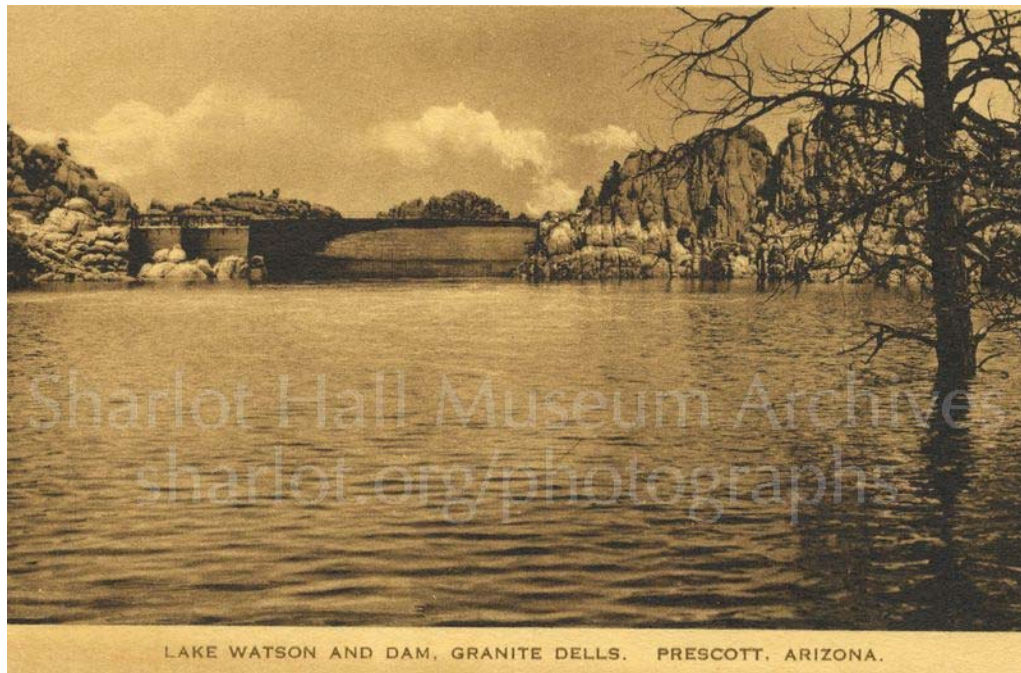
Lake furnished irrigation water to CVID shareholder properties via 40 miles of earthen canals for the first time in 1916, and has been providing water for alfalfa and other cash crops on an annual basis since.

Willow Lake was created in 1935, behind Willow Creek Dam, to augment Watson Lake storage for the CVID. Whereas Watson is fed by Granite Creek, Willow harnesses Willow Creek inflows. The Willow Creek Dam is accessible by car, thanks to the construction by the CVID of a road in 1984. Although boating historically has been allowed on Watson Lake when water levels allow, Willow Lake has been posted off limits since about the mid-1970s when vandalism, illegal dumping and liability risks forced the CVID to prohibit public use.

Trespassing and vandalism have been ongoing problems at both lakes, at a substantial cost in time and money to the irrigation district, Wells said. She and family members have spent many weekend hours at the lakes over the years cleaning up garbage, pursuing vandals, fixing fences, replacing signs and inspecting damage to the dams. "I always have baling and barbed wired in my truck," she said. Lack of rain and snow in recent years coupled with irrigation draws by the CVID have dried up Willow and Watson lakes. In the past, it was CVID policy to leave some water in the lakes year-round. "It would evaporate and we thought why are we doing that?"

An abundance of precipitation this year has started filling Watson Lake. If spring brings continued wet weather, Willow Lake won't be far behind.

(J.J.McCormack is the City of Prescott Communications Director.)



Sharlot Hall Museum Photograph [Call Number:\(dam126p\)](#)
([/img/detail_htmls/1953dam126p.html](#)) . Reuse only by [permission](#)
(<http://www.sharlot.org/archives/photographs/index.html#order>) .

This Acker Book Store postcard from the 1920s shows Lake Watson and the dam at Granite Dells.

This entry was posted in [Days Past](#) by . Bookmark the [permalink](#)
(<http://www.sharlot.org/library-archives/days-past/willow-and-watson-lakes-reflect-a-beautiful-history/>) .

RESOLUTION NO. 3033

A RESOLUTION OF THE MAYOR AND COUNCIL OF THE CITY OF PRESCOTT, YAVAPAI COUNTY, ARIZONA, RESCINDING RESOLUTION NO. 3010 AND ORDERING AND PROVIDING NOTICE OF A SPECIAL ELECTION TO BE HELD ON MAY 19, 1998, IN AND FOR THE CITY OF PRESCOTT, ARIZONA, TO SUBMIT TO THE QUALIFIED ELECTORS THEREOF THE QUESTION OF AUTHORIZING THE ISSUANCE AND SALE OF NOT TO EXCEED \$15,000,000 PRINCIPAL AMOUNT OF GENERAL OBLIGATION BONDS OF THE CITY AND RELATED MATTERS.

WHEREAS, the Mayor and Council of the City of Prescott, Arizona (the "City"), did on October 28, 1997, adopt its Resolution No. 3010; and

WHEREAS, the Mayor and Council of the City deemed it necessary and advisable and in the best interests of the City and in the public interest to rescind Resolution No. 3010; and

WHEREAS, the needs and best interests of the City, will be served by the issuance and sale of general obligation bonds of the City (hereinafter referred to as the "Bonds"), to provide funds for the capital needs of the City; and

WHEREAS, with respect to the Bonds, the provisions of Title 35, Chapter 3, Article 3, Arizona Revised Statutes, as amended, require that a special election be held in and for the City to submit to the qualified electors thereof the question of issuing and selling the Bonds.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF PRESCOTT, YAVAPAI COUNTY, ARIZONA, THAT:

SECTION 1. Resolution No. 3010 is hereby rescinded.

SECTION 2. A special election in and for the City be, and the same is hereby, called and ordered to be held on May 19, 1998 (hereinafter referred to as the "Election"), a day not less than thirty (30) nor more than one hundred and fifty (150) days before the date of the adoption of this Resolution, at which there shall be submitted to the qualified electors thereof the question of authorizing the issuance and sale of the Bonds of the City in the aggregate principal amount, having the maximum interest rate and number of years from their date and being for the purpose, in each case as set forth in the official form of ballot for the Election.

SECTION 3. The official ballot for the Election (hereinafter referred to as the "Official Ballot") shall be in substantially the form hereto attached and marked Exhibit "A".

Resolution No. 3033 - continued:

SECTION 4. Notice of the Election shall be given by mailing an informational pamphlet (hereinafter referred to as the "Informational Pamphlet") and a sample of the Official Ballot in substantially the form hereto attached and marked Exhibit "B" to the residence of each registered voter within the City not less than ten (10) days and not more than forty (40) days before the date of the Election. The Informational Pamphlet, as required by Title 35, Chapter 3, Article 3, Section 35-454, Arizona Revised Statutes, as amended, shall set forth:

- (i) The amount of the Bonds to be authorized;
- (ii) The maximum interest rate of the Bonds;
- (iii) Estimated debt retirement schedules for the Bonds and the current amount of bonds outstanding, showing both principal and interest payments and the estimated tax rates;
- (iv) The source of repayment of the Bonds;
- (v) The estimated issuance costs of the Bonds;
- (vi) The estimated tax rate impact on the average assessed valuation of both owner-occupied residential property and commercial and industrial property for the current year in the City, as determined by the Mayor and Council of the City;
- (vii) The current outstanding general obligation debt of the City and the constitutional debt limitation of the City;
- (viii) The purpose for which the Bonds are to be issued;
- (ix) The polling location for each registered voter, and
- (x) The hours during the day when the polls will be open.

The informational Pamphlet shall be prepared by the City Clerk of the City (hereinafter called the "Clerk"), and the Clerk is hereby authorized and directed to cause the Informational Pamphlet to be provided as and under the circumstances described herein. The Clerk is hereby authorized and directed to submit, within thirty (30) days after the date of the Election, a copy of the Informational Pamphlet to the Arizona Department of Revenue.

Resolution No. 3033 - continued:

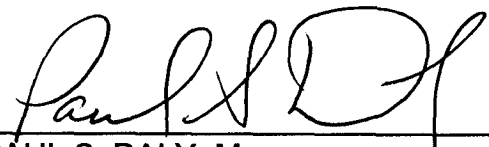
SECTION 5. Absentee/early voting with respect to the Election shall be permitted in accordance with the provisions of Title 16, Chapter 4, Article 8, Arizona Revised Statutes, as amended.

SECTION 6. The Clerk of the City is hereby authorized and directed to have printed and delivered to the election officials for the Election at the polling places for the Election, to be by them furnished to the qualified electors of the City offering to vote at the Election, the Official Ballot.

SECTION 7. In order to comply with the Voting Rights Act of 1965, as amended, the following materials pertaining to the Election shall be translated into Spanish and mailed or distributed in each instance where mailing or distributing of such materials is required, to-wit: Informational Pamphlet, Official Ballot, Absentee/Early Voting Materials and Instructions at the Polling Places.

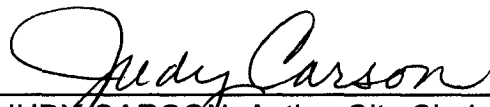
SECTION 8. The Election shall be held, conducted and canvassed in conformity with the provisions of the regular election laws of the State of Arizona, except as otherwise provided by law, and only such persons shall be permitted to vote at the Election who are qualified electors of the City.

PASSED, APPROVED and ADOPTED by the Mayor and Council of the City of Prescott, Arizona, this 10th day of JANUARY, 1998.



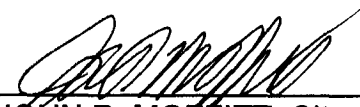
PAUL S. DALY, Mayor

ATTEST:



JUDY CARSON, Acting City Clerk

APPROVED AS TO FORM:



JOHN R. MOFFITT, City Attorney

EXHIBIT 'A'

OFFICIAL BALLOT

Shall the City of Prescott, Arizona (the "City") be authorized to issue and sell General Obligation Bonds of the City in the principal amount of not to exceed \$15,000,000, in one or more series, for the purpose of paying some or all of the costs to (1) acquire real property and water rights, (2) make any necessary improvements and (3) provide for legal, financial, engineering, architectural and other necessary matters, in each case associated with the acquisition and improvement of Willow Lake and Watson Lake and related properties and water rights for water resource and recreational purposes, such bonds to be payable from an ad valorem property tax which shall be unlimited as to rate and amount, to bear interest at a rate of not to exceed 8% per annum, and to mature over a period of not to exceed 15 years from the date of issuance of any series?

FOR THE BONDS

AGAINST THE BONDS

EXHIBIT "B"

CITY OF PRESCOTT, ARIZONA

**VOTER INFORMATION
PAMPHLET AND
SAMPLE BALLOT**

SPECIAL BOND ELECTION

MAY 19, 1998

TO THE VOTERS OF THE CITY OF PRESCOTT, ARIZONA:

On Tuesday, May 19, 1998, the voters of the City of Prescott, Arizona (the "City"), will be asked to authorize the issuance and sale of not to exceed \$15,000,000 principal amount of general obligation bonds of the City at a special bond election.

This information pamphlet has been prepared in order to provide voters with factual information regarding such special election. Your task will be to indicate whether you think the City should be allowed to issue such bonds.

In compliance with the federal Voting Rights Act of 1965, as amended, this information pamphlet has been prepared in both English and Spanish.

You are urged to read carefully the information contained in this information pamphlet and exercise your right to vote on election day.

When you cast your vote, you fulfill a responsibility to the City and determine a course of action consistent with your desires.

Sincerely,

Marie Watson
City Clerk, City of Prescott, Arizona

(Information pamphlet publication is mandated with respect to such general obligation bonds by A.R.S. § 35-454. The City is mandated to distribute this informational pamphlet to each qualified voter within the City.)

**INFORMATION PAMPHLET
FOR
CITY OF PRESCOTT, ARIZONA
SPECIAL BOND ELECTION
MAY 19, 1998**

REQUESTED AUTHORIZATION/PURPOSE FOR WHICH THE BONDS ARE TO BE ISSUED:

On January 6, 1998, the Mayor and City Council of the City passed and adopted a resolution calling a special election (the "Election") to authorize the issuance and sale of not to exceed \$15,000,000 principal amount of general obligation bonds of the City (the "Bonds"). A copy of such resolution is available from the City by written request to the City Clerk of the City, 201 South Cortez, Prescott, Arizona 86303, Telephone (520) 466-7942. The proceeds of the sale of the Bonds would provide money for acquisition of real property and water rights and for all legal, financial, engineering and other necessary costs in connection therewith.

MAXIMUM INTEREST RATE OF THE BONDS:

The maximum interest rate on the Bonds will not exceed 8% per annum.

PLAN OF FINANCE:

If the Election is successful, it is anticipated that the City would issue the total amount of the Bonds by the means of (..) bond sales. The interest rate to be borne by the Bonds would be determined by the market conditions that prevail at the time of sale, but in no event would the Bonds be sold at an interest rate greater than 8% per annum. Repayment of both principal of and interest on the Bonds would occur over a period of not to exceed 15 years.

If authorized and sold, the Bonds would be repaid ultimately from a levy of *ad valorem* property taxes on all taxable property within the City. It is expected that the Bonds would require a \$..... tax rate increase per \$100 of assessed valuation in the secondary tax rate for tax year 199..-9...

The following is an estimated debt service schedule for the Bonds and the estimated impact to the secondary tax rate of the City given the assumptions described therein:

Proposed Debt Service^(a)

<u>Date</u>	<u>Principal</u>	<u>Interest</u> ^(b)	<u>Total</u> ^(c)	<u>Tax Rate Increase</u>
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-
- (a) Assumes reasonable financing assumptions, 0.00% annual growth in secondary assessed valuation of property within the City which is currently \$..... and amortization of the bonds over the period indicated.
 - (b) A% average interest rate has been estimated in calculating interest costs.
 - (c) Estimated total debt service estimate does not include adjustments for interest earnings on the investment of Bond proceeds, tax collection delinquencies or applicable rebate.

ESTIMATED TAXPAYER COST:

As noted above, the Bonds would be repaid from a levy of *ad valorem* property taxes on all taxable property within the City which could initially impact the taxpayers in the 199..-9.. fiscal year in the form of a \$..... tax rate increase. The cost of this increase for any given property will depend on the Yavapai County Assessor's full cash and secondary assessed values of that property. (Such values are not necessarily equal to the market value of that property.) Each property owner should refer to his/her annual property tax statement issued by the Yavapai County Assessor or his/her property tax bill to determine the Yavapai County Assessor's full cash and secondary assessed values. That information, utilized in connection with the following table, will enable a property owner to determine the estimated annual and monthly tax cost that would result from the authorization and issuance of the Bonds:

Owner Occupied Residential Property (Assessed at 10%)

Assessor's Full Cash <u>Value</u>	Secondary Assessed <u>Value</u>	<u>Estimated \$</u>	<u>Tax Rate Impact**</u>
		<u>Annual Cost</u>	<u>Monthly Cost</u>
\$	\$	\$	\$

Commercial and Industrial Property (Assessed at 25%)

Assessor's Full Cash <u>Value</u>	Secondary Assessed <u>Value</u>	<u>Estimated \$</u>	<u>Tax Rate Impact**</u>
		<u>Annual Cost</u>	<u>Monthly Cost</u>
\$	\$	\$	\$

Agricultural and Vacant Land
(Assessed at 16%)

<u>Assessor's Full Cash Value</u>	<u>Secondary Assessed Value</u>	<u>Estimated \$ Annual Cost</u>	<u>Tax Rate Impact** Monthly Cost</u>
\$	\$	\$	\$

* Estimated average value of owner-occupied residential properties or commercial and industrial properties, as applicable, within the City as determined by Arizona Department of Revenue.

** The tax rate is levied per \$100 of secondary assessed value. Cost based on the average estimated tax rate increase and a number of other financing assumptions subject to change.

ESTIMATED ISSUANCE COSTS:

Should the Bonds be authorized and issued, the City estimates that the cost of issuance of each series of the Bonds will be approximately \$...,000.

CURRENT OUTSTANDING GENERAL OBLIGATION DEBT AND CONSTITUTIONAL DEBT LIMITATION:

The City currently has no general obligation debt outstanding. The current constitutional debt limit of the City is \$....., being twenty percent (20%) of the 199... secondary assessed valuation of the City for the purposes for which the Bonds are being issued.

POLLING LOCATIONS:

Precincts

Polling Places

HOURS DURING THE DAY WHEN THE POLLS WILL BE OPEN:

The polling place shall be open at 6:00 a.m. and close at 7:00 p.m. on the date of the election.

OTHER IMPORTANT VOTER INFORMATION:

A person is entitled to vote in the special bond election who has resided in a precinct in the boundaries of the City for 29 days preceding the special bond election, who is qualified to register to vote as provided in Section 16-101, Arizona Revised Statutes, as amended. The last day to register for this special bond election is, 1998.

1. Please check the address label on this voter information pamphlet for your polling place information.
2. Polling places will be open from 6:00 a.m. to 7:00 p.m.
3. Any qualified elector who is either physically or visually impaired or who is unable to read or understand the contents of the ballot, may be accompanied into the voting booth by a person of such elector's choice for the purpose of assisting such elector in casting a ballot.
4. Sample ballots may be brought to the voting place and may be taken into the voting booth on the day of the election.

5. Any qualified elector, who at 7:00 p.m., is in the line of waiting voters, will be allowed to prepare and cast a ballot.

EARLY/ABSENTEE VOTING INFORMATION:

Any qualified elector may vote an early/absentee ballot for this special bond election. Absentee/early voting with respect to such election shall be permitted in accordance with the provisions of Title 16, Chapter 4, Article 8, Arizona Revised Statutes, as amended. Absentee/early voting information with respect to such election may be obtained by contacting the office of the City Clerk, 201 South Cortez, Prescott, Arizona 86303, telephone number: (520) 776-6272.

TO VOTE AN EARLY/ABSENTEE BALLOT IN PERSON:

Appear in person at the office of the City Clerk, 201 South Cortez, Prescott, Arizona, no later than the close of business on, 1998. Voting will be permitted Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m.

TO OBTAIN AN EARLY/ABSENTEE BALLOT BY MAIL:

1. Submit a written, signed request to the office of the City Clerk, 201 South Cortez, Prescott, Arizona 86303 or call (520) 776-6272.
 - a. If confined because of physical disability or illness, indicate address of confinement and if assistance is needed.
 - b. If you will be out of town, indicate where to mail the early/absentee ballot.

Written or verbal requests for an early/absentee ballot must be received by the office of the City Clerk, 201 South Cortez, Prescott, Arizona before 5:00 p.m. on, 1998, in order for the ballot to be mailed.

The returned early/absentee ballot must be received in the office of the City Clerk, 201 South Cortez, Prescott, Arizona not later than 7:00 p.m. on election day, May 19, 1998, in order for the ballot to be counted.

OFFICIAL BALLOT

Office of the City Clerk of the
City of Prescott, Arizona

.....
Prescott, Arizona 86303

Non-Profit Org.
U.S. Postage
Paid
....., Arizona
Permit No.

OFFICIAL VOTING MATERIAL

YOUR POLLING PLACE
IS INDICATED ON LABEL

Only one Voter Information Pamphle
has been mailed to each residence
containing a registered voter. Please
make it available to all registered
voters in the residence.

History of Watson Lake Studies & Plans

1. Arizona Clean Lakes Classification Study (1983), Towler
 - Ranked Watson Lake 1st in eutrophication in the state
 - Sparked local interested in lake restoration and improving recreation potential of the lake
2. Water Quality Analysis of Watson Lake (1984), Sommerfeld and Ellingson (ASU)
 - “Short-term, preliminary investigation” contracted by COP
 - Lake WQ sampling July-Oct 1984
 - Purpose: to determine whether the lake was impaired by nutrient additions from watershed (including WWTP) or recycling of lake sediments
3. Watson Lake Water Quality Management Plan (1986), Towler (for NACOG?)
 - Stated that incidences of swimming were “infrequent” and that “Neither the City of Prescott nor the CVID want the liability associated with people swimming and possibly drinking the water. Although a park is planned with emphasis on boating use of the lake, the no swimming policy would be continued...”
 - Recommendation: due to uncertainty of nutrient removal at the WWTP, no recommendation for lake restoration was made at the time.
4. Management Plan for Watson Lake and the Sundog WWTP (1987)
 - Black and Veatch Engineers & Architects
 - For submittal to EPA. Covers interim and full scale improvements proposed for the Sundog WWTP, scope of work for the Use Attainability Analysis, scope of work for Granite Creek/Verde River connection study, scope of work for Watson Lake Restoration Study, and a schedule for management plan
 - Recommends data collection and modeling, similar to what is being proposed with AMEC, but was never done
5. Operational Plan for Watson and Willow Lakes (1998), COP
 - Purpose: establish operational levels, conservation pool, plan for discharges
6. Watson and Willow Lakes Master Plan (Date?), Logan Simpson Design
 - Purpose: recreation planning; water quality is not addressed
 - 15-person Citizen’s Lakes Steering Committee worked with consultant
 - Final Master Plan maps do not indicate developed swimming areas or mention swimming
7. Contaminants in Fish and Birds of Watson Lake, Arizona 2000-2001 (2003), USFWS
 - Purpose: Study impact of Southwest Forest Industries (wood treatment) Superfund Site

- Studied sediment, water, fish, crayfish, eggs, tadpoles, and frogs for trace elements, organochlorine insecticides, polycyclic aromatic hydrocarbons (PAH), total polychlorinated biphenyls, dioxins, and furans
 - Conclusion: Superfund Site has had minimal effect on Granite Creek/Watson Lake Watershed
 - Recommendations: Trace element monitoring should continue
8. Water Quality Characterization for the City of Prescott Surface Water Recharge Pipeline Replacement Project (2009), Civiltech
 - Reviewed, summarized, and compared water quality data with State Water Quality Standards
 - Reviewed Federal and State regulations, designation of impairment status
 9. Sediment Coring and Analysis in Watson Lake, Arizona (2012), Dr. Gremillion, NAU
 - ADEQ-contracted
 10. Watson Lake TMDL Receiving Water Modeling (2012), Tetra Tech
 - ADEQ-contracted
 11. Watson Lake Limno-coral Study (2012), Dr. Walker, U of A
 - ADEQ-contracted
 12. Phase II Limno-coral Study at Watson Lake (Addendum to Phase I report) (2013), Dr. Walker, U of A
 - ADEQ-contracted
 13. Watson Lake TMDL: Total Nitrogen, DO, pH & Total Phosphorus Targets (Final Draft – December 2014), ADEQ
 14. Watson Lake TMDL: Total Nitrogen, DO, pH & Total Phosphorus Targets (Final – February 2015), ADEQ



Public Works Department

433 N. Virginia Street
Prescott AZ 86301
928-777-1130

October 5, 2015

To: City Staff

From: Ben Burns, Capital Project Manager

Re: Time Line for Watson Reservoir TMDL with Supporting Documents

Following is a brief time line of events starting with Council authorization of the contract with AMEC to support City Staff in reviewing the Total Maximum Daily Load (TMDL) documents generated by ADEQ. Memos have been attached summarizing meetings and comments from ADEQ document reviews. The attached supporting documents have been kept short to only provide a general overview.

- March 12, 2013: AMEC contract passed Council to review TMDL documents before the Watson Lake TMDL was issued for public review.
- June 6, 2013: AMEC issued a memo to help summarize the City discussion with ADEQ scheduled for June 13.
- June 13, 2013: Staff and AMEC met with ADEQ to discuss TMDL concerns and offer a partnership to move forward. See attached agenda and summary of the meeting.
- October 13, 2013: Staff and AMEC met with ADEQ in Prescott. ADEQ was resistant to the City concerns. See attached summary of the meeting.
- April 1, 2014: ADEQ issued the Draft Lake TMDL. City responded on April 30, 2014.
- April 21, 2014: Summary document sent to upper City management encapsulating the City response to the Draft Lake TMDL. See attached
- December 11, 2014: ADEQ issued the Draft E. coli TMDL for the watershed. City responded on January 29, 2015.
- March 6, 2015: ADEQ issued the Final Lake TMDL Draft response.
- April 1, 2015: AMEC submitted a White Paper on different types of Watershed Modeling Programs and Methods. Document attached
- April 14, 2015: Council voted to appeal the response.

- May 26, 2015: Council voted down the TMDL/Watershed Management Contract and funds to support the appeal.
- June 16, 2015: City Staff met with ADEQ for a settlement hearing and a settlement agreement outline was reached.
- July 7, 2015: Executive Session was held for Settlement Agreement briefing.
- September 22, 2015: City Staff presented the Settlement Agreement and new TMDL/Watershed Management Contract to Council which was benched.

Memorandum

To: Mark Nietupski, Public Works Director
Cc: Craig McConnell, City Manager
From: Staff
Date: June 6, 2013

Subject: AMEC Technical Memorandum No. 1 for CIP12-035, Contract no. 2013-147

Background:

On March 12, 2013, City Council approved a professional services agreement with AMEC. The intent of the agreement was to review and respond to ADEQ's pending Total Maximum Daily Load (TMDL) reports for both the Watson Reservoir and Upper Granite Creek Watershed. AMEC's initial task under the contract is to assess the three ADEQ contracted studies (limno-coralls, sediment coring, and Watson Lake modeling) that contain supporting data for the development of the Watson Reservoir TMDL. The most important and substantial of the three contracted studies was the lake modeling study (model) that relied, in part, on the data obtained through the sediment coring and the limno-corral studies.

Findings:

A technical memorandum (TM) from AMEC titled *Review of the ADEQ Contracted Studies for Support of the Upper Granite Creek and Watson Lake TMDLs*, April 17, 2013, brought the following items to the City's attention:

- Weak model performance due to lack of data and uncertainties associated with watershed-wide representations of inflow loading.
 - The ADEQ contracted lakemodel assumed calendar year 2007 to represent a relatively dry year. Year 2010 represented a relatively wet year, and year 2011 was determined to be a drier than 2010 but a fairly typical year for Watson Lake's climate. These assumptions produce model results that indicate a need for in-lake concentrations to be reduced by 34% for Total Nitrogen and 32% for Total Phosphorus. AMEC performed a flow analysis using the same USGS gage (Granite Creek near Prescott, AZ) and determined the following:
 - Year 2007 was very dry at only 36% of the average and 72% of the median.
 - Year 2010 was very wet at 189% of the 18 year average runoff volume and 379% of the 18 year median runoff volume.

- Year 2011 was slightly drier than 2007 at 35% of the average and 70% of the median.

The concern is the use of calendar year 2011 as a typical year when in fact it was the 5th driest year in a 18-year period diminishes the reasonableness of the nutrient load reductions later summarized in the model report. Using the same modeling concept, but revising the flow assumption to reflect an average year from the 18-year gauge record, then the incoming watershed nutrient loads would have to be reduced by 76%. In summary, the TN and TP reductions required by the current model when the model is set to incoming flows to the lake at the fifth lowest in the 18 year record does not provide a true magnitude of the potential needed reductions.

- Limno-coral studies didn't reveal a clear relationship between nutrients and either chlorophyll-a or algal biovolumes.
 - The model did not calibrate to observed chlorophylla concentrations. In fact, the model significantly over predicts chlorophyll-a concentrations; the observed median 2011 concentrations were 2.8 ug/L, yet the calibrated model predicted 41.5 ug/L.
 - The model report recommends the limno-coral studies be performed again during the portion of the algae growing season in which peak productivity occurs.
 - The addition of aluminum sulfate (alum) to the limno-corals did not reduce any form of nitrogen, as would be expected.
- Lake sediment coring provided valuable information; however, significantly more watershed and lake studies are needed in order to yield the range and magnitude of data necessary to draw technically acceptable conclusions.
- Downstream impacts on the Verde River from Watson Lake are overstated due to the reservoir operation, which now allows very little, if any, water releases (intended or spills) to be made into the water course below the dam. Therefore, in-lake TN and TP will have negligible impacts to the Verde.

Summary:

The items listed are the major concerns with the available data the model and do not detail all aspects of the AMEC TM. The consulting firm who prepared the model recognized the need for additional data collection, and that model chosen for this investigation may not reflect some of the unique characteristics of Watson Lake.

Due to the significant amount of resources (staff and community funds) that will need to be expended, the City would like to have on-going discussions with ADEQ to determine basic actions that can be taken. These actions must be supportable with the current level of data showing that it truly targets and improves the in-lake conditions. While these basic actions are undertaken, the City would like the data sets improved, Arizona water quality standards adopted, modeling where calibration can be achieved and uncertainties reduced, and lake and watershed management plans developed.

Next step:

A meeting has been scheduled with ADEQ for Thursday, June 13th where city staff and AMEC will be present to discuss the contracted studies related to the above findings (agenda included).

Agenda items

1. Modeling concerns

- Tetra Tech (TT) took great effort to explore the conceptual model of the complex processes that occur in Watson Reservoir; however, the model BATHTUB (version 6.14) appears to be too simplistic to simulate the in-situ concentration in the reservoir that the conceptual model outlines.
 - TT report addresses a lack of adequate data (pgs 21, 31).
 - Stated difficulties in model calibration related to nutrient loads the lake received during the monsoon seasons (pg 31).
 - It is important to note that the empirical equations used in BATHTUB were derived from a dataset of reservoirs that may not reflect some of the unique characteristics of Watson Reservoir (pg 31).
 - Since BATHTUB is a steady state model, it does not accurately model time-varying changes in the surface water elevation in the reservoir nor storm water concentrations as a function of flow.
- TT report did not state what the nitrogen retention predicted by BATHTUB was nor did they discuss its verification.
- TT report stated that year 2007 represents a relatively dry year. Year 2010 represents a relatively wet year, and year 2011 was determined to be a drier than 2010 but a fairly typical year for Watson Lake's climate. Ultimately, it appears that year 2011 had the most available data for modeling purposes. AMEC's flow analysis of USGS gage – Granite Creek near Prescott, AZ determined the following:
 - Year 2010 was very wet at 189% of the 18 year average runoff volume and 379% of the 18 year median runoff volume.
 - Year 2007 was very dry at only 36% of the average and 72% of the median.
 - Year 2011 was slightly drier than 2007 at 35% of the average and 70% of the median.

The concern is that using 2011 as a typical year when in fact it was the 5th driest year in an 18 year period could have a negative effect on the reasonableness of the nutrient load reductions later recommended by TT.

- TT stated that they believe one of the most important triggers for lake impairment is excess nutrient loadings entering the lake during the growing season from May through October. In their view this will result in significant algal blooms.. TT has relied heavily on the 2011 BATHTUB model to establish the loading allocations for incoming TN and TP and evaluate the reductions that can be expected from various modeled scenarios. Where did the 2011 growing season inflow volume rank in regards to the average inflow volume observed during this critical growing season period? The average ratio of growing season flow volume to annual flow volume for the 18 year period is 36%. The 2011 ratio of growing

season runoff volume to annual runoff volume is only 9.4% which is the 5th lowest. The lowest ratio occurred in 2010 at 2.7%. Year 2010 was the other year used to calibrate the BATHTUB model. So it is troublesome that 2 of the 5 lowest ratios of growing season to annual runoff volume occurred during years that TT relied upon for model calibration.

- It appears that neither the limno-coral nor the coring studies have the range and magnitude of data sets to adhere to modeling industry standards.

2. General discussion items

- It is noted that both the sediment coring (11/12/2012) and the limno-coral (10/23/2012) documents that were reviewed were dated after the date of the modeling report (8/2012).
- Discussion on the Verde River Watershed Assessment – Watson Lake (pg 77). Watson has been designated by Arizona Surface Water Quality Standards to be warm-water Aquatic and Wildlife (A&Ww)Protection, this is defined as, "...the use of a surface water by animals, plants and other warm-water organisms, generally occurring at an elevation less than 5000 feet, for habitation, growth, or propagation."
- Verde River numeric endpoints for TN at 1 mg/L and TP at 0.1 mg/L and then the further available ranges were reduced to TN concentrations between 0.3 to 0.8 mg/L and TP between 0.03 to 0.06 mg/L.
- Discuss the level of watershed modeling completed to provide input data for the BATHTUB model.

3. ADEQ options and recommendations for City of Prescott and other stakeholders to improve the watershed and reservoir conditions

Memorandum

To: Mark Nietupski, Public Works Director

Cc: Craig McConnell, City Manager

From: Staff

Date: July 12, 2013

Subject: Meeting with the Arizona Department of Environmental Quality (ADEQ) on June 13, 2013

The City with its consultants from AMEC (Dr. Latimer and Mr. Sutherland) met with ADEQ representatives (Ms. Taunt, Mr. Sutter, and Ms. Fitch) to discuss the City concerns related to the studies used in the development of the forthcoming Watson Lake Total Maximum Daily Load (TMDL) report. This memo will document the key points, staff recommendations, and next step.

Key points:

- The model is too simplistic and the available data is too limited to capture the complex interactions in the reservoir and the watershed for which improvement requirements will be set in the TMDL.
- The average conditions for inflows to the reservoir, used in the modeling, were researched by AMEC and not found to be average.
- The use of Verde River numeric standards will be extremely difficult to meet and appear to not be an attainable nor appropriate improvement targets. Very little if any water volume reaches the Verde River even though Watson Lake is in the Verde Watershed. Watson Lake is a dammed water body without perennial water flows.
- Concerns related to the application of the TMDL in the City's MS4 permit.
- Concern for the limited quantity of data regarding the watershed inputs to the reservoir.
- ADEQ stated that the TMDL is drafted; however, they would like to review the City's concerns and determined what, if any, changes will be made to the TMDL report. ADEQ stated that they are confident in their data and use of the BATHTUB model.

Staff recommendations:

- Due to lack of watershed data to address forthcoming regulatory requirements, staff with concurrence from AMEC, recognizes the need for a monitoring program in city limits. The components of the monitoring plan are to be determined.
- Develop a regional stakeholder's group comprised of members who have responsibilities to land and water resources (e.g. MS4 permit holders, etc). The group will be open to those that have expertise in watershed management or related field.

- On-going information sharing with appropriate City Directors and City Elected Officials
- Development of a regional public education program.

Next step:

An outcome of the June 13, 2013 meeting was an agreement by both the City and ADEQ to meet again, where ADEQ will provide responses to the City's concerns prior to the release of the Watson Lake TMDL. This meeting is tentatively planned for late July/early August 2013.



Public Works Department

433 N. Virginia Street
Prescott AZ 86301
928-777-1130

Memorandum

To: Mark Nietupski
From: Benjamin Burns
Date: December 4, 2013
Subject: **Summary of ADEQ Watson Lake TMDL Meeting of October 29, 2013**

Background:

AMEC, the City's environmental engineering consultant, and staff met with ADEQ on June 10, 2013, to discuss concerns regarding the pending Total Maximum Daily Load (TMDL) reports for Watson Lake which were prepared by ADEQ. ADEQ declared Watson Lake impaired in 2004. Lake Water quality is negatively affected by high nutrient levels of Phosphorus and Nitrogen. The City presented critical analysis of the Watson Lake TMDL supporting data prompting ADEQ to conduct further review of the City's concerns before scheduling a second meeting.

Prior to the October 29th meeting, ADEQ supplied the City with a second phase limno-coral study conducted by the University of Arizona, Environmental Research Laboratory which was completed on August 6, 2013. This report was referenced by ADEQ during the second meeting as a relevant source of data which could help to clarify potential treatment methods of Watson Lake. AMEC is currently conducting their analysis of the new report.

Meeting Results from October 29, 2013:

Attendees:

Jason Sutter, ADEQ
Susan Fitch, ADEQ
Ben Burns, CoP
Amanda Richardson, CoP
Joel Berman, CoP
Mark Nietupski, CoP
Ed Latimer, AMEC
Roger, AMEC (phone)
Rick, AMEC (phone)

ADEQ RESPONSE TO KEY POINTS FROM MEETING No. 1

- ADEQ provided a second phase of limno-coral study which demonstrated that alum treatment is effective for suspended and attached algae. Aeration and dredging were also recommended; however, expected results obtained by any of the recommended treatments are not quantified for complete effectiveness or cost. Additional analysis must be performed before deciding which treatments will produce optimum results.

- ADEQ performed a review of the their BATHTUB Model assumptions and shortfalls and concluded that the data is defensible even though the average condition for inflows to the reservoir, used in the modeling, were researched by AMEC and found not to be average.
 - The Dry year (2011), used as the analysis base line in the Model is critical to internal loading in the lake; a wet year would have higher watershed loading and increased flushing of the lake.
 - ADEQ's required reduction of 30% in nutrients levels in a dry year would actually result in a required 70% to 75% reduction of nutrients in a normal year.
 - ADEQ did not change their insistence that using Verde River water quality standard as an endpoint is defensible. After additional analysis has been completed, ADEQ also said that the Watson Lake target could be modified at a later time.
- For the Watson Lake TMDL, loading pounds per years (lbs/yr) will be translated to concentration based milligrams per liter (mg/l).
- ADEQ conducted an analysis of the watershed loading data which is not available for review at this time. The data will be available in a companion document to the Draft Watson Lake TMDL.
- ADEQ is also planning to release a DRAFT E. Coli TMDL for Granite Creek in spring 2014 for public comment. The modeling for this TMDL was conducted during summer 2013. ADEQ will expect an E. coli reduction between 70% and 90%; however, it is uncertain where the point of compliance will be or where the point sources may be located.

TMDL, PERMITTING & STANDARDS

- The Draft Watson Lake TMDL is being reviewed by ADEQ management and is expected to be released in January of 2014.
- The Small MS4 General Permit does not currently require sampling/monitoring of surface water runoff. Monitoring stormwater will be required as part of the Watson Lake TMDL implementation to ascertain compliance with the City's wasteload allocation. The permit will remain a general permit and will not become an individual permit.
- ADEQ will reach out to other watershed stakeholders: ADOT, Yavapai County (YC), Yavapai Indian Tribe (YPIT), and Prescott National Forest (PNF). Permittees (ADOT, YC, CoP) will be allocated a percentage of waste-load based on contributing land area; non-permittees' participation in Watson Lake TMDL implementation will be voluntary. Grants and technical support could be used to incentivize participation from non-permitted stake holders.
- ADEQ has not located any point sources for nutrients; however, Watson Lake remains the collection point for those nutrients. Additional sampling and analysis must be performed in order to locate the point sources. ADEQ has determined the "background" condition for the undeveloped forested areas within the watershed.
 - Watershed loading must meet the Verde River water quality standard of 1 mg/l of nitrogen and 0.1 mg/l phosphorus. ADEQ will require the lake water inflow and discharge to meet this standard.
 - Potential sources of Nitrogen and Phosphorus
 - Background sources: naturally occurring sediment (non-human induced erosion), wildlife, wildfire
 - Livestock, domesticated animals, wildlife (drawn into the city by human activities – gardens, compost, garbage)
 - Human waste (septic systems, sanitary sewer, recreation)
 - Fertilizers
 - Sediment from construction sites/human-induced erosion

- Decomposing vegetative material (leaves, tree trimmings, grass clippings)
 - Vehicle emissions
- Nitrogen enters the water shed most commonly by rotting or dissolving tissues from dead organisms, septic systems, animal feed lots, agricultural fertilizers, manures, industrial waste waters, sanitary landfills, and garbage dumps.
- Phosphorus elevations in the water shed commonly occur in urbanized lands which include roads and lawns. According to a study performed by the Lake Champlain Basin Program in 2012, "On an acre by acre average basis, developed land can contribute up to four times more phosphorus than agricultural land and seven times more than forested or natural areas." Phosphorus is one of the most common naturally occurring elements however high amounts of Phosphorus are encountered during storm water runoff events. The impervious urbanized surfaces do not allow the water to percolate into the soil, thus the Phosphorus is washed into the water ways instead of providing nutrients to the surface plant life.
- Reductions in Phosphorus will be a concern – reducing Phosphorus from 0.2mg/l to 0.1mg/l is a significant task. Background levels of Phosphorus are higher as it is carried by sediment.
- ADEQ's opinion is that 30% reduction in nitrogen is achievable (many TMDLs require a 99% reduction). They recognize this will be a long term effort (20 years+).

ADEQ SUPPORT

- The Granite Creek Watershed is a target watershed. Prescott Creeks has received grant funds for the Watershed Improvement Plan (WIP) concurrent with the Watson TMDL analysis by ADEQ. The City is currently partnering with Prescott Creeks on two WIP implementation grant projects funded by ADEQ.
- ADEQ will continue sampling; nonpoint source 319 grant funds will be used to revise and update the WIP, and on-the-ground projects can be initiated.
- ADEQ can provide technical support to draft a Lake Management Plan and work with the MS4 permittee (City).
- Once the Watson Lake TMDL is in place it will be used as a target. The TMDL can be revisited and updated as more data collection improves understanding.
- It is not clear if ADEQ can offer funding for TMDL nonpoint source research and location. Current funding available (319 and MS4) is not designated for research efforts to locate point sources or analyze the best methods for remediation. Funding is only available for actual "on the ground" projects that will correct the TMDL non-compliance.
- ADEQ does not believe 319 funding can be utilized for development of a monitoring plan. ADEQ can provide technical support to the City in developing a monitoring plan.

TARGETED WATERSHEDS IN THE STATE

- Prescott, Sedona, Oak Creek Canyon, San Francisco River, San Pedro River, and the Tonto Creek Basin.
- Sedona has an MS4 permit tied to the Oak Creek TMDL for Nutrients and E. coli. The City of Sedona is one of multiple jurisdictions affected by the TMDL.
 - AMEC will contact Sedona regarding the MS4 permit and TMDL Standard imposed by ADEQ.

CITY OF PRESCOTT CONCERNS

The original concerns presented by the City to ADEQ in the June 10, 2013, meeting still stand: Are the Verde River water quality standards achievable or even reasonable? Data and modeling presented by ADEQ contains questionable information from which to draw conclusions; however, ADEQ appears unwilling to partner with the City to perform additional research and testing before issuing the TMDL Draft. ADEQ contends their conclusions are defensible and is proceeding as planned. This presents the City with several issues:

- Point sources of nutrients are unknown (the City is not the only contributor to the water shed).
- The Verde River has an entirely different contributing water shed (wilderness, relatively unpopulated and spring fed). The City of Prescott water shed is urbanized which creates doubt that the Verde River water quality standards can be met. ADEQ recognizes that water from the reservoir will rarely reach the Verde River.
- The City of Prescott does not have a revenue stream to fund research of the point sources or incorporate Best Management Practices (BMP's) for treatment. There are unknown costs associated with the research and prospective projects. It is critical to implement methodical treatment after understanding the nature of the point sources in lieu of a shotgun approach, as suggested by ADEQ, to determine what works best.
- If standards are burdensome and unreasonable, the City may explore contesting the standards.
- ADEQ indicates that standards can be lessened over a period of years after obtaining additional data however; we are unaware and uncertain how this may be achieved.

AMEC will continue to assist the City in moving through Phase 1 of this project to transition into Phase 2. Phase 2 will of necessity involve a different type of data collection which will allow AMEC to develop a more precise model than ADEQ was able to produce. This will assist in designing and implementing BMP's while estimating long term costs. AMEC can assist in structuring potential revenue streams that may be considered by the community to address long term water quality improvement. Additionally, AMEC has assisted other agencies in similar circumstances, to successfully contest unreasonable standards.

WHITE PAPER



Watershed Modeling In Support of the Upper Granite Creek Basin TMDL Implementation



The Arizona Department of Environmental Quality (ADEQ) is establishing Total Maximum Daily Loads (TMDLs) for: *Escherichia coli* (*E. coli*) in Granite Creek as well as three of its major tributaries; and for Total Nitrogen (TN) and Total Phosphorus (TP) in Watson Lake, which receives its inflow from Granite Creek. To respond to these TMDLs, significant reductions of these three pollutants in the stormwater being discharged to these waterways will be required over the next several decades. To assist in responding to these TMDLs, communities often turn to numerical models to observe, monitor, and document the complex process of achieving TMDL compliance. This document will briefly explore the various types of numerical models available for a comprehensive Watershed Modeling Study as well as present a detailed discussion on the recommended programs. Regardless of Amec Foster Wheeler's recommendation, the watershed model the City selects should provide accurate estimates of flows and loads of sediment, nutrients, and *E. coli* entering the watershed and the Lake. In addition, the selected model should be capable of effectively evaluating the reduction in these pollutant loadings throughout the City of Prescott and the watershed that would result from the implementation of various BMP practices.

Review of Available Models

There are three different types of models that could be used for this comprehensive TMDL implementation planning work. They are classified as: hydrologic, hydraulic, and water quality. Each type of model has its strengths and weaknesses in addressing the complex needs of this kind of study. The table on the next page briefly summarizes each model and a more detailed discussion of each model follows the table.

Hydrologic models are watershed based models that focus on the transformation of rainfall and snow into stream flow or stormwater discharge. These models can simulate a single precipitation event or a continuous series of events spanning several months or several decades. The most notable hydrologic model is the USEPA supported Hydrologic Simulation Program Fortran (HSPF). HSPF, once calibrated to flows, can produce very accurate flow results.

Hydraulic models are usually developed for a specific reach of a stream or river and they focus on translating stream or stormwater flow (i.e. usually obtained from a hydrologic model and input by the user) into hydraulic characterizations such as stream depth, width and velocity. The most notable is the USACE's Hydrologic Engineering Center's Riverine Analysis System (HEC-RAS) used extensively for the creation of FEMA Flood Insurance Mapping.

Water quality models are a bit more complicated since the best ones contain some ability to estimate flow (i.e. hydrology) and/or estimate the physical characteristics of the flow (i.e. hydraulics). Water quality models are generally classified as either watershed models (such as for Granite Creek) or receiving water models (such as for Watson Lake). Watershed models play an important role in linking sources of pollutants to their respective receiving water bodies as nonpoint source loads. These models have been referred to as load generating and upland load transport models. Watershed water quality models are driven by precipitation, land use, impervious areas, slope, soil types and drainage area. Many of these models essentially have the same input as the hydrology models discussed previously. In fact, it is common to have various hydrologic and hydraulic models embedded within or linked directly to them. These combined abilities make Water Quality models the most dynamic and powerful methods to represent a watershed or receiving water.

SUMMARY TABLE

Type of Model	Method / Purpose	Benefit	Drawbacks	Commonly Used
Hydrologic	Focuses on the transformation of rainfall and snow into stream flow (stormwater)	- can simulate a single precipitation event or a continuous series of events overlong timeframes - can produce very accurate flow results	- limited spatial definitions - simplified representation of urban drainage systems	- USEPA - Hydrologic Simulation Program Fortran (HSPF) - USACE - Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS)
Hydraulic	Translates stream or stormwater flow into hydraulic parameters (stream depth, width, velocity, etc)	- can handle steady and unsteady flow - can be modified for a network of channels - can incorporate bridge and culverts, dams, and levees	- most are one dimensional in flow - unsteady in steep or highly variable rivers and streams	- USACE - Hydrologic Engineering Center's Riverine Analysis System (HEC-RAS)
Water Quality – (Watershed-based)	Links pollutant sources to receiving waters as nonpoint sources then estimates those loads and their transport through stormwater collection systems	- incorporates hydrologic and hydraulic characteristics (imbedded or linked within the Water Quality Model) - similar to hydrology models being driven by precipitation, land use, impervious areas, slope, soil types and drainage area - accuracy of the flow and pollutant loading inputs drives the accuracy of the modeling results	- some are not designed to efficiently run for a prolonged time period - some have weak algorithms related to groundwater / surface water interaction result in inaccuracies - most have no or weak algorithms related to pollutant build up and wash-off in urban areas	- USEPA's Storm Water Management Model (SWMM) - Loading Simulation Program in C++ (LSPC) - Simplified Particulate Transport Model (SIMPTM) - Water Quality Analysis Simulation Program (WASP) - Open Source Water Quality Model (DELWAQ)

Further Discussion of Water quality Models

The most notable watershed water quality model is the USEPA's Storm Water Management Model (SWMM). SWMM is best known for its ability to accurately simulate closed pipe flow and hydraulics known in urbanized systems. However, the model was not designed to efficiently run in a continuous manner (several decades) as will be needed for the Granite Creek watershed modeling. In addition SWMM's algorithms related to groundwater/surface water interaction also referred to as interflow are very weak and they haven't been proven to be very accurate. So the model is challenged to accurately match a recorded stream flow record the way HSPF has been

able to routinely do. In addition, there are numerous problems with the water quality algorithms used in SWMM that relate to pollutant build up and wash-off.

The most important difference in the various watershed water quality models available for use on Granite Creek basin is how they estimate the nonpoint source pollutant loads being transported by stormwater. There are three approaches to nonpoint source pollutant loads, the simple method, regressive equations, and physically based processes.

- The simplest approach (i.e. called the simple method) is to link the concentration of any given pollutant to its underlying land use. The user specifies the concentration of each pollutant assumed to originate on each specified land use which is usually based on monitoring data. Unfortunately, the model cannot simulate any variation in these concentrations or how these concentrations maybe reduced by various best management practices (BMPs). Simple method models are not very useful in identifying the most cost effective BMPs to implement.
- Another very popular modeling approach is to simulate the loading of any given pollutant using various empirically based equations also referred to as regression equations developed from other data sets. So pollutant loads can vary as a function of flow and other parameters used in the regression equations that have been developed. However, these models are still challenged to effectively simulate the load reductions associated with various BMP's. In most cases the user has to specify the pollutant removal associated with a BMP which means the user establishes the BMPs effectiveness and not the model itself.
- The most powerful pollutant load generators are those that are classified as physically based. Physically based models are mathematical programs designed to simulate the actual physical processes that are thought to be directly related to the desired output of the model itself. Physically based models frequently utilize empirical equations within their frameworks to describe relationships between variables that are considered relevant to a process being simulated. Keep in mind that the interactions between the physically based model processes can provide knowledge of a problem that rarely can be achieved through a simple statistical analysis of the data itself or a totally empirically based simulation approach. The greatest strength of a properly formulated, applied and calibrated physically based model is not its ability to predict specific outcomes but instead its ability to reveal interactions and dependencies on various physical processes that were not known to the user previous to the commencement of the modeling exercise.

Recommendation

As with any model, the accuracy of the model is highly dependent on the user's ability to input appropriate data, make reasonable assumptions, and interpret the output the model generates. Amec Foster Wheeler recommends that the best watershed modeling approach for the Granite Creek basin tributary to Watson Lake be a hybrid of two loading generating water quality models, specifically, the Loading Simulation Program in C++ (LSPC) for load generation in rural areas linked with the Simplified Particulate Transport Model (SIMPTM) for load generation in the urban areas of the watershed. Together these two programs would provide the City with a comprehensive view of the watershed. While the SWMM model discussed above presents a number of limitations, the LSPC in combination with the SIMPTM models overcome these limitations and present a powerful approach to modeling.

Each of the two recommended programs is discussed in more detail below.

- LSPC is a physically based watershed modeling system that includes HSPF algorithms for simulating hydrology, sediment, and general water quality on land as well as a simplified stream transport model. LSPC builds off the Mining Data Analysis System (MDAS), which was developed by EPA Region 3 and has been widely used for mining applications and TMDLs. A key data management feature of this system is that it uses a Microsoft Access database to manage model data and weather text files for driving the simulation. The system also contains a module to assist in TMDL calculation and source allocations. For each model run, it automatically generates comprehensive text-file output by sub-watershed for all land-layers, reaches, and simulated modules, which can be expressed on hourly or daily intervals. LSPC has no inherent limitations in terms of modeling size or model operations. The Microsoft Visual C++ programming architecture allows for seamless integration with modern-day, widely available software such as Microsoft Access and Excel.

LSPCs strength will be in the rural portions of the watershed that are not urbanized but are thought to generate significant loadings of sediment that can be transported through the urbanized portion of the basin. LSPC can model sediment flows in-stream which is a valued capability since in-stream sediment transport and deposition will be key to understanding the in-stream loadings of other pollutants like TN, TP and *E. coli*. However, LSPCs weakness is its ability to estimate sediment and associated pollutant loadings originating in an urbanized landscape. That is why Amec Foster Wheeler recommends combining the LSPC model with the Simplified Particulate Transport Model (SIMPTM) to generate pollutant loadings from the urbanized portions of the watershed.

- SIMPTM was developed by Pacific Water Resources, Inc (now part of Amec Foster Wheeler). SIMPTM is a physically-based model that simulates over time the various processes that may result in the contamination of stormwater in the urban environment. These processes generally include parameters such as: "street dirt" accumulation; wet weather accumulation of contaminated sediment from adjacent areas; wash-off of sediment to adjacent properties; pollutant loading reductions due to street sweeping; and incorporating other pollutants based on particle size.

The key to SIMPTM's proven success is its ability to continuously account for 8 different categories of particle size ranges throughout its simulation of its major processes. The SIMPTM simulation can be driven by a historic hourly rainfall trace of unlimited length for areas that do not experience freeze thaw conditions. Version 5.0 of the model can now be driven by a continuous runoff trace of unlimited length using any user defined time step from five minutes to sixty minutes. So this means SIMPTM can now be driven by the hydrologic output from LSPC, SWMM or HSPF or any other hydrologic model that can provide a continuous flow output.

Another benefit of SIMPTM is its ability to evaluate the pollutant reduction capabilities associated with alternative cleaning programs. If the City is considering the implementation of a street and catch basin program or the revision of an existing program, the model will fairly accurately estimate the amount of a given pollutant of

interest that can be removed from the stormwater discharges are a result of the program's implementation. A catch basin cleaning program can only be effective if the City has allowed the use of sediment trapping stormwater inlets as part of its stormwater collection system. Another strength of SIMPTM is its ability to quickly estimate the watershed-wide flow and pollutant reduction capabilities of implementing Green Infrastructure (GI) or Low Impact Development (LID) activities through the use of a parameter called effective impervious area (EIA). The maximum use of GI or LID throughout the City of Prescott was recommended by ADEQ as the preferred way to reduce inflows and nutrient loading into Lake Watson and achieve the targeted TMDLs. As such it will be important to have a way of evaluating and quantifying the use of these practices as part of the TMDL implementation process.

One of the benefits of using and calibrating HSPF which is embedded within the LSPC model is that Amec Foster Wheeler can (if LID practices turn out to be cost effective) create and deliver a Granite Creek Basin specific application of a LID design model called the Flow Duration Design Model (FDDM). FDDM was developed by Amec Foster Wheeler (formerly Pacific Water Resources, Inc). It provides continuous hydrologic simulations for a historic period of hourly rainfall of unlimited years based on runoff time series extracted from a calibrated HSPF program. Continuous hydrologic modeling permits utilization of a "flow duration standard" rather than a "peak flow standard" for the design of stormwater management systems in developments. Studies in the Pacific Northwest have shown deficiencies with the traditional peak flow standard in terms of downstream flooding and both habitat and water quality protection. FDDM was designed to be configured for use in other watersheds throughout North America provided a calibrated HSPF model has been developed for the area of interest.

FDDM allows explicit simulation of LID activities. The goal of LID is to enhance infiltration while reducing stormwater runoff at the site level. Currently the model supports continuous hydrologic simulations of: permeable pavements, green roofs, blue roofs, infiltration facilities also called rain gardens or green streets, smart cisterns and traditional detention. Many other techniques can be modeled as variations of one of these types. Engineers can use FDDM to assess and compare the cost versus performance of various stormwater management methods.

Additional Considerations

The model the City selects will be for the purposes of modeling conditions with Granite Creek and its major tributaries. Additional modeling will be needed for Watson Lake. The models appropriate for Watson Lake will differ from those appropriate for Granite Creek in that the selected model that will need to simulate Watson Lake's continuous water quality response to the watershed loadings it receives. Receiving water models (such as Environmental Fluid Dynamics Code (EFDC), Water Quality Analysis Simulation Program (WASP), CE-QUAL-W2, and Open Source Water Quality Model (DELWAQ) should all be evaluated on their merits for selection. An important consideration in model selection will be the models' ability to interface with the model selected for the Granite Creek watershed modeling.

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Lakes Sub-Committee Final Report

The references used for this report are:

- 1999 Willow and Watson Lake Master Plan
- 1984 Water Quality Analysis of Watson Lake
- Severance and Transfer Agreement with SRP
- Archives saved by Elisabeth Ruffner
- Core study of Watson Lake done by Dr. Paul Gremillion paid by ADEQ

Watson Lake and Willow Lake experienced three distinct phases (Gremillion). These were:

1. From inception of the dams to approximately 1962 flooding stages occurred bringing in large deposits of silt. Previously to building of dams the silt could pass through. The original depth of Watson Lake after the building of the dam was 48 feet at the dam, after the flooding and the latest testing shows that depth at 36 feet, an accumulation of 12 feet of silt at the deepest section.
2. Phase 2 included massive infiltrations of raw sewage and other pollutants (1984 Water quality study of Watson Lake and Gremillion). The recommendation of the 1984 Water Quality Analysis was to desist from introducing pollutants and raw sewage or reclassify the Lake.
3. Phase three (Gremillion) decrees that the lake(s) have become anoxic or self-destructing.

In 1999 the City of Prescott with the approval of the express desire of the community voted to purchase the Lakes from Chino Valley Irrigation District for 15 million dollars. The public voted for this with the resolution that the Lakes would be used for recreation including swimming and body contact (1999 Willow and Watson Lake Master Plan).

In 2002 Watson Lake was declared impaired by the EPA and today no body contact is permitted in either lake. Historical references captured by Elisabeth Ruffner suggest that both lakes were declared swimmable in 1998 by ADEQ.

Dr. Paul Gremillion was hired by ADEQ at the recommendation of the Lake Sub-Committee to perform core samplings of Watson Lake in 2010 and the results of his testing are summarized in one sentence. They are:

- Remove all sediments to original levels through draining and dredging the lakes.

Removing only partial sedimentation, particularly at the South end of Watson Lake would prove inadequate since the incursion of toxic materials would still be massively present at deeper parts of the lakes and minimal removal of materials would not solve the anoxia in the long run (Gremillion).

Following Gremillion's recommendation would require the requirements by SRP in the contracted agreement with them:

1. Provide 90 day notice to SRP in writing of intent to drain and dredge
2. Perform Bathymetric studies to determine the depths of the lakes and the amount allowed to be removed
3. Drain only in designated time frames as allowed by SRP through their agreement

When those agreements are met and agreed upon steps are also needed with the Army Corp of Engineers to proceed, they are:

1. Request a permit from the Army Corp of Engineers (ACE) to proceed with dredging.

If this is the intent of the City Of Prescott the ACE has a special program that can provide up to \$100,000 in engineering studies (bathymetric) and up to \$5 millions of dollars to perform the recommended procedures.

Again, the recommendations of the scientist who performed the Coring Samples of Watson Lake are to drain and dredge the lake(s) contrary to the recommendation of ADEQ who hired him to perform the study as they recommend only partial draining and dredging which, according to Gremillion would be detrimental to the rehabilitation of the lake(s).

The Lakes Sub-Committee has further designed and developed a working plan to prevent future silting of both lakes including plans to restore the quality and quantity of both lakes to the request that voters paid for the future of the lakes.

PROPOSAL FOR WATSON LAKE IMPROVEMENTS

February 6, 2013.

Presented by:

The Mayor's Advisory Lakes Sub-Committee

Chuck Budinger

Walt Anderson

Gary Worob

Gordon Bean

To:

Mayor Kuykendall

The City Council Water Issues Committee

The Mayor's Advisory Committee to the City Council Water Issues Committee is submitting the following recommendations for water quality improvements to Watson Lake. This report comes after two years of interviewing various wildlife management agencies, water providers, and water quality regulators. As a result of this research, the citizen's group has developed a plan that will achieve several goals of the City: recreational use; improved water supply; and to provide avian wildlife habitat areas (Important Bird Areas as designated by the Audubon Society).

This proposal focuses on Watson Lake because it has been classified as impaired by the Environmental Protection Agency. The recommendations in this proposal are based on the most recent scientific data available and the historical information based on past legal agreements and management plans, and experts in the field of Lake Hydrology and wildlife ecology. The general consensus of the Sub-Committee is that the management of the lake will take two separate approaches to minimize the eutrophication process: 1) actions within and around Watson Lake, 2) actions in the watershed upstream of Watson Lake.

The proposed recommendations for Watson Lake can also be applied to Willow Lake in the future to prevent a classification for impairment.

The Plan

In order to reduce the in-lake processes that have led to impairment, the Sub-Committee recommends designating three separate "ecological zones" for Watson Lake. These three ecological zones are shown on the map attached to the report.

The first zone is a deep lake zone. Dredging of this zone should be performed to remove a sufficient volume of sediment that will eliminate those layers contributing to the in-lake eutrophication responsible for the impairment. Dredging should be extensive enough to nearly restore the volume of water in the lake to those described in the Sever and Transfer Agreement with the Salt River Project.

Zone 1 can be created by constructing an earthen berm across the southern portion of the lake with an engineered flow control structure that will allow stormwater flows into the lake at manageable volumes. Dredging will occur north of this berm.

Zone 2 should be a constructed wetland of sufficient size to absorb excess nutrients dissolved in stormwater from the upper watershed. Treatment of nutrients can also be achieved through contemporaneous improvements in the watershed upstream of the Lake.

Zone 3 will be a smaller basin intended to trap sediment from upstream. The sediment accumulated in this basin can then be easily cleaned out and removed without disturbing the other portions of the lake. Sediment removal is a key element in restoring the Lake's natural chemistry and biology and preventing the eutrophication process from being sustainable.

Zones 2 and 3 are also separated by an earthen berm with flow control structures to allow for flood waters to pass through them. The black lines in the aerial attachment represent an approximate location for the earthen berms separating the three zones and do not imply an engineered decision.

Finally, a conservation easement needs to be dedicated around the lake that encompasses an area 1000 yards back from the shoreline. This easement should carry substantial restrictions on it for development and special conditions should be placed on new development outside but adjacent to the easement. These conditions would include the best management practices available to treat stormwater coming into the lake from off-site developments outside the easement.

These activities in Watson Lake are necessary and separate of watershed improvements upstream because the studies showed that in-lake processes

originating in the bottom sediments are the largest contributors to impairment at this time.

Lake Management Plan

Dredging Watson Lake and creating a wildlife habitat are only part of the overall picture for a Lake Management Plan. In addition to this proposal, the City should implement a Watershed Management Plan to reduce pollutants that flow to the Lake. However, it is the consensus of the Committee and the ADEQ Reports that a Watershed Plan alone will not address the impairment. The primary cause of the impairment is the in-lake processes occurring within the sediments at the bottom of the Lake.

In addition to dredging, creating a wildlife habitat, and reducing sediment, the Lake Management Plan should include a process to address potential flare ups of algae and underwater plants. This can be accomplished in a number of different ways that includes adding Alum to the water in the trouble spots and/or installing aerators at the bottom of the lake.

The Lake Management Plan should be a comprehensive approach to maintaining the Lake after this proposal has been implemented and the area begins to stabilize into a wildlife habitat or Important Bird Area.

The City should establish a Watershed Commission (Board) to develop a Lake Management Plan in conjunction with a Watershed Management Plan and to implement the Management Plan for the Lake (this can then be adapted to Willow Lake).

Funding

The US Army Corps of Engineers has funds available for habitat restoration through their Water Resources Development program. This program will provide funds for the initial engineering feasibility plan and then the implementation plan. This program has been used for the restoration of wildlife habitat across the US with great success. The Corps of Engineers has spent well over \$4 million in the Tucson area through this program.

The Sub-committee believes that the best approach to restore the water quality of Watson Lake to a level that is beneficial for recreational activities (sailing, swimming and kayaking) is to restore the lake to a standard suitable for wildlife

(avian) habitat. The Water Resources Development Act provides the funding and technical mechanisms necessary to achieve that goal.

Funds are accessed through a letter from the Mayor to the Corps of Engineers.

Map showing Ecological Zones is attached as the next page.

