

**City of Shelby
Change Application Number 2
Year-Round Water Rights**

Application To Change Two Existing Non-Irrigation Water Rights

**Change in Place of Use and Change in Point of Diversion
For Municipal Water Rights 41P 192877 00 and 41P 192879 00**

Marias River – Basin 41P



Prepared for:
Montana DNRC Water Resources
Division
Havre Regional Office
210 Sixth Avenue
Havre, Montana 59501

Prepared by:
HydroSolutions Inc
P.O. Box 1779
Helena, Montana 59624

**Hydro
Solutions Inc**



APPLICATION TO CHANGE AN EXISTING NON-IRRIGATION WATER RIGHT

FILING FEE

\$900.00 To change a point of diversion, place of use, purpose of use, or place of storage

\$200.00 (The following types do not qualify for a filing fee reduction)

- Replacement well that exceeds 35 GPM or 10 AF per year
- Replacement municipal well that exceeds 450 GPM
- Replacement reservoir on the same source
- To move or add stock tanks to an existing system

FILING FEE REDUCTION

If you attend a pre-application meeting with DNRC staff and your application is submitted within 6 months of the meeting date, the filing fee will be reduced by \$200.00. The time period may be extended if measurements or an aquifer test is required.

Use this application to change the point of diversion, place of use, purpose of use, and/or place of storage of an existing non-irrigation water right. Attach additional sheets if necessary. Attachments must be labeled as shown in the sections below.

ADDENDUMS THAT MAY BE NEEDED

- Change to Instream Flow
- Change of Salvage Water
- Change in Purpose
- Temporary Change

FOR DEPARTMENT USE ONLY

Application # _____ Basin _____

Date Received _____

Time _____ AM / PM

Rec'd By _____

Fee Rec'd \$ _____ Check # _____

Deposit Receipt # _____

Payor _____

Refund \$ _____ Date _____

Applicant Name City of Shelby

Mailing Address 112 1st Street South

City Shelby State Montana Zip 59474

Phone Numbers: Home _____ Work _____ Cell _____

Email Address larry@shelbymt.com (Mayor Larry Bonderud)

Contact Person: Contact is Applicant Contact is Consultant Contact is Attorney Contact is Other

Contact Name David Donohue, HydroSolutions Inc

Mailing Address P.O. Box 1779

City Helena State Montana Zip 59624

Phone Numbers: Home _____ Work 406-443-6169 x103 Cell _____

Email Address davidd@hydrosi.com

Note: If a contact person is identified as an attorney, all communication will be sent only to the attorney unless the attorney provides written instruction to the contrary. If a contact person is identified as a consultant, employee, or lessee, the individual filing the water right form will receive all correspondence and a copy may be sent to the contact person.

CHANGE APPLICATION INFORMATION

A water right owner who wants to make a change to an existing water right must submit an application to the DNRC. The proposed change cannot create an adverse affect to other existing users who hold water rights that may have an earlier (senior) or later (junior) priority date than the Applicant's. If the application for change is granted, the Applicant's water right will retain its priority date.

A water right is valid if water was actually put to use historically. The water right is limited to the extent of that historical use. A water right cannot exist if it was never used, even if the water right is described on paper.

The information provided to the questions below is required for the Department to begin processing the application. The Department may require additional information during the processing of the application. For any questions, please contact a Water Resources Division Regional Office.

NIR.3 HISTORIC USE - ARM 36.12.1902

For the questions below, describe the historic use of the water right or the current use if a change authorization was previously granted on the water right. The description of the historic use depends on the type of water right being changed. Historic use for a Statement of Claim or for an exempt non-filed right must be described as it was used prior to July 1, 1973. Historic use for provisional permits and certificates of water right must be described as was used at the filing date of the completion notice.

The historic consumptive use is the amount of water that was diverted from the source minus the amount of water that returns to a water source.

The Department will calculate the diverted volume and the consumptive volume.

Complete the following information for each water right being changed.

NIR.3.A Attach a description of how the system operated from the point of diversion through the place of use. Include a description of wastewater collection and treatment used, if any. Please label attachment **NIR.3.A Historic Use**.

NIR.3.B Attach a description of the uses (i.e. domestic, stock, irrigation of parks, industrial, commercial, etc.) and provide a narrative detailing the approximate amount of water associated with those uses. Please label attachment **NIR.3.B Historic Use**.

NIR.3.C What has been used to convey the water to the place of use?

Conveyance (ditch/pipeline) See Attachment Size _____ Length _____
Conveyance (ditch/pipeline) See Attachment Size _____ Length _____

NIR.3.D What is your diversion method type and capacity?

Diversion See Attachment and Table NIR.3.A Capacity _____ GPM/CFS

NIR.3.E How did you determine the capacity? See Attachment

NIR.3.F How often do you divert water? See Attachment

NIR.3.G What is the duration of each diversion? Days/year See Attachment Hours/day _____

NIR.3.H If wastewater is discharged, what amount of water is discharged? See Attachment GPM/CFS

NIR.3.I Yes No Do you measure water near the existing point of diversion or near/at your place of use? If yes, what type of measuring device do you use? See Attachment

NIR.3.J Yes No Do you have water commissioner, water measurement records available, or other documents that support the amount of water you have historically diverted or used? If yes, please submit that information and label attachment **NIR.3.J Historic Use**.

NIR.3.K Yes No Do you supplement your water usage with water from another water right? If yes, attach an explanation of that water right and how and when it is used to supplement this water right. Please label attachment **NIR.3.K Historic Use**.

NIR.4 ADVERSE EFFECT – ARM 36.12.1903

- NIR.4.A Attach an explanation of how all points of diversion will be operated in order to not exceed historical diverted flow rate? Please label attachment **NIR.4.A Adverse Effect**.
- NIR.4.B. Attach an explanation of what your plan is to not create an adverse effect to existing water rights, certificates, permits, and water reservations? Please label attachment **NIR.4.B Adverse Effect**.
- NIR.4.C Attach an explanation of when the last time water was appropriated and used beneficially to the extent identified in your water right? If there has been a period of non-use, explain why the water right was not used, and explain why a resumption of use will not adversely affect other water users. Please label attachment **NIR.4.C Adverse Effect**.

NIR.5 ADEQUATE DIVERSION MEANS AND OPERATION – ARM 36.12.1904

- NIR.5.A Yes No Is the means of diversion a well? If yes, provide a copy of the well log. If the well log is not available, who drilled the well? See Attachment
- NIR.5.B Yes No Is another agency requiring you to measure your water use? If yes, explain. See Attachment
- NIR.5.C Yes No Do you have any plans to measure your diversion and use? If yes, attach a description of the plan and the type of measurements you will take. Please label attachment **NIR.5.C Adequate Diversion Means and Operation**.
- NIR.5.D For applications that propose new conveyance facilities, provide preliminary design plans and specifications for the proposed diversion and conveyance facilities and the equipment used to put the water to beneficial use.

NIR.6 GENERAL PROJECT PLAN & PROPOSED COMPLETION PERIOD

- NIR.6.A How many years will you need to complete this project? 10 years

NIR.7. CHANGE APPLICATION ADDENDUMS

Check yes or no if any of the following addendums are applicable:

- Yes No **Change to Instream Flow:** Required if your proposed project includes a change to instream flow.
- Yes No **Change of Purpose:** Required if the change application is to change the purpose of a water right.
- Yes No **Change of Salvage Water:** Required if the change application includes appropriation of water made available for use from an existing valid water right through creation of a water-saving method.
- Yes No **Temporary Change:** Required if the change application is to be for a temporary period of time.

NIR.8 AFFIDAVIT & CERTIFICATION

All undivided interest owners must sign as applicants.

Read carefully before you sign and review with legal counsel if you have any questions.

I affirm the information provided for this application is to the best of my knowledge true and correct. I also affirm I have possessory interest, or the written consent of the person with the possessory interest, in the property where the water is to be put to beneficial use.

I understand that making a false statement under oath or affirmation in this application and official proceedings throughout the examination of my application may subject me to prosecution under §45-7-202, MCA, a misdemeanor punishable by a jail term not to exceed 6 months or a fine not to exceed \$500, or both. I have read this Affidavit and understand the terms and conditions

I declare under penalty of perjury and under the laws of the state of Montana that the foregoing is true and correct.

Printed Name _____

Applicant Signature _____ Date: _____

Printed Name _____

Applicant Signature _____ Date: _____

WATER RESOURCES OFFICES

BILLINGS: AIRPORT INDUSTRIAL PARK, 1371 RIMTOP DR., BILLINGS MT 59105-1978
PHONE: 406-247-4415 FAX: 406-247-4416
SERVING: Big Horn, Carbon, Carter, Custer, Fallon, Powder River, Prairie, Rosebud, Stillwater, Sweet Grass, Treasure, and Yellowstone Counties

HELENA: 1424 9TH AVE., PO BOX 201601, HELENA MT 59620-1601
PHONE: 406-444-6999 FAX: 406-444-9317
SERVING: Beaverhead, Broadwater, Deer Lodge, Jefferson, Lewis and Clark, Powell, and Silver Bow Counties

BOZEMAN: 2273 BOOTH HILL COURT, SUITE 110, BOZEMAN MT 59715
PHONE: 406-586-3136 FAX: 406-587-9726
SERVING: Gallatin, Madison, and Park Counties

KALISPELL: 655 TIMBERWOLF PARKWAY, SUITE 4, KALISPELL MT 59901-1215
PHONE: 406-752-2288 FAX: 406-752-2843
SERVING: Flathead, Lake, Lincoln, and Sanders Counties

GLASGOW: 222 6TH STREET SOUTH, PO BOX 1269, GLASGOW MT 59230-1269
PHONE: 406-228-2561 FAX: 406-228-8706
SERVING: Daniels, Dawson, Garfield, McCone, Phillips, Richland, Roosevelt, Sheridan, Valley, and Wibaux Counties

LEWISTOWN: 613 NORTHEAST MAIN ST., SUITE 1, LEWISTOWN MT 59457-2020
PHONE: 406-538-7459 FAX: 406-538-7089
SERVING: Cascade, Fergus, Golden Valley, Judith Basin, Meagher, Musselshell, Petroleum and Wheatland Counties

HAVRE: 210 6TH AVENUE, PO BOX 1828, HAVRE MT 59501-1828
PHONE: 406-265-5516 FAX: 406-265-2225
SERVING: Blaine, Chouteau, Glacier, Hill, Liberty, Pondera, Teton, and Toole Counties

MISSOULA: 2705 SPURGIN RD, BLDG. C, PO BOX 5004, MISSOULA MT 59806-5004
PHONE: 406-721-4284 FAX: 406-542-5899
SERVING: Granite, Mineral, Missoula, and Ravalli Counties

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
Water Resources Division - Water Rights Bureau
WEBSITE: <http://dnrc.mt.gov/wrd/>

**City of Shelby
Change Application Number 2**

Application To Change Two Existing Non-Irrigation Water Rights

**Change in Place of Use and Change in Point of Diversion
For Municipal Water Rights 41P 192877 00 and 41P 192879 00**

Marias River – Basin 41P

Supporting Attachments

1. Attachment 606 NIR-1 Supporting Information
2. Attachment 606 NIR-2 Temporary Change Addendum; Form 606-TCA
3. Well Logs
4. KLJ Well Field Pumping Test Report
5. KLJ Water System Modeling report
6. Water service area design and record drawings

Attachment 606 NIR-1 Supporting Information

Introduction

This attachment provides additional information to support the Form 606 Application to Change a Non-Irrigation Water Right (NIR) as part of the City of Shelby (City or Shelby) application to temporarily change their municipal water rights. The Form 606 NIR is submitted to change the place of use and point of diversion of existing partial-year municipal water rights 41P 192877 00 and 41P192879 for the City. This change application will be referenced as change application number 2. The City is submitting a separate water right change application, referenced as change application number 1, for year-around water rights 41P 192878 00, 41P 192880 00, 41P 192881 00, 41P 192882 00, 41P 4489 00, 41P 4490 00, and 41P 58129 00 and water reservation 41P 71891 00. The end goal of both applications is the same except for the period of use for water rights 41P 192877 00 and 41P 192879. In total these nine water rights and one water reservation make up the City's municipal water supply.

The City has developed a reliable water source with good water quality that has historically served and presently serves its residents and a portion of the surrounding community. The purpose of the two temporary change applications is to provide a reliable interim water source for communities surrounding Shelby until the Rocky Boy's/North Central Montana Regional Water Authority (NCRWA) pipeline is in place. When the NCRWA pipeline is completed and in service the proposed changes would no longer be needed and these water rights would revert back to their current elements.

The City draws all its municipal water from a well field south of Shelby along the north side of the Marias River consisting of 13 wells completed in alluvial deposits. Water is pumped from individual wells and is comingled during treatment and transmission and then pumped and distributed to meet municipal demands. Wells 1 through 8 each have separate water rights with individual points of diversion and overlapping places of use. Wells 9 through 13 together form the ninth municipal water right for the City with common points of diversion and a smaller but overlapping place of use with Wells 1 to 8. The City's water reservation does not list any specific points of diversion, but states that up to 8 new wells can be installed. The water rights included in this change application and their current place of use is listed in Table NIR-1. Throughout this application, the water right numbers may also be referred to by well number (well name).

Table NIR-1.

Water Right	Well Number	Place of Use
41P 192877 00	1	T32N, R2W, Section 21, 22, 27, 28
41P 192879 00	3	T32N, R2W, Section 21, 22, 27, 28

This change application is submitted in order to change the place of use and point of diversion for each water right. This application would change the place of use of water rights 41P 192877 00 and 41P 192879 00 so that water historically used within the City of Shelby could serve the City of Shelby, the Crossroads Correctional Facility (prison) along with the communities of Devon, Dunkirk, Ethridge, and Big Rose Hutterite Colony (Big Rose Colony) as their primary water source. The requested change in place of use would also include the City of Cut Bank,

which would be provided a source of water supplemental to their existing water source. A change in the point of diversion is requested to better represent the historical and operational nature of Shelby's well field since all water is comingled and the well field is operated as one unit to meet municipal demands. The change would combine the points of diversion for water rights 41P 192877 00 and 41P 192879 00 since they have the same periods of use from May through October. Separating out a specific water right from the place of use is not possible since all water originating from the City's well field is mixed during treatment and transmission and is shared among all water distribution areas. In total, two separate water right change applications are submitted concurrently. Change application number 1 addresses seven existing year round City of Shelby municipal water rights and one water reservation. Change application number 2 addresses two existing City of Shelby municipal partial year water rights. The outline below follows Form 606 NIR.

NIR.1 Application Details - ARM 36.12.1901

NIR.1.A Application Details

A change in place of use and point of diversion is proposed.

NIR.1.B Application Details

Table NIR.1.B

Water Right No.	Well Number	Current Flow Rate (GPM)	What is the Flow Rate needed for the project? (GPM)
41P 192877 00	1	300	300
41P 192879 00	3	300	300

NIR.1.C Application Details

Attach a narrative explaining specific details of the requested change(s) to the water right and why it is being requested.

The Form 606 NIR is submitted to change the place of use and point of diversion of existing municipal water rights 41P 192877 00, and 41P 192879 00. This change application is intended address expected changes to the City's municipal water service area or place of use as nearby communities look to them for a reliable source of good quality water. The application also changes the point of diversion for all of the City's municipal water rights and water reservation to common points of diversion that would be shared amongst all of the water rights and the reservation. The need exists to change the points of diversion and place of use for the following reasons. The proposed change:

- 1) Provides a critical and reliable water source to multiple communities until the NCMRWA pipeline is built.
- 2) Changes the point of diversion on each water right (41P 192877 00, and 41P 192879 00) so that all wells (Wells 1 and 3) are recognized as multiple points of diversion on each water right. Since all municipal water comingles during treatment and transmission, this change better reflects actual use of the well field.

- 3) Changes the place of use for each of the existing water rights to better reflect actual historic use outside of the City's designated place of use including use at the prison; and adds the communities of Devon, Dunkirk, Ethridge, Big Rose Colony, and the City of Cut Bank.
- 4) Would not exceed the City's maximum historic diverted or consumptive use plus water reservation.

NIR.1.D Application Details

Are you proposing to change all of the historic water right(s) associated with the place of use? If no, attach an explanation of why not.

No. The City is not changing water right 41P 192874 00 which is a surface water right on an unnamed tributary to Sullivan Coulee for the purpose of flood control. Lake Shel-oolle is backed up behind a 49 foot high dam for the purpose of flood control with a maximum volume of 550 acre feet. The place of use is listed as locations within Section 22, T32N, R2W. This water right does not affect municipal water supply and does not need to be changed.

The City is submitting a separate water right change application (change application number 1) for year-around water rights 41P 192878 00, 41P 192880 00, 41P 192881 00, 41P 192882 00, 41P 4489 00, 41P 4490 00, and 41P 58129 00 and water reservation 41P 71891 00.

NIR.1.E Application Details

Identify the water rights used on the place of use that are not included in this application.

Table NIR.1.E

Water Right No.	Purpose	Priority Date
41P 192878 00	Municipal (Well 2)	October 1, 1946
41P 192880 00	Municipal (Well 4)	October 12, 1946
41P 192881 00	Municipal (Well 5)	December 26, 1963
41P 192882 00	Municipal (Well 6)	December 26, 1963
41P 4489 00	Municipal (Well 7)	December 26, 1974
41P 4490 00	Municipal (Well 8)	December 26, 1974
41P 58129 00	Municipal (Wells 9-13)	June 10, 1985
41P 71891 00	Municipal (Water Reservation)	July 1, 1985
41P 192874 00	Flood Control	June 23, 1966

NIR.2. MAP – ARM 36.12.111

Maps depicting the historic and proposed water system are required. Aerial photos may be available from the DNRC, NRIS, NRCS, USGS, and on the Internet and may be available from the 1940s up until today.

NIR.2.A

Note the section corners, township, range, and add a north arrow to the map for all maps submitted.

All maps include the required information.

NIR.2.B Historical Use

For each water right being changed, provide a map depicting the historic point(s) of diversion, means of conveyance, place of use, and place of storage. Be sure to identify the water right number on each map.

See Map NIR.2.B for a map showing the historic use of the water rights to be changed. Separate maps are provided for the place of use and the points of diversion (well field map).

NIR.2.C Historical Use

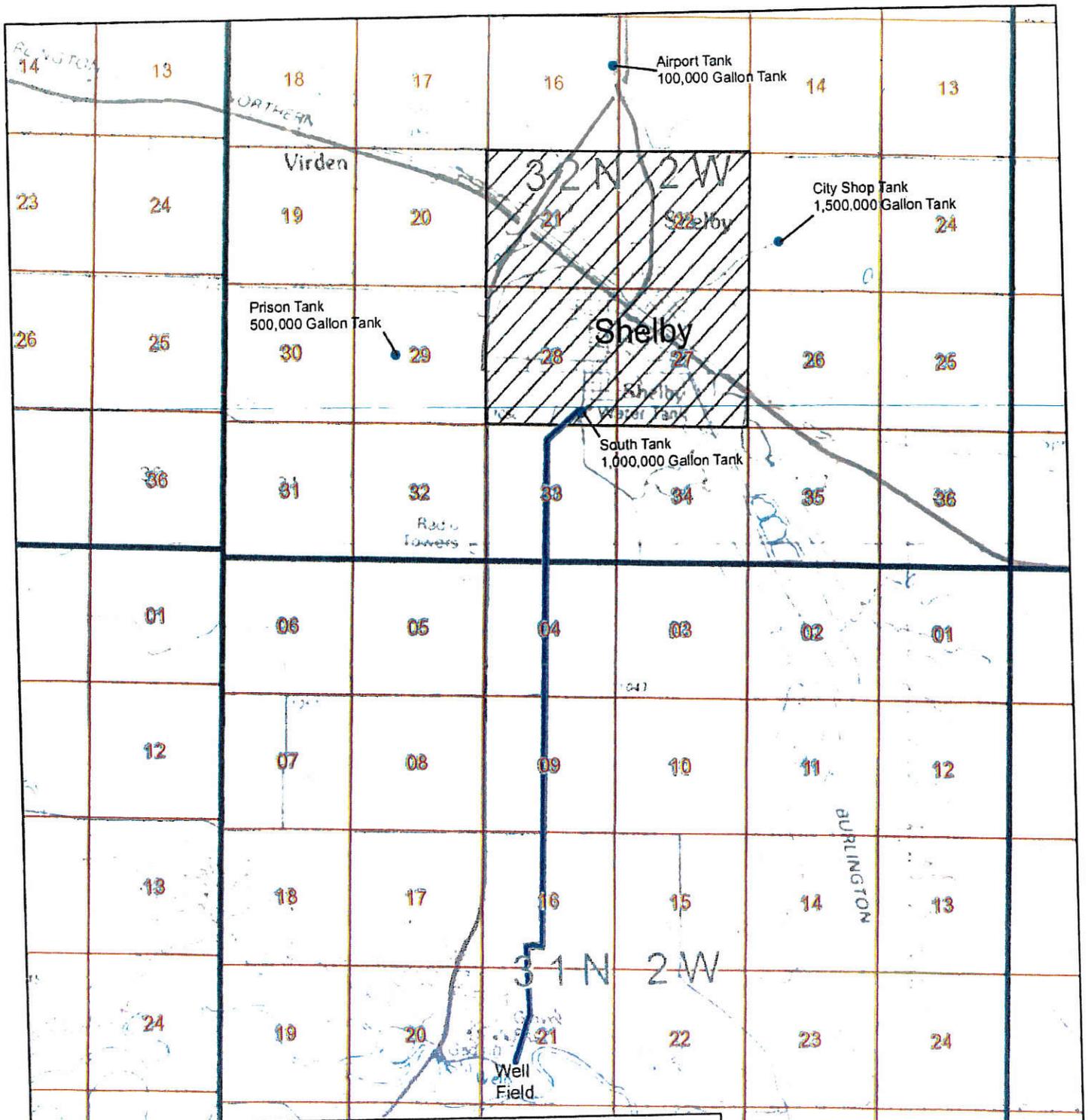
If you measure water near the historical point of diversion or place of use, please identify where the measurement occurs

Historically water diversions were measured but do not appear to be recorded until early 1980s. The 1961 Preliminary Engineers Report on Water Supply and Distribution System for Shelby by Stanley J. Thill (1961 PER) indicates that the terminal storage tank, which was a 1 million gallon concrete tank at the south side of Shelby, had a propeller water meter, but it was not accurately measuring and recording flow. The PER indicated that the meter was likely worn and underestimating the amount of flow. Actual flow records do not appear to be available in the PER. The 1988 water reservation application completed by Aquoneering describes a master meter installed in the manifold piping which combines the flows from the entire well field. The water reservation application states that operators have kept reliable and accurate records for several years and tabulates monthly water use for the years 1982 to 1986 from the entire well field. Use from individual wells was not historically metered. Currently a master water meter that measures all water diverted from the well field is located near the storage tank on the south side of Shelby. Other water meters maintained by the City measure or will measure water distributed to the water service areas proposed in the application. A map of all current and proposed water meters is shown on the Water Meter Location Map NIR.5.C.

NIR.2.D Proposed Use

Provide a map which clearly identifies the proposed point(s) of diversion, place of use, and place of storage. For partial changes, the map should reflect the entire water right including the proposed change and the remaining historic use.

See Map NIR.2.D, City of Shelby's Proposed Place of Use below. This map shows the proposed place of use of water with the addition of the communities of Devon, Dunkirk, Ethridge, Big Rose Colony, and the City of Cut Bank.



Map NIR.2.B Change Application #2
 Historic Use, City of Shelby Water Rights

Water Tank
 Means of Conveyance (Pipeline)
 Place of Use, 41P 192877 00, 41P 192879

Prepared By: R Swngen
 File Name: NIR2B_CityofShelby_historic_2
 Production Date: 3/19/2015
 Original Scale: 1:62,500

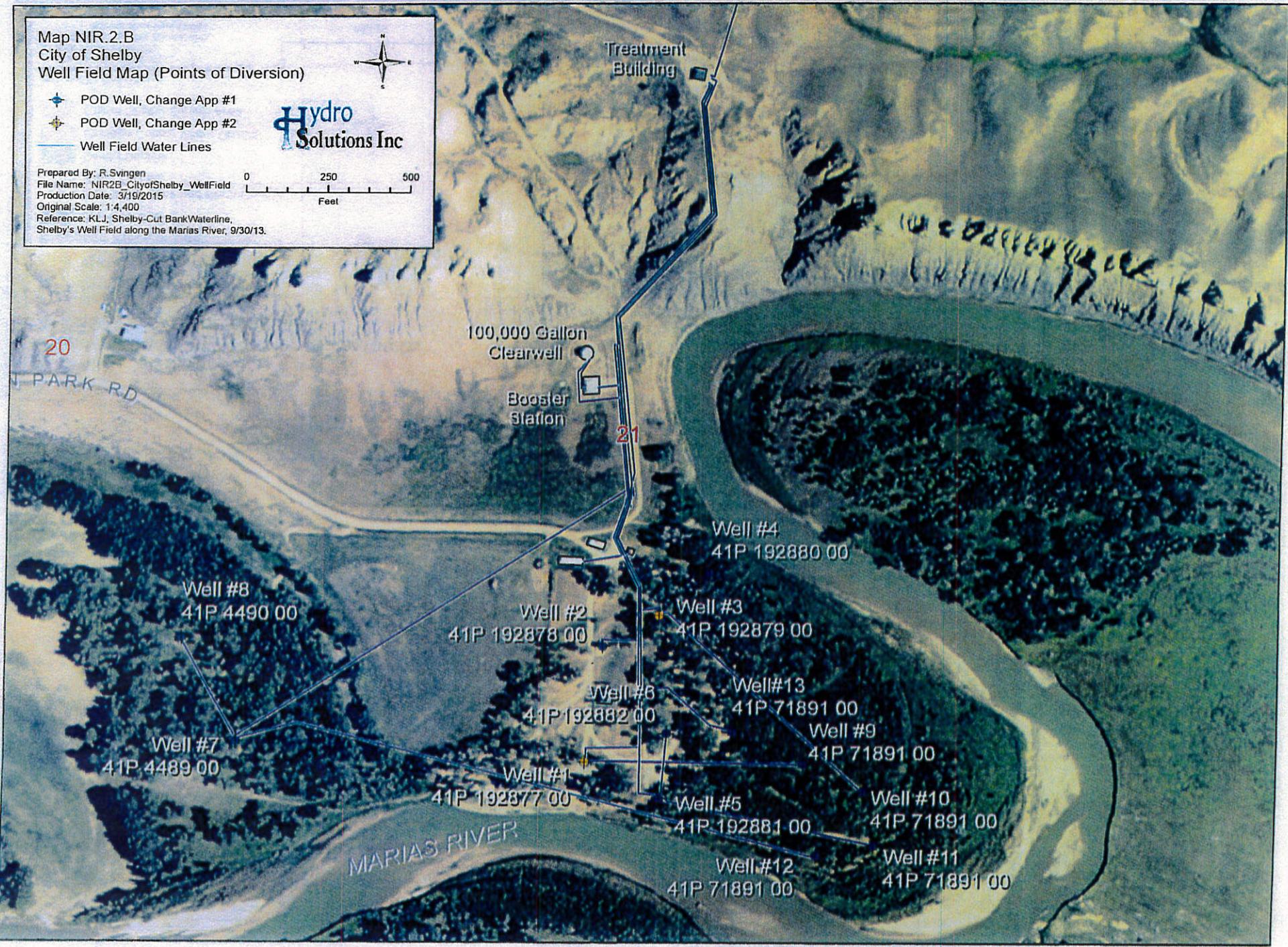
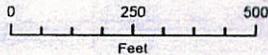
Map NIR.2.B
City of Shelby
Well Field Map (Points of Diversion)

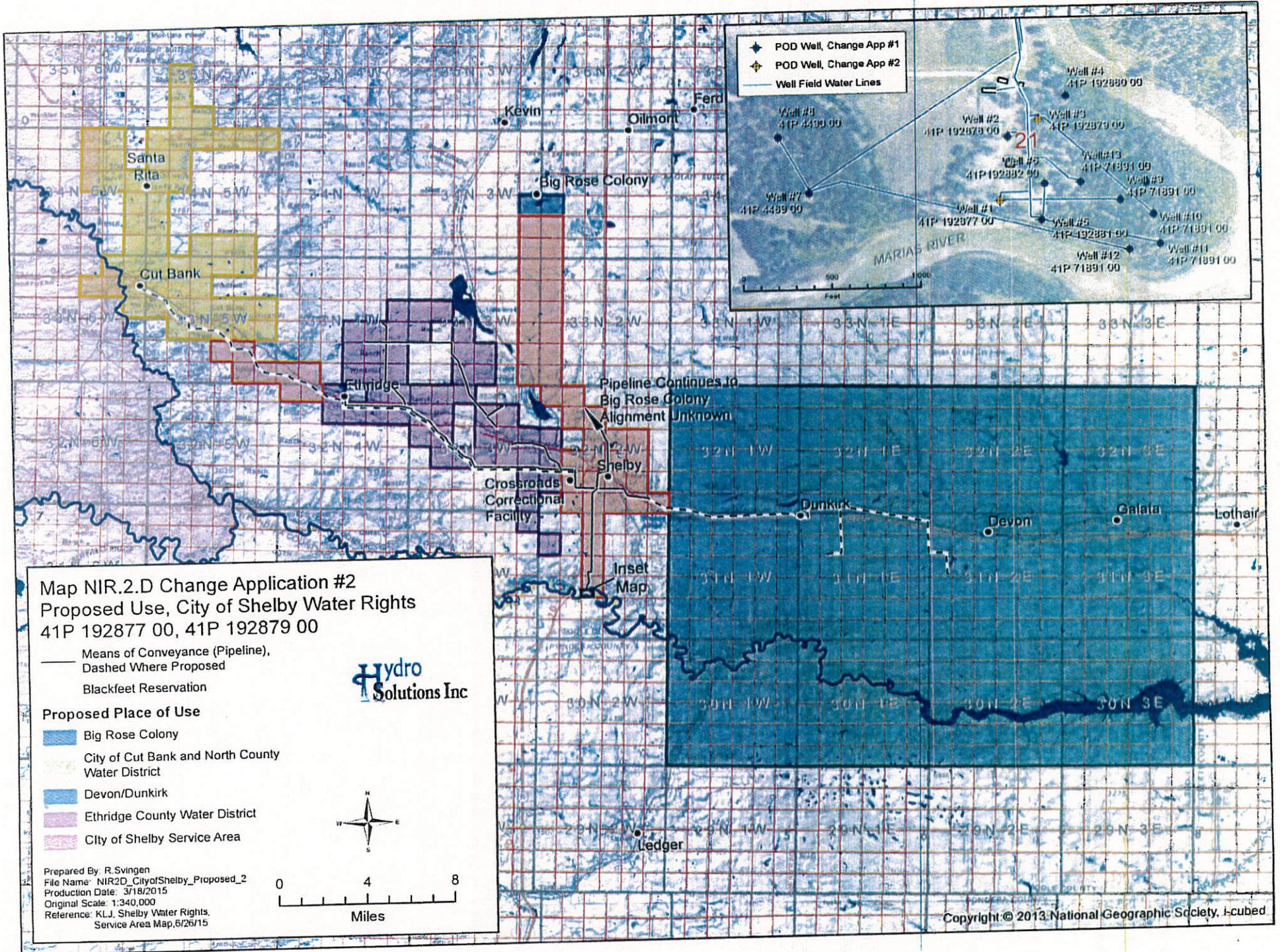


- POD Well, Change App #1
- POD Well, Change App #2
- Well Field Water Lines



Prepared By: R.Svingen
File Name: NIR2B_CityofShelby_WellField
Production Date: 3/19/2015
Original Scale: 1:4,400
Reference: KLJ, Shelby-Cut Bank Waterline,
Shelby's Well Field along the Marias River, 9/30/13.



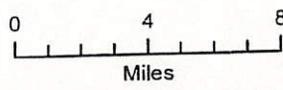


**Map NIR.2.D Change Application #2
Proposed Use, City of Shelby Water Rights
41P 192877 00, 41P 192879 00**

— Means of Conveyance (Pipeline),
Dashed Where Proposed
Blackfeet Reservation

Proposed Place of Use

- Big Rose Colony
- City of Cut Bank and North County Water District
- Devon/Dunkirk
- Ethridge County Water District
- City of Shelby Service Area



Prepared By: R. Svigen
File Name: NIR2D_CityofShelby_Proposed_2
Production Date: 3/18/2015
Original Scale: 1:340,000
Reference: KLJ, Shelby Water Rights, Service Area Map, 6/25/15

- POD Well, Change App #1
- POD Well, Change App #2
- Well Field Water Lines



Pipeline Continues to
Big Rose Colony
Alignment Unknown

NIR.3.A Historic Use

Attach a description of how the system operated from the point of diversion through the place of use. Include a description of wastewater collection and treatment if used, if any.

General Historic Water Use

Historic water use of Shelby's water system can be found in three primary sources:

1. The 1961 Preliminary Engineers Report on Water Supply and Distribution System for Shelby, Toole County, Montana by Stanley J. Thill, Conrad, Montana (1961 PER)
2. Application for Reservation of Water for the City of Shelby by Aquoneering, Roger Perkins, Laurel Montana, August 1988 (1988 Reservation Application)
3. Preliminary Engineering Report Water System Improvements prepared for City of Shelby, Montana by Kadrmaz, Lee & Jackson Engineers and Surveyors Planners (KLJ), 2010 (2010 PER), and correspondence with KLJ, the City's engineer

All of the City of Shelby's water supply is obtained from a well field located approximately 6 miles south of the City and one mile east of the interstate highway along the north side of the Marias River. The entire well field currently consists of 13 wells drilled to a total depth ranging from 31 feet to 50 feet bgs. Wells are completed in alluvial deposits of the old river bed. The depth of the aquifer varies in each well as shown in the perforated intervals in Table NIR.3.A. All water pumped from the individual wells is comingled and pumped in a transmission line to the south side of Shelby where it enters the City's distribution system. Water is distributed throughout the City to meet municipal demands.

As reported in the 1988 Reservation Application, given their reliable source and good quality, the City has a long history of supplying local communities outside of their designated place of use with water. The 1988 Reservation Application describes water service connections to additional people on the fringe of the City and also available for users to haul water from a City standpipe. This use has more or less occurred throughout the service life of Shelby's water system. Historically water use outside of the designated place of use was primarily trucked and more recently has included pipelines to outlying areas. The prison, Ethridge, and Big Rose Colony are three areas outside of the place of use designated in the City's water rights currently supplied with water from Shelby's municipal well field via pipelines. Record drawings indicate that a pipeline was installed, or possibly reconstructed to Ethridge in 2003, but prior to that water was trucked from Shelby for many years (personal communication, Jason Crawford, KLJ, March 12, 2015). Similarly water was initially trucked to Big Rose Colony, and is now delivered via a pipeline. Specific information regarding the dimensions and alignment of pipeline to Big Rose Colony could not be located with the City. All pipelines out of the city are metered. Information on water piped outside of the City's designated place of use is summarized below.

Service Area	Date Water First Piped from Shelby	Water Distribution Method
Prison	1999	12-inch diameter pipeline
Ethridge	2003	12-inch diameter pipeline
Big Rose Colony	2004	Pipeline

Well completion information for the City's well field is presented below in Table NIR.3.A.

Table NIR.3.A Well Completion Information, City of Shelby Municipal Water Supply Wells

Well Name	Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7	Well 8	Well 9	Well 10	Well 11	Well 12	Well 13
MBMG GWIC Number	87581	87577	87576	87478	87579	87580	87572	87573	87574	87575	251163	251162	225363
Basin	41P	41P	41P	41P	41P	41P	41P	41P	41P	41P	41P	41P	41P
Water Right Number	19287700	19287800	19287900	19288000	19288100	19288200	448900	449000	7189100	7189100	7189100	7189100	7189100
Date of Completion	06 June 1940	01 Jan 1946	07 July 1939	12 Oct 1946	01 Jan 1962	04 Aug 1962	14 Jan 1975	12 Mar 1975	13 Mar 1985	13 Mar 1985	31 May 1993	31 May 1993	30 Sept 2005
Date Placed in Service	1940	1946	1939	1946	NA	NA	NA	NA	Jul 1985	Jul 1985	NA	NA	2006
Total Depth (ft bgs)	49	48	48	50	44	41	31	39	40	41	38	38	42
Perforated Interval (ft bgs)	26-36	13-15 19-32	24-34	15-30	34-44	31-41	28-38	20-30	24-40	29-41	24-36	24-36	27-37
Static Water Level (ft bgs)	18	15	15.6	20	20	20	7	7	10	9	8	8	9.8
Pumping Water Level (ft bgs)	36	30	NA	29	34	30	NA	NA	18	15	23	23	37
Draw Down (ft)	18	15	NA	9	14	10	NA	NA	8	6	15	15	12.4
Yield (gpm)	300	300	300	300	350	250	250	250	235	320	440	440	320

Notes:

NA Data or information not available

The information contained in this table was provide by the City of Shelby or obtained from a query of MBMG GWIC database.

Yields shown are permitted values and do not necessarily represent pumping capacity.

Historically each of the wells has come in and out of service for various reasons. Overall, the wells are used in combination with the others to meet municipal demands that vary with the season. Historically well pumps were designed to pump from the well directly to the terminal storage tank located on the south end of the City. In 2010 a clear well and treatment system was constructed. The clear well provided intermediate storage near the well field and allowed well pumps to be sized more efficiently. Booster pumps at the clear well (Clear well booster station) pump water through the treatment system and deliver water to storage tanks in the City.

The discharge pipes of some of the wells are plumbed into the casings of other wells in the subsurface. Other wells pump directly to the 100,000 gallon clear well. All wells are able to operate independently. The following is a summary of the well operation and supplementary plumbing:

- Well 1 pumps into the 100,000 gallon clear well, Well 9 pumps into Well 1
- Well 2 pumps into the 100,000 gallon clear well
- Well 3 pumps into the 100,000 gallon clear well, Well 10 pumps into Well 3
- Well 4 is currently offline, piping is being redone
- Well 5 pumps into the 100,000 gallon clear well, Well 6 and Well 11 pump into Well 5
- Well 6 pumps into Well 5, but has been offline since 2009
- Well 7 pumps into the 100,000 gallon clear well, Well 12 pumps into Well 7
- Well 8 pumps into the 100,000 gallon clear well
- Well 9 pumps into the casing of Well 1
- Well 10 pumps into the casing of Well 3
- Well 11 pumps into the casing of Well 5
- Well 12 pumps into the casing of Well 7
- Well 13 pumps into the 100,000 gallon clear well

Discussion of all of the City's municipal wells and water rights are included in this section since the well field is operated as a whole and all are part of the overall historic use.

Wells 1 to 4

Wells 1 to 4 were completed between 1939 and 1946. Although Wells 1 and 3 (water rights 41P 192877 00 and 41P 192879 00) have partial year periods of use (May through October), a review of historical records do not indicate their use was limited to those times. The historic use of Wells 1 to 4 is described in the 1961 PER.

The 1961 PER states that separate six and eight inch cast or steel lines transmitted water from the wells into a common twelve inch steel line running from the well field area to the top of the breaks approximately 1,500 feet. From the top of the breaks the transmission line transitions into a twelve inch wooden line. The report states that the wooden line was a source of considerable trouble due to collar and pipe leaks. The wooden line was held together by steel bands that were badly corroded. The wooden line transmitted water to one of two terminal storage tanks. According to the 1961 PER, no water treatment occurred at that time. Terminal storage tanks included a one million gallon concrete tank located at the southwest edge of town, and a one hundred thousand gallon elevated steel tank located north of the city. The 1961 PER reported that the tank had undergone several recent repairs; however, there were indications

that leaks were still occurring. The one hundred thousand gallon storage tank was placed on the north side of town in 1957. The 1961 PER reports the storage tank is in fair condition.

The 1961 PER describes the City's distribution system. In 1961 the system included 76,000 feet of line in various sizes:

- 2.1% of the lines were less than 4-inches in diameter
- 36.3% of the lines were 4-inch in diameter
- 52.3% were 6-inch diameter
- 9% were made up of 8 and 10-inch diameter lines

The main distribution system consists of cast iron and asbestos cement pipe, however, the 1961 PER notes that at the time some wooden pipe was still in use.

Water use in Wells 1 to 4, based on 1961 PER, is described as follows:

- Wells 1 to 4 can deliver maximum flow rate of 1,195 gallons per minute (gpm) without drawing air; over a 24 hour period could deliver 1,720,800 gallons
- Wells 1 to 4 are capable of each delivering approximately 300 gpm without entraining air.
- Specific yield test completed on Well 4 found results of 85 gpm per foot of drawdown to 47.6 gpm per foot of drawdown at corresponding pumping rates of 200 gpm and 500 gpm respectively.

Wells 5 and 6

Wells 5 and 6 were completed in 1962 after the 1961 PER. Since the same general infrastructure was in place when Wells 5 and 6 were completed, these wells have the same historic use pattern as Wells 1 to 4 described above.

Wells 7 to 13

Wells 7 and 8 were completed in 1975. Wells 9 and 10 were completed in 1985. Wells 11 and 12 were completed in 1993, and Well 13 was completed in 2005. Historic water use of these wells follow a similar pattern of use as described above.

Besides adding new wells, the system infrastructure was upgraded over the years to include a new transmission line, additional storage, water treatment, booster pumps, and other improvements.

The 1988 Reservation Application and the 2010 PER report that a 16-inch asbestos-cement pipeline is now used to convey water from the well field to the City. This line was constructed in 1962. In 1988 the City had 2.6 million gallons of storage to control pumping and to meet peak hourly demands. A large format map, Figure 2, included in the 1988 Reservation Application shows Shelby water system details including wells, transmission line, storage tanks, and sewage lagoons. The 1988 Reservation Application reports that the City used seven of the well as primary pumping wells while three of the wells were used to supplement the others during low flows. The Application does not state which of those well are primary and which are supplemental.

The 2010 PER describes the current system, which is applicable to the entire well field and includes historic use for water right 41P 58129 00. Well 13 is the latest well completed for the

City's water system. It was completed in 2005 and placed into service in 2006. In 2005, a new water treatment facility was constructed and houses the chlorination unit and ultraviolet (UV) disinfection equipment. Currently comingled well water is pumped to the 100,000 gallon clear well. Booster pumps at the clear well pump water through the treatment system where it is disinfected and then pumped in the transmission line to the City.

Transmission lines within the well field were replaced in 2006. Portions of the historic 1940s water distribution system still exist within the City, but numerous improvements have been made. A booster station, 500,000 gallon elevated steel tank and several thousand feet of distribution mains were constructed in 2001. Several more thousand feet of distribution mains were constructed in 2004 and 2008.

The following information from the Shelby Water System Model (KLJ 2014) describing the current water supply system for the service area is included. The City is divided into three different pressure zones: high, middle and low. The high and middle pressure zones are controlled by the prison tank. The low pressure zone is controlled by the south tank, the airport tank, and the shop tank. The high pressure zone is made up of Ethridge and the Prison, both of which are metered and the middle pressure zone is made up of Shelby Heights. The low pressure zone includes the remainder of the town (south tank, airport tank, and shop tank).

South Tank, Shop Tank, and Airport Tank (Low Pressure Zone)

The 1,000,000 gallon south tank is 67 feet in diameter and holds 26,372 gallons per foot. The south tank has the ability to operate at an elevation between 3,452.03 feet and 3,478.96 feet. The 100,000 gallon airport tank is 28 feet in diameter and holds up to 4,606 gallons per foot. The airport tank has the ability to operate at an elevation between 3,450.41 feet and 3,478.96 feet. The 1,500,000 gallon shop tank is 80.5 feet in diameter and holds up to 38,070 gallons per foot. The shop tank has the ability to operate at an elevation between 3,439.96 feet and 3,478.96 feet. The total storage for the Low Pressure Zone is 2,600,000 gallons.

The clear well booster station (CWBS) is located just north of the well field and is used to deliver water from the well field through the treatment system to the City. The CWBS is made up of four separate pumps. The pumps can operate in multiple configurations (individually or in tandem) to maximize efficiency in delivering water to the City.

Prison Tank Booster Station

The prison tank booster station (PTBS) is situated adjacent to the south tank at an elevation of 3,456.79 feet. The PTBS draws water from the south tank and pumps water into the 500,000 gallon prison tank through approximately 2 miles of 12-inch PVC pipe. The PTBS is made up of 3 constant speed pumps.

Prison Tank (High and Middle Pressure Zones)

The 500,000 gallon prison tank is 49.5 feet in diameter and holds up to 14,395 gallons per foot. The prison tank has the ability to operate at elevations between 3,637.53 feet and 3,663.38 feet. The 3 pumps can operate in multiple configurations (individually or in tandem) to maximize efficiency in delivering water to the prison.

Wastewater Collection, Treatment, and Disposal

Wastewater is collected via a municipal wastewater collection system and conveyed to the City's wastewater treatment facility. The 1988 Reservation Application describes a facultative sewage lagoon system located along Medicine Rock Coulee southeast of the City, which is tributary to the Marias River. The 1988 Reservation Application reports an average effluent flow of 0.33 million gallons per day, but records showed very little to no flow from the lagoon during summer months of July and August. The Application states that most flow is depleted by evaporation in the lagoons or by evapo-transpiration by vegetation in Medicine Rock Coulee and that discharges generally do not reach the Marias River.

Water Reservation 41P 71891 00

The City also has a water reservation for municipal use that has not been put to use at this time. A separate change application (change application 1) is submitted to change its point of diversion and place of use. There is no historic use associated with the water reservation.

NIR.3.B Historic Use

Attach a description of the uses (i.e. domestic, stock, irrigation of parks, industrial, commercial, etc.) and provided a narrative detailing the approximate amount of water associated with those uses.

Historic water use for the subject water rights has been for municipal use. Historic municipal use has included domestic use in houses, lawn and garden irrigation, park irrigation, firefighting, commercial and industrial use, and marketing through the sale of water at City standpipes. While water use for each specific use is not metered the amount can be approximated from water use in other communities through comparable analysis. In water right change application for the City of Conrad (41M 30069920), DNRC found 60% of diverted volume is used for domestic and commercial purposes and 40% is used for lawn and garden irrigation. This method of analysis is used to estimate the amount of water associated with those uses.

Wells 1 to 6: Historically water diversions were measured but do not appear to be recorded until the early 1980s. The 1961 PER indicates that the terminal storage tank, which was a 1 million gallon concrete tank at the south side of Shelby, had a propeller water meter, but it was not accurately measuring and recording flow. The PER indicated that the meter was likely worn and underestimating the amount of flow. Flow records are not available in the 1961 PER. Since historic water use records do not exist, estimates of historic use are based on census data and water use of 250 gallons per capita day (gpcd), which is consistent with previous historic use analysis conducted by DNRC for municipal use.

According to census data, Shelby's peak population occurred in 1960 at 4,017. At 250 gpcd, maximum the historic diversions totaled 1,004,250 gallons per day, 366,551,250 gallons per year, and 1,124.90 acre-feet per year. Based on the assumptions described above 674.94 acre-feet were used for domestic and commercial purposes and 449.96 acre-feet were used for lawn and garden irrigation. As shown in Table NIR.3.B-1 these totals are achievable with Wells 1 to 6, but also alone with Wells 1 to 4.

Assuming that a similar population of 4,017 existed in 1962-63 when Wells 5 and 6 were completed, the proportional historic use for Wells 1 to 6 can be calculated. The proportion each

well (i.e. water right) contributed to the historic diverted volume is assumed to be the proportion of the well's maximum possible diverted volume (well flow rate in gpm x 1440 minutes/day x number of days = gallons per year) to the sum total maximum volume of Wells 1 to 6. The result of this calculation is shown in Table NIR.3.B-1.

Table NIR.3.B-1 Estimate of Maximum Water Diversion, City of Shelby Wells 1 through 6.

Well #	Water Right no. (41P)	Flow Rate (gpm)	Max Vol (ac-ft)	Period of Use	Days	Max Day Use (gpd)	Max Diversion per year (gal)	Max Diversion (ac-ft)	Percent Diversion (%)
1	192877	300	250	May1-Oct31	183	432,000	79,056,000	242.61	10%
2	192878	300	450	Jan1-Dec31	365	432,000	157,680,000	483.90	20%
3	192879	300	250	May1-Oct31	183	432,000	79,056,000	242.61	10%
4	192880	300	450	Jan1-Dec31	365	432,000	157,680,000	483.90	20%
5	192881	350	550	Jan1-Dec31	365	504,000	183,960,000	564.55	23%
6	192882	250	400	Jan1-Dec31	365	360,000	131,400,000	403.25	17%
Totals		1,800	2,350				788,832,000	2,420.84	

Note that all municipal wells (water rights) are analyzed here since they were all used in combination to serve municipal demands. Based on the proportional contribution of each well shown above the historic volume for each well can be found. The historic volume is based on a peak population of 4,017 in 1960 and per capita use of 250 gpcd. Historic diverted volumes for each Well 1 to 6, and their respective water rights, are shown in Table NIR.3.B-2.

Table NIR.3.B-2 Estimate of Historic Volume Diverted, City of Shelby Wells 1 through 6.

Source	Water Right no.	Percent Diversion (%)	Historic Volume Diverted (ac-ft)	Domestic & Commercial (ac-ft)	Lawn & Garden (ac-ft)
WELL 1	41P 192877 00	10%	112.74	67.64	45.09
WELL 2	41P 192878 00	20%	224.86	134.91	89.94
WELL 3	41P 192879 00	10%	112.74	67.64	45.09
WELL 4	41P 192880 00	20%	224.86	134.91	89.94
WELL 5	41P 192881 00	23%	262.33	157.40	104.93
WELL 6	41P 192882 00	17%	187.38	112.43	74.95
Totals			1,124.90	674.94	449.96

Wells 7 to 13: These wells provide supplemental water to meet municipal demands of the City. These wells provide additional pumping capacity at times when river and aquifer tables drop decreasing productivity of Wells 1 to 6. These wells do not add to the historic volume, but do increase the overall pumping rate available to the City. Table NIR.3.B-3 provides an estimate of the proportion that each well/water right is used and an estimate of the historic volume of use. While the maximum historic diverted volume is shown in Table NIR.3.B-3, actual water use varies year to year. At times there are wells that are taken off line for water quality or operational concerns so the estimated volumes in Table NIR.3.B-3 are intended to provide a representation of the entire well field over a broad range of time, based on the maximum historic diverted volume.

Table NIR.3.B-3 Estimate of Historic Volume Diverted, City of Shelby Municipal Water Rights (Wells 1 through 13).

Source	Water Right no.	Percent Diversion (%)	Historic Volume Diverted (ac-ft)	Domestic & Commercial (ac-ft)	Lawn & Garden (ac-ft)
WELL 1	41P 192877 00	10%	112.49	67.49	45.00
WELL 2	41P 192878 00	5%	56.25	33.75	22.50
WELL 3	41P 192879 00	10%	112.49	67.49	45.00
WELL 4	41P 192880 00	12%	134.99	80.99	54.00
WELL 5	41P 192881 00	10%	112.49	67.49	45.00
WELL 6	41P 192882 00	7%	78.74	47.25	31.50
WELL 7	41P 4489 00	4%	45.00	27.00	18.00
WELL 8	41P 4490 00	4%	45.00	27.00	18.00
WELL 9-13	41P 58129 00	38%	427.46	256.48	170.99
Totals			1,124.90	674.94	449.96

Water Reservation

Since the water reservation has not been put to use, there is no historic use that can be analyzed.

NIR.3.C Historic Use

What has been used to convey the water to the place of use?

In general a single transmission line from the well field at Williamson Park to a storage tank on the south side of Shelby conveys water about 5 miles to the place of use.

Historically and as documented in the 1961 PER, six and eight inch cast or steel lines transmitted water from the wells into a common twelve inch steel line running from the well field area to the top of the breaks approximately 1500 feet. Historically, well pumps were designed to pump from the well to directly to the terminal storage tank located on the south end of the City. From the top of the breaks the transmission line transitions into a twelve inch wooden line. The 1961 PER states that the wooden line was a source of considerable trouble due to collar and pipe leaks. The wooden line was held together by steel bands that were badly corroded. The 12-inch wooden transmission line was replaced with a 16-inch asbestos-cement pipeline in 1962 about the same time Wells 5 and 6 were constructed.

Currently, a 16-inch asbestos-cement pipeline is used to convey water to the place of use. Additionally, there have been recent upgrades to the transmission pipelines within the well field at Williamson Park. In 2010 a clear well and treatment system was constructed. The clear well provided intermediate storage near the well field and allowed well pumps to be sized more efficiently. Booster pumps at the clear well pump water through the treatment system and deliver water to storage tanks in the City.

NIR.3.D Historic Use

What is your diversion method type and capacity?

The diversion method for each point of diversion is a submersible pump in each well. A summary of known information regarding the historic and current pump model, type, and capacity for each well is provided in Table NIR.3.D.

Table NIR.3.D City of Shelby Municipal Well Pumps

Water Right	Well No.	Historic		Current	
		Historic Pump Make/Model	Capacity (GPM)	Current Pump Make/Model	Capacity (GPM)
41P 192877 00	1	Fairbanks Morse and Co., 20 stage, 50 hp turbine	320	Gould's 7CLC Submersible/Franklin-Electric NO. 23661290, 10HP	320
41P 192878 00	2	Fairbanks Morse and Co., 20 stage, 50 hp turbine	300	Gould's 7CLC Submersible/Franklin-Electric NO. 23661290, 7.5HP	350
41P 192879 00	3	Fairbanks Morse and Co., 20 stage, 50 hp turbine	370	Gould's 7CLC Submersible/Franklin-Electric NO. 23661290, 10HP	320
41P 192880 00	4	Fairbanks Morse and Co., 20 stage, 50 hp turbine	300	FE STS Submersible/Franklin Electric 6" 460V Sand Fighter, 7.5 HP	350
41P 192881 00	5	Fairbank- Morse Vertical Turbine Pump/13 Stage, 10" LC	500	Gould's 7CLC Submersible/Franklin-Electric NO. 23661460, 20HP	500
41P 192882 00	6	Layne	250	Out of service	Out of service
41P 4489 00	7	Deming Pumps Fig. 4700/19 Stage	250	Gould's 7CLC Submersible/Franklin-Electric NO. 23661390, 15HP	250
41P 4490 00	8	Deming Pumps Fig. 4700/19 Stage	250	Gould's 7CLC Submersible/Franklin-Electric NO. 23661390, 15HP	250
41P 58129 00	9	Aermotor Submersible	260	Aermotor Submersible	260
	10	Aermotor Submersible	260	Aermotor Submersible	260
	11	Aermotor Submersible	260	Aermotor Submersible	260
	12	Aermotor Submersible	260	Aermotor Submersible	260
	13	NA	NA	Gould's 7CLC Submersible/Franklin-Electric NO. 23661190, 15HP	350

Note: Well pump information obtained from City's engineer

Additionally, the City's engineer completed pump and pipeline questionnaires for Wells 1 to 4. These questionnaires are on file with the DNRC Water Adjudication Bureau and address specifics historic of diversion, conveyance, flow rate, history and condition, and other information. The original system used in Well 1 (installed in 1940) was a vertical turbine pump with a vertical motor multi-stage deep well capable of delivering 500 gpm against a total head of 485 feet at 1,760 rpm (Pipeline and pump questionnaire for claim number 41P 192877-00). The original system is not documented for Well 3.

NIR.3.E Historic Use

How did you determine capacity?

Capacity of each well was determined through multiple methods including:

- 1) Directly from the results of a pumping test completed at the time of well completion.
- 2) Pump capacity specifications
- 3) Knowledge of aquifer transmissivity and capacity from previously completed pumping tests

Multiple pumping tests have been accomplished over the years by the City and their engineers to determine sustainable pumping rates. The 1961 PER provides additional documentation of the capacity of Wells 1 to 4, described above. The 1988 Reservation Application and the 2010 PER document overall system use, but do not evaluate individual well capacities since individual wells are not metered.

NIR.3.F Historic Use

How often do you divert water?

Water is diverted from the City's well field on a daily basis to meet municipal demands. Demands vary with the season, peaking in the summer months when residents use water for lawn and garden irrigation.

Wells 1 and 3 (water rights 41P 192877 00 and 41P 192879 00) have partial-year periods of use, 183 days from May 1 through October 31. Review of historical records does not indicate their use was limited to those times, rather that they have historically diverted water throughout the year. Well completion dates for Wells 1 and 3 are about 6 years prior to Wells 2 and 4. This earlier completion date indicates that once the Wells 1 and 3 were placed into service, in 1940 and 1939, respectively, they would have been used year-around without any other supplemental source. The historic use analysis presented above assumes Wells 1 and 3 were used only during their designated period of use (May through October).

Historically Wells 2, 4, and 5 to 13 have diverted water up to year around to meet municipal demands. Wells may be shut down for maintenance or during cold weather to prevent freezing. The 1961 PER recommends installing well field automation indicating that prior to 1961 wells pumps were operated manually by the City. The system is now automated so that at a certain elevation in the water tank pumps will automatically turn on to fill the tank.

Correspondence from the City's engineer indicates that Wells 7 to 12 are currently shut down in winter to prevent freezing. At times Well 5 is also currently shut down in the winter due to decreased municipal demand. Well 5 and Wells 7 to 12 are primarily used in the summer to meet additional demands (typically lawn and garden irrigation).

NIR.3.G Historic Use

What is the duration of each diversion?

The duration of each diversion has not been measured. System automation and storage tanks in the City provide a continuous source of municipal water and prevent cycling of the well pumps. Based on the total historic volume diverted shown in Table NIR.3.B-2, Wells 1 to 6 would have had to operate just over 11 hours per day at their listed flow rate to pump the

required maximum historic volume. Wells 7 to 13 are supplemental and used primarily in the summer to meet increased demands. These wells decrease the overall time that each well must be pumped.

NIR.3.H Historic Use

If wastewater is discharged, what amount of water is discharged?

Wastewater is collected via a municipal wastewater collection system and conveyed to the City's wastewater treatment facility. The 1988 Reservation Application describes a facultative sewage lagoon system located along Medicine Rock Coulee southeast of the City, which is tributary to the Marias River. The 1988 Reservation Application reports an average effluent flow of 0.33 million gallons per day. The Reservation Application goes on to report that very little to no flow was discharged from the lagoon during the summer months of July and August. The Application states that most flow during other months is depleted by evaporation in the lagoons or by evapo-transpiration by vegetation in Medicine Rock Coulee and that discharges generally do not reach the Marias River.

NIR.3.I

Do you measure water near the existing point of diversion or near/at your place of use? If yes, what type of measuring device do you use?

Historically water diversions were measured but do not appear to be recorded until the early 1980s. The 1961 PER indicates that the terminal storage tank, which was a 1 million gallon concrete tank at the south side of Shelby, had a propeller water meter, but it was not accurately measuring and recording flow. The PER indicated that the meter was likely worn and underestimating the amount of flow. Actual flow records do not appear to be available in the PER. The 1988 water reservation application completed by Aquoneering describes a master meter installed in the manifold piping which combines the flows from the entire well field. The water reservation application states that operators have kept reliable and accurate records for several years and tabulates monthly water use for the years 1982 to 1986 from the entire well field.

Currently a master water meter that measures all water diverted from the well field is located near the storage tank on the south side of Shelby. Other water meters maintained by the City measure or will measure water going to the service areas proposed in this application. A map of all current and proposed water meters is provided on the Water Meter Location Map NIR.5.C. The City currently maintains the water meters shown in Table NIR.3.I.

Table NIR.3.I City of Shelby Water Meters

Meter Location/Service Area	Meter Type
Transmission Main Master Meter	Seametrics EX215, Insertion Electromagnetic Meter
Big Rose	4-inch Badger Meter
Ethridge	4-inch Neptune T10
Cut Bank	6-inch Badger Meter
Prison	4-inch Neptune T10
Devon-Dunkirk	4-inch Neptune T10

Individual residential water meters (Neptune T10) are present at service connections in the City. Most of the water main meters and all residential meters are radio-read, allowing the City to simply drive by the meter to pick up the output. Meters are read by the City once per month for total volume. The City also monitors and records peak day water use in the transmission main master meter.

NIR.3.J Historic Use

Do you have water commissioner, water measurement records available, or other documents that support the amount of water you have historically diverted or used?

Water measurement records are not available to document the historic diverted volume. Water use records for the entire well field do exist in the 1988 Reservation Application and the 2010 PER. Records of current water use are maintained by the City. These water use records may not be representative of historic use since many water system improvements have occurred including replacement of a wooden transmission line and leaky storage tanks. The wooden transmission line and terminal storage tank documented in the 1961 PER indicates that water leakage from these sources would have increased the overall per capita historic water use.

NIR.3.K Historic Use

Do you supplement your water usage with water from another water right? If yes, attach an explanation of that water right and how and when it is used to supplement this water right.

Yes. Wells 2, 4, and 5 to 13 are also a part of the City's municipal well field. The historic use of these wells is described above. These wells will be changed under a change application number 1. The City's water reservation provides another legal source of municipal water, but since it has not yet been put to use, there is no historic use that can be analyzed.

NIR.4 Adverse Effect – ARM 36.12.1903

NIR.4.A Adverse Effect

Attach an explanation of how all points of diversion will be operated in order to not exceed historical diverted flow rate?

The City would operate all points of diversion associated with their municipal water rights as they have operated historically. Together the well field would divert no more than the historic volume shown in Table NIR.3.B-3 along with the additional volume provided in the City's water reservation. Consistent with current operations, water would be diverted from each well and pumped into the clear well where it comesles with water from other wells (all from the same groundwater source) and then pumped in a single transmission line through the water treatment system to the south side of Shelby. From there Shelby water would be stored in tanks and distributed throughout the City or distributed in pipelines to the outlying communities within the service area. The following is a summary of the well operation and supplementary plumbing:

- Well 1 pumps into the 100,000 gallon clear well, Well 9 pumps into Well 1
- Well 2 pumps into the 100,000 gallon clear well
- Well 3 pumps into the 100,000 gallon clear well, Well 10 pumps into Well 3
- Well 4 is currently offline, piping is being redone
- Well 5 pumps into the 100,000 gallon clear well, Well 6 and Well 11 pump into Well 5

- Well 6 pumps into Well 5, but has been offline since 2009
- Well 7 pumps into the 100,000 gallon clear well, Well 12 pumps into Well 7
- Well 8 pumps into the 100,000 gallon clear well
- Well 9 pumps into the casing of Well 1
- Well 10 pumps into the casing of Well 3
- Well 11 pumps into the casing of Well 5
- Well 12 pumps into the casing of Well 7
- Well 13 pumps into the 100,000 gallon clear well

Based on existing water use records, water use planning factors, and water use agreements the City has with communities in the proposed service area, the expected flow rate and volume to be diverted by the City's municipal well field is estimated below. Actual water use will vary year to year for each community, and would be metered to ensure the historic volume plus water reservation is not exceeded.

Proposed water use:

City of Shelby

Current Population	3,304	Source: 2015 DEQ Public Water Supply (PWS) records
Use	Municipal (domestic, commercial, industrial, lawn and garden)	
Average Day Demand (gpd)	631,064	
Average Day Demand (gpd)	438	
Use per person (gpcd)	191	Source: 2010 PER (KLJ)
Annual Demand (ac-ft)	706.88	
Peak Day Demand (gpd)	1,672,320	Peaking Factor of 2.65 source: KLJ 2012 water use data
Peak Day Demand (gpm)	1,161	

Prison

Current Population	783	623 inmates and 160 daily staff (City economic impact report, 2009)
Use	Commercial/Industrial/Institutional	
Date First Served by Shelby	1999	
Average Day Demand (gpd)	65,682	Source: KLJ 2012 water use data
Average Day Demand (gpd)	46	
Use per person (gpcd)	84	
Annual Demand (ac-ft)	73.57	
Peak Day Demand (gpd)	173,755	Source: KLJ 2012 water use data
Peak Day Demand (gpm)	121	

Ethridge

Current Population	70	Source: 2015 DEQ PWS records
Use	Domestic/Lawn and Garden	
Date First Served by Shelby	Pipeline constructed in 2003; water was truck from Shelby earlier	
Average Day Demand (gpd)	13,345	Source: KLJ 2012 water use data
Average Day Demand (gpm)	9	

Use per person (gpcd)	191	Average Day Demand / Current population
Annual Demand (ac-ft)	14.95	
Peak Day Demand (gpd)	35,304	Source: KLJ 2012 water use data
Peak Day Demand (gpm)	25	

Big Rose Colony

Current Population	60	Source: Personal communication, KLJ 1/12/2015
Use	Domestic/Lawn and Garden	
Date First Served by Shelby	Pipeline constructed in 2004, water was truck from Shelby earlier	
Average Day Demand (gpd)	3,874	Source: Personal communication, KLJ, 11/11 2014
Average Day Demand (gpm)	3	
Use per person (gpcd)	65	Average Day Demand/Current Population
Annual Demand (ac-ft)	4.34	
Peak Day Demand (gpd)	11,235	Peaking Factor of 2.9 based 2010 PER (KLJ)
Peak Day Demand (gpm)	8	

Devon and Dunkirk

Current Population	75	Based on MT DEQ PWS records, 2015; 25 households (Devon Water Inc.)
Use	Domestic/Lawn and Garden/Agricultural Crop Spraying	
Date First Served by Shelby	Not yet served	
Average Day Demand (gpd)	33,225	Source: average current use 2006-2012 records (personal communication, Roy Benjamin, Devon Water Inc., 2/4/2015)
Average Day Demand (gpm)	57.7	Orifice limiting system at 2.3 gpm/connection (personal communication, Mike O'Brien, TD&H, January 19, 2015)
Use per person (gpcd)	443	
Annual Demand (ac-ft)	37.22	
Peak Day Demand (gpd)	96,353	Based on peaking factor of 2.9; maximum established in agreement with Shelby is 120,000 gpd
Peak Day Demand (gpm)	57.7	

Cut Bank

Current Population	3,105	Source: 2015 DEQ PWS records
Use	Supplemental municipal (domestic, commercial, industrial, lawn and garden)	
Date First Served by Shelby	Not yet served	
Average Day Demand (gpd)	349,650	Calculated from requested peak day demand with peaking factor of 2.86
Average Day Demand (gpm)	243	
Use per person (gpcd)	113	
Annual Demand (ac-ft)	391.66	
Peak Day Demand (gpd)	1,000,000	Maximum requested amount established with Shelby
Peak Day Demand (gpm)	694	

Total Estimated Water Use Summary

	City of Shelby	Prison	Ethridge	Big Rose	Devon/ Dunkirk	Cut Bank	Total
Current Population	3,304	783	70	60	75	3,105 (supplemental)	7,397
Average Day Demand (gpd)	631,064	65,682	13,345	3,874	33,225	349,650	1,096,840
Average Day Demand (gpm)	438	46	9	3	58	243	796
Annual Demand (ac-ft)	706.88	73.57	14.95	4.34	37.22	391.66	1,228.62
Peak Day Demand (gpd)	1,672,320	173,755	35,304	11,235	96,353	1,000,000	2,988,966
Peak Day Demand (gpm)	1,161	121	25	8	58	694	2,066

The total historic diverted volume as presented above in Table NIR.3.B-2 is 1,124.90 acre-feet. This historic use includes all wells in the well field, including Wells 2, 4, and 5 to 13, which are being changed under a separate application. The water reservation adds an additional 161 acre-feet of volume available to the City for a total of 1,285.90 acre-feet. As shown above in the total estimated water use summary the annual demand is expected to be 1,228.62 acre-feet, which is less than the total volume available. The estimated total average day demand flow rate and peak day demand flow rate are both less than the sum of the flow rates of the water rights being changed under both applications. The proposed change will cause no adverse effect since the proposed use would be less than the total historic use plus the City's water reservation.

Historical diverted flow of the existing water rights plus the water reservation will not be exceeded under this proposed change and the change of Wells 2, 4, and 5 to 13 and the water reservation. Flow meters are present on the City of Shelby and other distribution points to each place of use so that diverted flow is monitored. During winter months total diverted flow rate cannot exceed the sum maximum flow rate for water rights 41P 192878 00, 41P 192880 00, 41P 192881 00, 41P 192882 00, 41P 4489 00, 41P 4490 00, 41P 58129 00, and reservation 41P 71891 00 of 3,653.23 gpm. During summer months diverted flow rate can increase another 600 gpm with the addition of Wells 1 and 3. If the Shelby water service area experiences significant population growth or changes to existing water use patterns, or expects estimated water use to exceed historical volumes, new sources of water would need to be appropriated. The City has water service agreements with each of the communities served. These agreements serve as caps to ensure no community will receive more water than what they have purchased.

The legal descriptions of the proposed water service area (place of use) for the change are described below.

Proposed Place of Use:

Shelby		
Township	Range	Section
31N	02W	4, 9, 16, 21
32N	02W	5, 6, 8, 9, 14, 15, 16, 20, 21, 22, 23, 26, 27, 28, 29, 32, 33, 34, 35, 36
32N	04W	5, 6
33N	02W	6, 7, 18, 19, 30, 31
33N	03W	1, 12, 13, 24, 25, 36
33N	04W	31, 32
33N	05W	26, 27, 35, 36
34N	02W	30, 31
34N	03W	25, 36

Ethridge		
Township	Range	Section
31N	02W	7
31N	03W	1
32N	02W	18, 19, 30
32N	03W	4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 17, 18, 20, 21, 22, 23, 24, 25, 36
32N	04W	1, 2, 4, 9, 10, 11, 12
33N	03W	17, 18, 19, 21, 27, 28, 33, 34
33N	04W	13, 22, 23, 24, 25, 26, 27, 34, 35, 36

Big Rose		
Township	Range	Section
34N	02W	19
34N	03W	24

Devon Dunkirk		
Township	Range	Section
30N	01E	1-36
30N	01W	1-36
30N	02E	1-36
30N	03E	1-36
31N	01E	1-36
31N	01W	1-36
31N	02E	1-36
31N	03E	1-36
32N	01E	1-36
32N	01W	1-36
32N	02E	1-36
32N	03E	1-36

Cut Bank		
Township	Range	Section
33N	05W	2, 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24
33N	06W	1, 2, 10, 11, 12, 13
34N	05W	1, 2, 3, 4, 5, 6, 7, 8, 17, 18, 19, 30, 31, 33, 34, 35
34N	06W	2, 3, 10, 11, 13, 14, 15, 24, 25, 36
35N	05W	20, 29, 32, 33

NIR.4.B Adverse Effect

Attach an explanation of what your plan is to not create an adverse effect to existing water rights, certificates, permits, and water reservations?

The City would operate all points of diversion associated with their municipal water rights as they have operated historically. Together the well field would divert no more than the historic volume shown in Table NIR.3.B-3 along with the additional volume provided in the City's water reservation. The seasonal and daily timing of diversions from the source aquifer would remain the same as historic diversion. Since the proposed use is less than the historical diverted flow of the existing water rights plus the water reservation no adverse effect will be experienced by other water users. There is no adverse effect to existing water users from continuing to use this municipal water right. The amount of water that is diverted by the City of Shelby will be measured and recorded as part of the agreement the City has with each community. The City of Shelby and all proposed service areas will have flow meters installed on the primary distribution lines so that the volume of water provided to all service areas will be accurately monitored and recorded.

NIR.4.C Adverse Effect

Attach an explanation of when the last time water was appropriated and used beneficially to the extent identified in your water right? If there has been a period of non-use, explain why the water right was not used, and explain why a resumption of use will not adversely affect other water users.

Water from the City's well field has continually been put to beneficial use by the City of Shelby since the first wells were put into service around 1940. Each well in the well field diverts a portion of the City's daily and annual municipal water demand. There has been no period of non-use. As documented in the 1988 Reservation Application the City has a history of also supplying water outside of their designated place of use. Some operational problems have resulted in temporary suspensions of two wells in the City's well field. Well Number 6 has been out of service since 2009 due to vandalism. The pump was turned on and ran continual when water level was lower than the pump intake and the motor burned out. Well Number 4 has been out of service since 2003. Undercutting of the river bank of the Marias River decreased the distance from the well to surface water and resulted in failure of the Microscopic Particulate Analysis (MPA) test. Since then, increased deposition along that bank has increased the distance from the well to the surface water. MPA testing will be conducted to evaluate if the well can be brought back on-line.

NIR.5 Adequate Diversion Means and Operation – ARM 36.12.1904

NIR.5.A Adequate Diversion Means and Operation

Is the means of diversion a well? If yes, provide a copy of the well log. If the well log is not available, who drilled the well?

All points of diversion are wells. A copy of each well log is attached.

NIR.5.B Adequate Diversion Means and Operation

Is another agency requiring you to measure your water use?

Montana Department of Environmental Quality may require public water supply usage to be measured.

NIR.5.C Adequate Diversion Means and Operation

Do you have any plans to measure your diversion and use? If yes, attach a description of the plan and the type of measurements you will take.

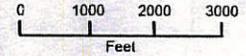
Water will be measured at multiple points throughout the City's transmission and pipeline systems. Water meter locations are shown on Map NIR.5.C. Water use to each community served in the proposed service area will be metered. A master water meter that meters all diverted flow is located on the south end of Shelby. The City of Shelby keeps accurate records of the quantity of water diverted and supplied to other service areas. The City records daily water use, peak flow rates, and totalized monthly and annual volumes for the total diverted flow. The total monthly volume is metered and recorded to each community in the proposed service area and for residential use in the City. Service area water is tracked for water use agreement purchases. A portion of the water reservation point of diversion will be assigned to each well located in the well field. No new measurement plans will be necessary for the water reservation.

Currently a master water meter that measures all water diverted from the well field is located near the storage tank on the south side of Shelby. Other water meters maintained by the City measure or will measure water going to the service areas proposed in this application. A map of all current and proposed water meters is provided on the Water Meter Location Map NIR.5.C. The City currently maintains the water meters described in Table NIR.3.I.



Map NIR.5.C
City of Shelby
Water Distribution and
Meter Location Map

Hydro
Solutions Inc



Prepared By: R.Svingen
File Name: COS_WaterMeterLocations
Production Date: 2/17//2015
Reference: KLJ, Shelby Water Rights, Water Meter Locations, 1/29/15.

NIR.5.D Adequate Diversion Means and Operation

For applications that propose new conveyance facilities, provide preliminary design plans and specifications for the proposed diversion and conveyance facilities and the equipment used to put the water to beneficial use.

No new diversion facilities are needed to complete the proposed change for the water rights, and no new wells will be drilled to initiate use of the water reservation. The City's engineer conducted a well field pumping test to evaluate the current total yield of the well field. The pumping test was conducted on Wells 1, 2, 3, 5, 7, 8, 9, 10, 11, 12, and 13 on October 2-3, 2013. As described in NIR.4.C, Wells 4 and 6 are currently not operational. The well field pumping test found a total maximum pumping rate of 2,079 gpm and 2,993,760 gpd. These totals are greater than the total peak day demand estimated in NIR.4.A; therefore, the existing diversion facilities are adequate for the proposed change applications (all wells and reservation). The well field pumping test report is attached to this application package.

The City's engineer also completed a water system model to assess the capability of the City's water system to handle the additional demands. This report is attached to this application. The report includes description of well pump modeling, clear well and booster stations, water storage tanks, and the modeled demands. From the report:

"Water is pumped into the clear well from all points of diversion according to their individual pumping schedules. From the clear well, four booster pumps pump the water through the water treatment system where it is disinfected. From the treatment plant, water is pumped to the south side of Shelby and the volume is recorded at the location of the master water meter. From here water is pumped, aided by several booster pumps, to the south tank, airport tank, shop tank, and prison tank. Check valves are located along the lines at selected locations to prevent backflow. Water meters are located at selected locations, as shown on Map Figure NIR.5.C to record the amount of water distributed the Prison, Ethridge, Big Rose Colony, Cut Bank, and Devon".

Conveyance facilities are built or are being designed for each of the proposed water service areas. Existing conveyance facilities are already in place to the prison, Ethridge, and Big Rose Colony. Conveyance facilities to Cut Bank and Devon and Dunkirk are in the design process.

Prison

There are three booster pumps that deliver water from the City's water tank on the south side of Shelby to the prison via a 12-inch PVC line. A 500,000 gallon water tank stores water at the prison. A water meter exists at the prison near the water tank. A 12-inch PVC line extends north from the prison to serve Ethridge and Cut Bank. Record drawings exist for the infrastructure improvements that were completed in 1999. The alignment of this pipeline is shown on a plan view record drawing sheet attached to this application.

Ethridge

The Ethridge service area is served from a 4-inch main line that is connected to the 12-inch waterline extending north from the prison. Water distribution lines within the Ethridge service area also include 1, 2, and 3-inch lines. A water meter exists where the system connects to the City's pipeline north of the prison. Record drawings exist for the infrastructure improvements that were completed in 2003. The alignment of this pipeline is shown on a plan view record drawing sheet attached to this application.

Big Rose Colony

An existing water pipeline extends north of Shelby to Big Rose Colony. The pipeline was constructed in 2004 and water use is metered by the City. A water meter exists where the system connects to the City's pipeline on the north side of the City. The City and the City's engineer could not locate record drawings or other information for this pipeline.

Cut Bank

Design drawings for the NCMRWA pipeline from Shelby to Cut Bank have recently been completed. The pipeline will be a 16-inch pipeline extending from Shelby to Cut Bank as shown on Map NIR.2.D. The pipeline would connect into the City's existing 12-inch waterline north of the prison, where water would be metered. The proposed pipeline would parallel the existing Ethridge pipeline and then continue northwest to Cut Bank where it would connect into Cut Bank's existing water distribution system. The alignment of this pipeline is shown on a plan view design drawing attached to this application.

Devon-Dunkirk

Design drawings for the pipeline from Shelby to the Devon-Dunkirk service area have recently been completed. The proposed pipeline alignment is shown on Map NIR.2.D. The pipeline would be a 4-inch waterline serving a total of 25 connections. The system is designed to be orifice limited to provide a maximum of 2.3 gpm per service connection (personal communication, Mike O'Brien, TD&H, January, 19, 2015). The constant flow rate would be fed into an existing distribution system of cisterns at each service connection. Existing cisterns vary in size from 500 gallons to 10,000 gallons, with the average cistern having a capacity of 3,000 gallons. Water use would include a community water depot where water could be trucked throughout the proposed service area. In addition to domestic and lawn and garden water use, water would be used to satisfy agricultural spraying demands. Agricultural spraying requires potable water to be mixed with chemicals at rates of 5 to 10 gallons of water per acre. Each farmer within the proposed service area treats on average 6,000 acres of dry-land crops multiple times per year through aerial application (personal communication, Roy Benjamin, Devon Water Inc., February 3, 2015). Water use would be metered by the City where the proposed Devon pipeline would connect to the City's distribution system. The alignment of the proposed pipeline is shown on a plan view design drawing attached to this application.

**TEMPORARY CHANGE ADDENDUM
FORM 606-TCA**

**APPLICATION FOR CHANGE OF A WATER RIGHT
TEMPORARY CHANGE ADDENDUM**
§ 85-2-407; § 85-2-408; § 85-2-436, MCA
ARM 36.12.1901

This addendum must be completed and the required information attached to a change application when a temporary change is requested under the statutes shown above. A temporary change can be made to a point of diversion, place of use, purpose of use, or place of storage of a water right. Complete an addendum for each water right that is proposed to be temporarily changed

On a separate attachment provide the following information. Attachments must be labeled as shown in the sections below. (i.e. TCA.1.a) If a section is not applicable, label the section as Not Applicable or NA. Improperly labeled attachments will not be considered. Conclusions, calculations, references, data, and assumptions used must be included in the application materials.

Water Right No. 41P 192877 00 and 41P 192879 00

Complete this form for each water right being changed

Section 1. Temporary Change Details

TCA.1.a Who is the owner of the water right?
City of Shelby

TCA.1.b Yes No Is the owner of record changing the water right for another's use? If no explain whose use is it being changed for?
The water right use will remain as municipal beneficial use. The water right will be changed to change the places of use (service area) and points of diversion

TCA.1.c How many years will the water right will be temporarily changed? 10 years

TCA.1.d Yes No Will the temporary change will be intermittent over the years? If yes, explain how it will be used

TCA.1.e For what purpose will the water right be temporarily used?
Municipal water supply until the North Central Montana Regional Water System is operational

TCA.1.f Yes No Is the quantity of water subject to the temporary change being made available from the development of a new water conservation or storage project? If yes explain the water conservation or storage project

WELL LOGS

31 N QW 2100

1002

101
not coded

MONTANA STATE BOARD OF HEALTH
Water and Sewage Division
WELL DRILLER'S REPORT

Top of Ground
(Elev. above sea level)

0
to
1 ft.- Soil
to
7 ft. 6 in.-Sand
to
15 ft.-Gravel & Sand
to
18 ft.- Dark Clay
to
36 ft.-Gravel & Sand
to
48 ft. 6 in.-Dark Clay

coded

Registration No. 16

Driller M.M. Ulrich

Address Missoula, Montana

Owner of Well City of Shelby

Exact Location of Well On river bottom about 200 feet from the other well

Water to Be Used for Domestic

Drilling Begun May 29, 1940

Well Finished June 6, 1940

Indicate on the diagram the character and thickness of the different strata met with in drilling, such as soil, clay, shale, gravel, rock or sand, etc. Show depth at which water is encountered, thickness and character of water-bearing strata and height to which the water rises in the well.

Casing Record

#5
by Voorheese

Size of Pipe	Kind and Weight of Material Used	From (Feet)	to (Feet)	PERFORATIONS		
				Kind Size	From (Feet)	to (Feet)
1 1/2" L.D.	70 lb. oil well casing	4 Ft. above surface	26 Ft. 2 in. below surface	Screen 2 1/2" x 2 1/2" x 1/2"	26 ft.	36 ft.

Describe the type of joints in casing Screw

Describe any screens used 6 ft. of 1 1/2" inch pipe above screen- 12 1/2 ft. of 1 1/2" inch pipe below screen. The screen is a Johnson Copper screen

Capacity of Well 500 to 500 G.P.M.
(In Gallons or Barrels)

How Determined Will be tried out with a pump
(Pump, Baller, Weir, Etc.)

Signed M.M. Ulrich

Date June 10, 1940

(Law and Regulations on Reverse Side)

Show exact depth of bottom.

37581