NEW

Windmill Farms - Water Testing

Craig Dalton <craig@performance-ec.com>

Wed 7/11/2018 6:03 PM

To:Forrest Mandeville <Forrest@forrestmandevilleconsulting.com>;

Cc:Bruce Tonn (danielcatlinksc@gmail.com) <danielcatlinksc@gmail.com>; Bryce Kirschenmann <bryce@keconstruction.com>;

Forrest,

The owners of Windmill Farms conducted a water availability test with AAqua Drilling today within Block 2 of the proposed subdivision. Pumping test yielded a flow rate of 20 gal/min. at a well depth of 26.5 feet. The property has not been irrigated this year and the conditions seen now would be anticipated as normal water conditions for the future. Based on the pump test results, it was of the driller's opinion that water availability would not be an issue in this area.

We would like this information to be conveyed at tomorrow's commissioner meeting if possible to reflect the developer's due diligence into the matter. Furthermore, this information will be provided to the DEQ as part of the sanitary permitting aspect of the project.

Thank you,

Craig Dalton, P.E.
Project Manager/Principal
craig@performance-ec.com
Office: (406) 384-0080
Mobile: (406) 459-8456

PERFORMANCE ENGINEERING
7100 Commercial Ave, Suite 4 • Billings, MT 59101
www.performance-ec.com

This message is for the sole use of the intended recipients and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not an intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message. E-mail attachments may contain viruses which could damage your computer. While we have taken precautions to minimize this risk, we cannot accept liability for such damage and you should carry out your own virus checks before opening an attachment. Thank you for your cooperation.

Windmill Farms Well Test Results - UPDATE

Craig Dalton <craig@performance-ec.com>

Thu 7/12/2018 7:08 AM

Inbox

To:Forrest Mandeville <Forrest@forrestmandevilleconsulting.com>;

Cc:Bruce Tonn (danielcatlinksc@gmail.com) <danielcatlinksc@gmail.com>; Bryce Kirschenmann <bryce@keconstruction.com>;

Forrest,

To add to the email I sent yesterday, the developers of Windmill Farms drilled a total of 3 test well on 7/11/18 on Lots 1, 2, and 4 of Block 2 of the proposed subdivision. The yields from the pumping test were as follows:

Well 1: 60 gpm @ 30 ft
Well 2: 60 gpm @ 30 ft
Well 3: 20 gpm @ 26.5 ft

We would like this information to be conveyed at today's commissioner meeting if possible to reflect the developer's due diligence into the matter. Furthermore, this information will be provided to the DEQ as part of the sanitary permitting aspect of the project.

Thank you,

Craig Dalton, P.E.
Project Manager/Principal
craig@performance-ec.com
Office: (406) 384-0080
Mobile: (406) 459-8456

PERFORMANCE ENGINEERING
7100 Commercial Ave, Suite 4 • Billings, MT 59101
www.performance-ec.com

This message is for the sole use of the intended recipients and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not an intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message. E-mail attachments may contain viruses which could damage your computer. While we have taken precautions to minimize this risk, we cannot accept liability for such damage and you should carry out your own virus checks before opening an attachment. Thank you for your cooperation.

NEW

Edgar Aquifer Additional Information

Craig Dalton <craig@performance-ec.com>

Thu 6/28/2018 12:24 PM

To:Forrest Mandeville <Forrest@forrestmandevilleconsulting.com>;

Cc:Bruce Tonn (danielcatlinksc@gmail.com) <danielcatlinksc@gmail.com>; Bryce Kirschenmann <bryce@keconstruction.com>;

1 attachments (77 KB)

GWIC 263997.pdf;

Forrest,

In light of the comments/concerns received from the neighbors and planning board members in reference to the water availability of the aquifer within the area, we have conducted additional due-diligence to not only address the neighbor's concerns, but to also formalize our proposal moving forward into permitting portion of the project.

We contacted Aaqua Drilling out of Joliet who has completed several of the newer wells in the area including the Town of Edgar. A conversation was held with the Aaqua owner, Paul, who had the following opinions:

- The Clarks Fork Valley is a strong aquifer.
- Generally speaking when people have water issues it more often than not has to do with the condition of their individual wells, not the aquifer in general. Wells require maintenance from time-to-time and older wells are more likely to experience issues.
- They target a gravel layer within the aquifer (seen on the attached well log). Sometimes they hit sand pockets at which point they will adjust the well location slightly and re-drill to the gravel layer. (This is a modern day convenience. Less likely to dig/drill multiple well locations 100-years ago.)

We also had a separate conversation with a local land owner whose feedlot is located just SW of the proposed project. He has several wells on his property and provided some insight on the issues he had seen/heard regarding older wells in the area. His general opinion was similar to Paul's in that the water issues people experience are typically related to the wells themselves. He stated that older wells in the region have had issues in the past with the slits in the lower part of the well's steel casing rusting shut, causing iron in the water and ultimately restricting the wells capability to draw from the aquifer.

Finally, we also pulled a well record of a recent (2011) well drilled in Edgar. The well was drilled to a depth of 35 ft and drew 60 gpm (Elton Well – GWIC 263997).

If possible we would like to include this information in the documents forwarded to the County Commissioners for the July 12 meeting.

We appreciate your ongoing involvement in our project.

Thank you,

Craig Dalton, P.E.
Project Manager/Principal
craig@performance-ec.com
Office: (406) 384-0080
Mobile: (406) 459-8456

PERFORMANCE ENGINEERING

7100 Commercial Ave, Suite 4 • Billings, MT 59101
www.performance-ec.com

This message is for the sole use of the intended recipients and may contain confidential and privileged information. Any unauthorized review, use, disclosure or distribution is prohibited. If you are not an intended recipient, please contact the sender by reply e-mail and destroy all copies of the original message. E-mail attachments may contain viruses which could damage your computer. While we have taken precautions to minimize this risk, we cannot accept liability for such damage and you should carry out your own virus checks before opening an attachment. Thank you for your cooperation.

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (1/12/2012 10:29:21 AM)

Site Name: ELTON, RANDY AND DEBBIE
GWIC Id: 263997

Section 1: Well Owner(s)

1) ELTON, RANDY AND DEBBIE (MAIL)
202 ELWELL
EDGAR MT 59026 [09/07/2011]

Section 2: Location

Township	Range	Section	Quarter Sections
04S	23E	26	NW¼ NE¼ NW¼

County
CARBON

Geocode

Latitude	Longitude	Geomethod	Datum
45.46342803455	-108.856014682	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, September 07, 2011

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	20	8.75
20	35.5	7

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	35.5	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
35.5	35.5	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	0	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 35.5
Static Water Level: 18
Water Temperature:

Air Test *

60 gpm with drill stem set at 35 feet for 1 hours.
Time of recovery 0.08 hours.
Recovery water level 18 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	2	TOPSOIL TAN SOFT
2	5	SANDY LOAM TAN SOFT
5	27	GRAVEL TAN MEDIUM
27	31	SAND TAN SOFT
31	32	CLAY TAN SOFT
32	35.5	GRAVEL TAN MEDIUM

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: PAUL STEINMETZ
Company: AAQUA DRILLING INC
License No: WWC-542
Date Completed: 9/7/2011

NEVINS HARDING
PO BOX 64
EDGAR, MONTANA
406 671 4725
nevinsharding@hotmail.com

Introduction

I am opposed to the Windmill Farms subdivision if they drill into the limited aquifer that feeds the Edgar shallow wells. Further, I am opposed to the establishment of septic leach fields. The objection is based on the town site of Edgar having a catastrophic salmonella, shigellia, and e coli contamination from Septic tanks in the early 1960's. This resulted in the building of the Edgar sewage system completed in 1967.

History

Edgar is a sleepy 1950's style town sitting on the original Bozeman Trail. Here the residents watch out for each other. The most notable excitement was the bank robbery around 70 years ago and the cows belonging to the Antler Ranch loose in town as they drove the cows to the stockyards at Edgar from the Crow Reservation. The town site of Edgar was founded around 1903 when JJ Thornton purchased land from Christain Deeg, the original patent holder. Thornton's house, the house I live in, was finished in 1905. My father came through here in 1919 but did not stay. Thornton then subdivided the original town site into 25 foot wide lots. Water was developed by hand dug shallow wells and rain cisterns. Then starting in the 1940's Bill Sheller, using a cable tool drilled shallow wells throughout the town site. My well was drilled in 1943 and had a hand pump on it initially. During the 1950's people changed to indoor toilets and water piping. This necessitated cesspools and septic tanks with leach fields. In the 1960's the very old and very young developed intestinal illnesses that was traced to bacterial contamination in the wells, caused by the leach fields. The residents formed a sewer district that was completed in 1967. This problem was solved. **However, historically, many of us experience water shortages in our wells during April and May depending on the year.**

IMPACT ON EDGAR WATER AQUIFER BY THE WINDMILL SUBDIVISION
DATA PROVIDED TO THE STATE OF MONTANA

I first did a census of the population of Edgar, number of residences and number of wells.
Results: 92 residents, 62 wells(some idle), and 52 residences.

EDGAR CURRENT WATER USAGE AS OF 07/10/2018	
92 residents using 88gal/day for 365 days	2,955,040 gal/year
Edgar Bar, 150 customers/day at 8 gal/customer for 360 days	432,000 gal/year
Fire Hall, cisterns, per Chief	18,000 gal/year
Fire Hall, Other water, per Chief	10,000 gal/year
TOTAL EDGAR	**3,415,040 gal/year**

COMPARE TO WINDMILL FARMS CLAIMED USAGE, 13 HOME SITES:	
10 acre feet	3,258,510 gal/year
Contiguous homestead, claim increased from 4200 to 814,628	814,628 gal/year
Contiguous stock well increased from 72,000 to 472,484	472,484 gal/year
TOTAL WINDMILL	**4,545,622 gal/year**

ANALYSIS:

Edgar runs out of water at 3,415,040 gal/year in the late spring as evidenced by submitted statements and transponders in two wells monitoring the aquifer as it heads into town. I have been a weather observer for NOAA for 40 years at Edgar. **In 24 out of 40 years, Edgar has run out of water in parts of town. The proposed subdivision totally intercepts the aquifer before it gets to Edgar. The Windmill subdivision will also run out of water, but much earlier, and Edgar will get no water.**

Source Charts for determining water usage:"EPA Water Sense and Statistics", "Water Usage Estimating Charts for Water Treatment Equipment", "DNRC Tables for Water Consumption". Chart by Nevins Harding.

GROUND WATER FLUCTUATIONS AS RECORDED BY THE BUREAU OF MINES AND MONTAN TECH SHOWING LIMITED AQUIFER

Shown is the first graph provided by research hydrologist Shawn Kuzara with the Montana Bureau of Mines. **(EXHIBIT A)** The recording transponder is in a well on the Wetstein farm, just across the road from the Windmill312 proposed development. It shows a 9 foot swing in water depth during a calendar year with minimum water level in April and May of the year shown 2017, the latest data available. Years ago, the Tschida, and later, the Baker families, who were residents in the house, discussed with me the water shortage in the spring from that well.

The second graph is from a well monitored by Montana Tech. (**EXHIBIT B)** This well is on the boundary between the old school property and the Windmill312 proposed subdivision and placed in the groundwater flow 220 feet directly south west of the school water well. It was placed to monitor nitrates that might be coming from the fields. Nearly 1000 readings of water level have been made and the data can be accessed by going to the site at the top of the graph. The graph confirms the annual fluctuations of water depth over the period from 03/15/1991 to the most recent 05/23/2018.

The Edgar water flows from basically the south west to the north east as shown on the accompanying US Geological map. There is a discussion, taken from the map, to explain how elevation causes hydraulic pressure to effect the direction of flow. **(EXHIBITS C,D,E)**

THE DATA FROM THIS WELL CONFIRM THAT SEWAGE CONTAMINATION TO THE EDGAR WELLS IS LIKELY.

CHANGES IN THE GROUND WATER AT AND NEAR TO THE PROPOSED SUBDIVISION (EXHIBIT E)

Two large farm fields to the west and south west of the town site of Edgar have recently installed sprinkler irrigation and no longer flood irrigate those fields. This reduces their contribution to the aquifer which they previously provided.

Windmill312, on December 19, 2017, transferred the water rights from the sellers on the two wells on this 67 acre parcel, called the Gradwohl Place from which this subdivision is created. The refiled the water rights on the Gradwohl water rights were increased from 4.200 gallons(1962 filing) and 72,000 gallons(1947 filing) to

814,628 gallons and 472,484 gallons, respectively, all gallons per year. A total of 1,287,112 gallons per year and an increase of **1,205,912 gallons** per year.

DITCH WATER FOR LAWNS NOT LIKELY TO BE AVAILABLE

The proposed subdivision claims to extract 10 acre feet from the ground water by shallow wells. This is **3,258,510 gallons** for house hold use.
The problem with this claimed usage is that it understates the potential actual usage. The ditches here go on usually around May 15 and off around October 8. So those lot owners will use well water to water their lawns before that and after that. Sometimes the watering season starts in April and ends in November depending on the year. Further the ditch water during the summer is not always available to Windmill312, because they have a 1898 water right which is at the bottom of the totem pole. The use of Cooney dam water is problematic. The subdivision proposal does not define the method of division of the Cooney water throughout the 67 acres. Cooney dam will not transfer less than 50 shares in a block. A water court needs to appoint a creek commissioner to distribute the water. Those involved with Cooney water tell me that it is a pipe dream that this subdivision will get the water.

The subdivision residents will likely use well water because irrigation water is not available or it will be more convenient than tapping a yet unrevealed system of getting the ditch water around the subdivision. This is difficult to estimate, but the DNRC source book indicated that it may take 488,776 gallons of well water per acre if ditch water is not available, or a total 6,354,088 for the 20 acres, worst case scenario. This is another 19.5 acre feet on top of the proposed draw of 10 acre feet. This is catastrophic for us in the town site, because any unusual small draw reflects in our wells.

ALTERNATIVE WATER SOURCE FOR SUB DIVISION

Alternative well sources would be to drill deep wells either 5 miles west of Edgar or 10 miles East according to the "Groundwater Inventory, Carbon County, Montana". A copy of page 34 is attached and the entire document is available on line.(**EXHIBIT F**)
There is no available aquifer, according to the State of Montana before the 3500 foot level. Other wells have been drilled locally to the 80 foot level and found no

water, so the casing were breached at 22 feet to allow ground water to enter the casing.
Cisterns should considered with haul trucks and water available in Fromberg.

PREVIOUS SUBDIVISION REJECTED JUST ASROSS ROAD(EXHIBIT E)

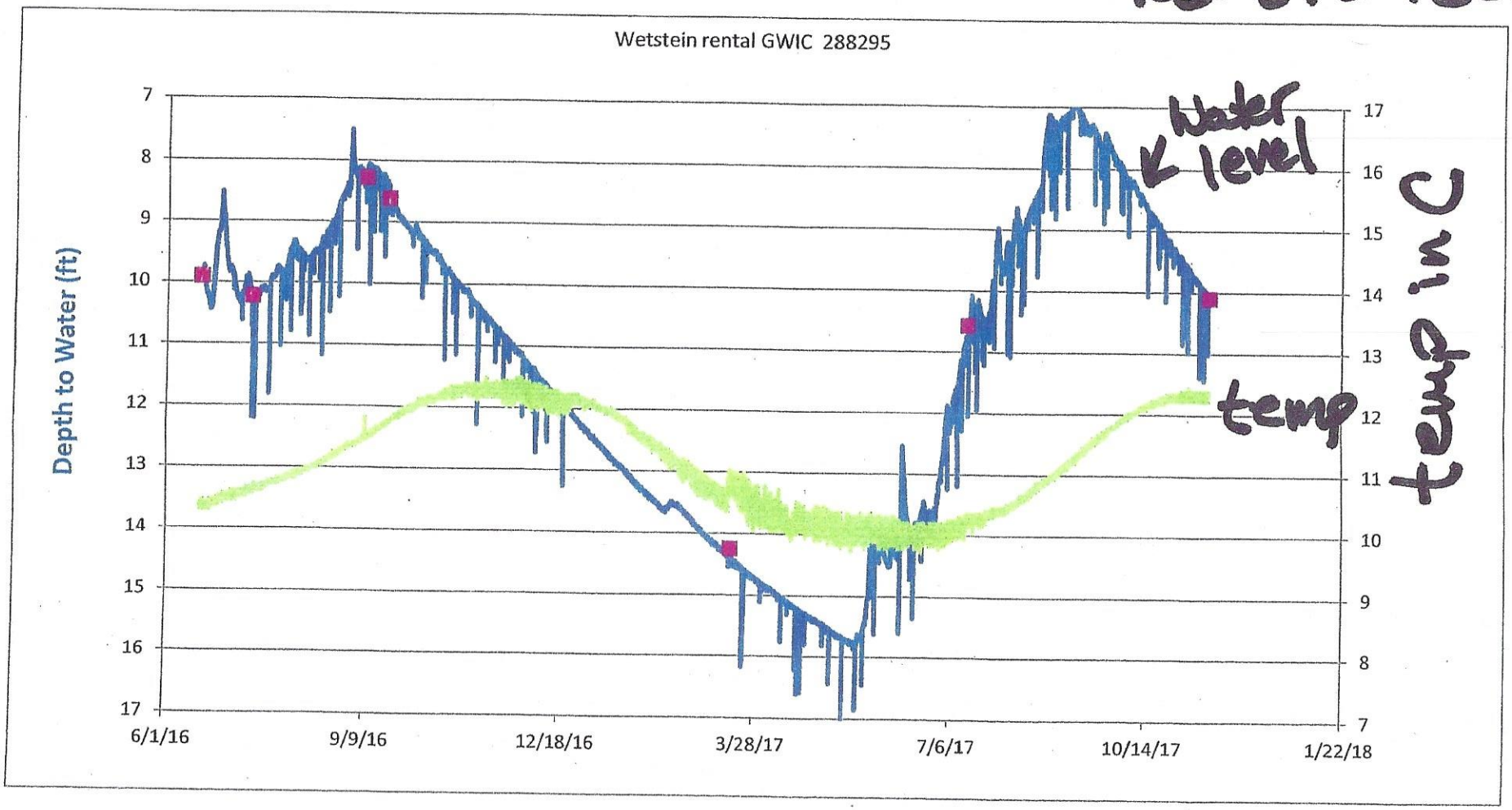
A proposed RV park was disallowed due to concerns about the impact on Edgar's water quantity and quality.

OTHER CONCERNS:

I work with HOA groups daily so do understand that many of the commitments made in this subdivision proposal can be changed by the HOA when the new owners are situated. This is a concern.
Windmill212 changed the proposal to the subdivision before the Carbon planning meeting by reducing the offering from 20 home sites to 13 sites, but with the provision to further subdivide this parcel later. The result of this reduction is that an initial DNRC review was bypassed.

MBMG data

contact: Shawn Kuzara
406-272-1606

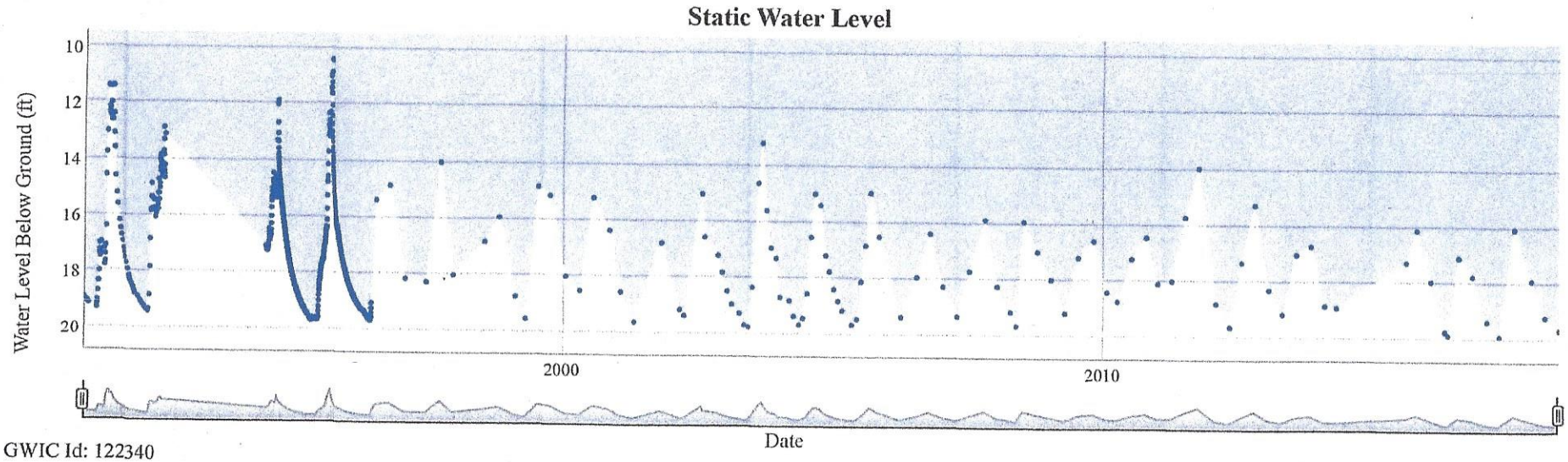


total depth of well
22.2 feet

EXHIBIT "A"

Groundwater Information Center Well Hydrograph

The following chart represents the current hydrograph for this well. Data reported are static water levels in feet below ground surface. A filter has been applied to the data to remove all dry and/or non-static measurements.



GWIC Id: 122340
Site Name: EDGAR SCHOOL TOEPFER BROS.
Location: 04S23E26BABB
Total Depth: 22.6 feet
Number of Measurements: 938
Period of Record: 3/15/1991 - 5/23/2018 1:21:00 PM

Disclaimer

The preceding materials represent the contents of the GWIC databases at the Montana Bureau of Mines and Geology at the time and date [6/19/2018 11:14:05 AM] of the retrieval. The information is considered unpublished and is subject to correction and review on a daily basis. The Bureau warrants the accurate transmission of the data to the original end user at the time and date of the retrieval. Retransmission of the data to other users is discouraged and the Bureau claims no responsibility if the material is retransmitted. There may be wells in the request area that are not recorded at the Information Center. Water level data downloaded from GWIC are not filtered and will contain all measurements.

EXHIBIT "B"

EXHIBIT "C"

MONTANA BUREAU OF MINES AND GEOLOGY
A Department of Montana College of Mineral Science and Technology

Prepared in cooperation with the
U.S. GEOLOGICAL SURVEY

HYDROGEOLOGIC MAP SERIES NO. 6
Sheet 1 (of 3)
Julianne F. Levings, 1986

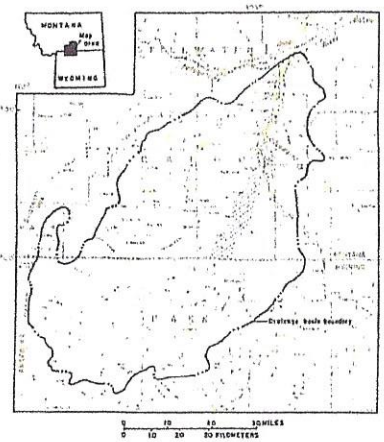
INTRODUCTION

DESCRIPTION OF STUDY AREA

The Clarks Fork Yellowstone River originates in the Beartooth Mountains and Absaroka Range of Montana and Wyoming. The river flows about 50 miles east and northeast in Wyoming, then flows an equal distance north-northeast from the State line to Laurel, Montana, where it empties into the Yellowstone River (location map). In its downstream reaches, the Clarks Fork flows through an alluvial valley that ranges from about 1 to 3 miles in width. Most domestic water supplies in this valley are derived from wells completed in the alluvial aquifer; some wells are completed in bedrock aquifers if alluvium is not present or is unproductive. Crops grown in the valley are irrigated mainly with surface water diverted from the Clarks Fork and some of its major tributaries. The Clarks Fork transports large loads of suspended sediment from spring runoff and from intense local summer storms.

PURPOSE AND SCOPE

The purpose of this 1-year study was to collect information about the thickness and extent of the alluvial aquifer, the altitude and configuration of the potentiometric surface in the alluvial aquifer, the quantity and variation in streamflow and suspended sediment, and the chemical quality of ground and surface water. To accomplish these objectives, 37 wells were inventoried and 43 samples of ground water were collected for water-quality analysis. Thirty-two holes were augered; some were cased and some had recorders installed for water-level observation. Daily sediment stations were operated from March through September 1984 at two active streamflow-gaging stations operated by the U.S. Geological Survey. Quarterly samples also were collected at these stations for water-quality analysis. Water and suspended-sediment samples were collected for analysis from selected diversion canals, ditch return flows, and the Clarks Fork and its tributaries. Information collected during the well inventory (tables 1 and 2) and observation-well drilling (table 3), and the analytical results of ground-water-quality samples (tables 4 and 5) are tabulated in the accompanying pamphlet.

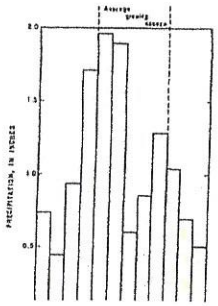


LOCATION MAP OF STUDY AREA (PATTERNED) AND CLARKS FORK YELLOWSTONE RIVER BASIN IN MONTANA AND WYOMING

PRECIPITATION

Annual precipitation in the study area ranges from about 6 inches near the State line to about 13 inches near the Yellowstone River (U.S. Soil Conservation Service, 1977). The location of the Beartooth Mountains west of the southern one-third of the study area coupled with the prevailing weather patterns are responsible for the rain-shadow effect in that area.

The mean annual precipitation at Bridger for 1951-84 was 12.72 inches. At Bridger, about 50 percent of annual precipitation (precipitation graph) falls during the 154-day growing season that extends on the average from May 1 through September 32, based on a freeze threshold temperature of 28°F (National Oceanic and Atmospheric Administration, 1982).



The graph of cumulative departures from mean annual precipitation can be used

HYDROGEOLOGY

EXPLANATION

—3500— POTENTIOMETRIC CONTOUR--Shows altitude of potentiometric surface in alluvium, 1984. Dashed where approximately located. Contour intervals 20 and 100 feet. Datum is sea level

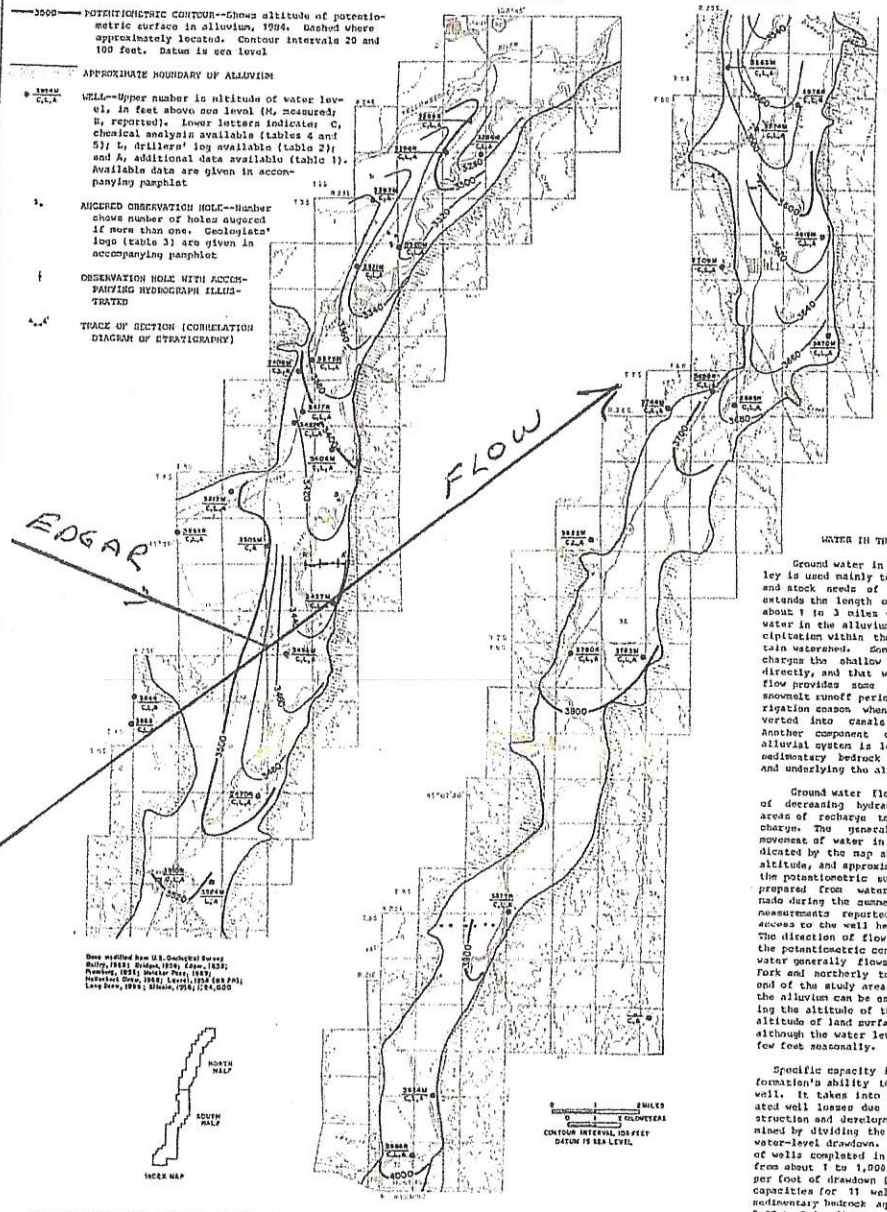
APPROXIMATE BOUNDARY OF ALLUVIUM

3914M / C,L,A — WELL--Upper number is altitude of water level, in feet above sea level (M, measured; E, reported). Lower letters indicate: C, chemical analysis available (tables 4 and 5); L, drillers' log available (table 2); and A, additional data available (table 1). Available data are given in accompanying pamphlet

5 — AUGERED OBSERVATION HOLE--Number shows number of holes augered if more than one. Geologists' logs (table 3) are given in accompanying pamphlet

OBSERVATION HOLE WITH ACCOMPANYING HYDROGRAPH ILLUSTRATED

A—A' TRACE OF SECTION (CORRELATION DIAGRAM OF STRATIGRAPHY)



Base modified from U.S. Geological Survey Bolin, 1963; Bridger, 1956; Edgar, 1956; Fromberg, 1956; Molitor Peak, 1957; Rockvale Cove, 1968; Laurel, 1954 (6x 7m); Long Dere, 1956; Silesia, 1956; (1:24,000

MAP SHOWING AREAL EXTENT OF ALLUVIUM AND ALTITUDE AND CONFIGURATION OF POTENTIOMETRIC SURFACE

WATER IN THE ALLUVIUM

Ground water in the Clarks Fork valley is used mainly to supply the domestic and stock needs of residents. Alluvium extends the length of the valley and is about 1 to 3 miles wide. The source of water in the alluvium is mostly from precipitation within the contributing mountain watershed. Some precipitation recharges the shallow ground-water system directly, and that which becomes streamflow provides some recharge during the snowmelt runoff period and during the irrigation season when streamflow is diverted into canals and onto fields. Another component of recharge to the alluvial system is leakage of water from sedimentary bedrock units adjacent to and underlying the alluvium.

Ground water flows in the direction of decreasing hydraulic head and from areas of recharge toward areas of discharge. The generalized direction of movement of water in the alluvium is indicated by the map showing areal extent, altitude, and approximate configuration of the potentiometric surface. The map was prepared from water-level measurements made during the summer of 1984, and from measurements reported after 1962 where access to the well head was not possible. The direction of flow is perpendicular to the potentiometric contours. Thus, ground water generally flows toward the Clarks Fork and northerly toward the downstream end of the study area. Depth to water in the alluvium can be estimated by subtracting the altitude of the contours from the altitude of land surface at a given point, although the water level will fluctuate a few feet seasonally.

Specific capacity is a measure of the formation's ability to yield water to a well. It takes into account any associated well losses due to methods of construction and development. It is determined by dividing the well yield by the water-level drawdown. Specific capacities of wells completed in the alluvium range from about 1 to 1,000 gallons per minute per foot of drawdown (table 1). Specific capacities for 11 wells penetrating the sedimentary bedrock aquifers ranged from 0.02 to 2.4 gallons per minute per foot of drawdown (table 1).

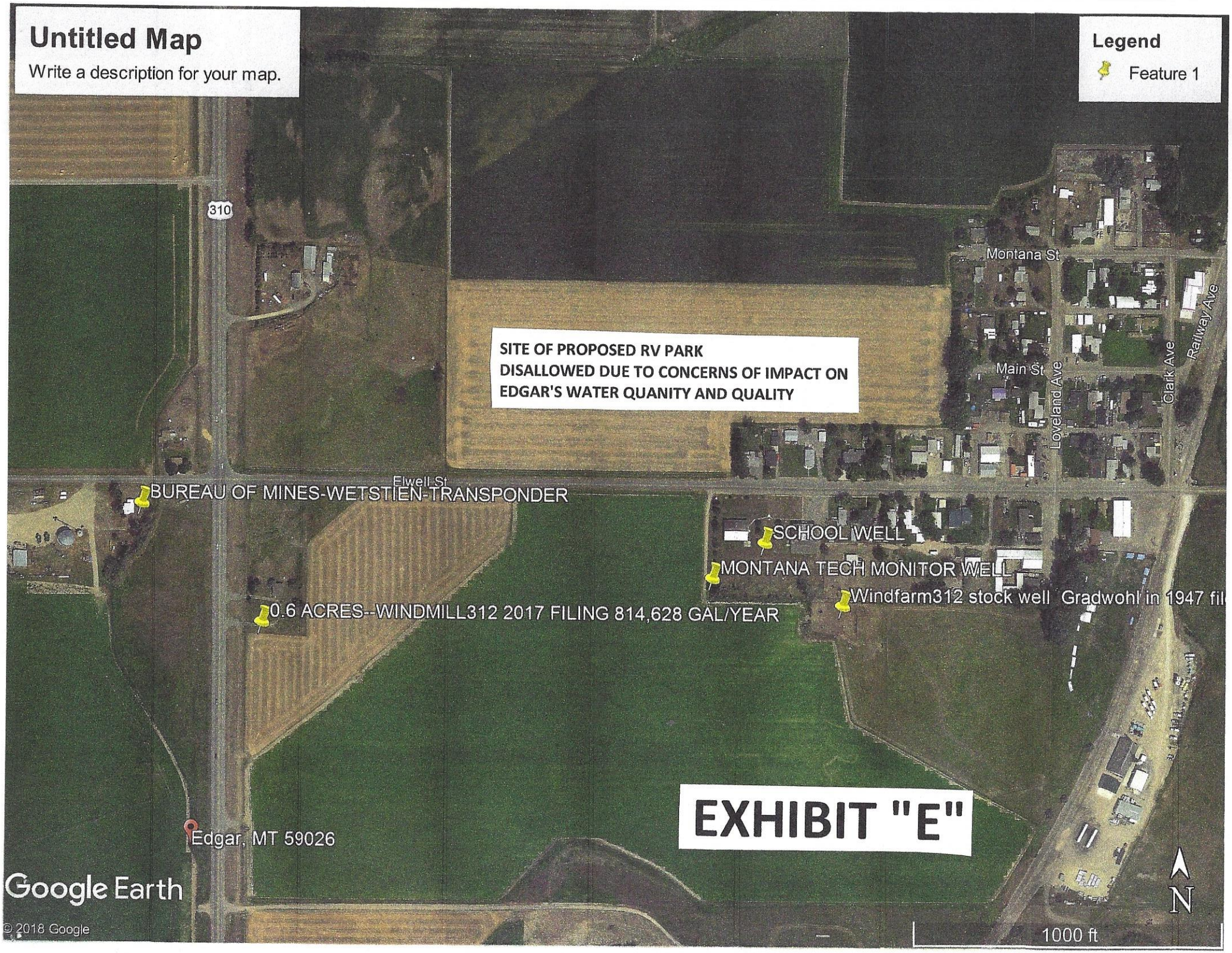
EXHIBIT "D"

WATER IN THE ALLUVIUM

Ground water in the Clarks Fork valley is used mainly to supply the domestic and stock needs of residents. Alluvium extends the length of the valley and is about 1 to 3 miles wide. The source of water in the alluvium is mostly from precipitation within the contributing mountain watershed. Some precipitation recharges the shallow ground-water system directly, and that which becomes streamflow provides some recharge during the snowmelt runoff period and during the irrigation season when streamflow is diverted into canals and onto fields. Another component of recharge to the alluvial system is leakage of water from sedimentary bedrock units adjacent to and underlying the alluvium.

Ground water flows in the direction of decreasing hydraulic head and from areas of recharge toward areas of discharge. The generalized direction of movement of water in the alluvium is indicated by the map showing areal extent, altitude, and approximate configuration of the potentiometric surface. The map was prepared from water-level measurements made during the summer of 1984, and from measurements reported after 1962 where access to the well head was not possible. The direction of flow is perpendicular to the potentiometric contours. Thus, ground water generally flows toward the Clarks Fork and northerly toward the downstream end of the study area. Depth to water in the alluvium can be estimated by subtracting the altitude of the contours from the altitude of land surface at a given point, although the water level will fluctuate a few feet seasonally.

Specific capacity is a measure of the formation's ability to yield water to a well. It takes into account any associated well losses due to methods of construction and development. It is determined by dividing the well yield by the water-level drawdown. Specific capacities of wells completed in the alluvium range from about 1 to 1,000 gallons per minute per foot of drawdown (table 1). Specific capacities for 11 wells penetrating the sedimentary bedrock aquifers ranged from 0.02 to 2.4 gallons per minute per foot of


Untitled Map
Write a description for your map.
Legend
Feature 1
310
Montana St
Main St
Loveland Ave
Clark Ave
Railway Ave
SITE OF PROPOSED RV PARK
DISALLOWED DUE TO CONCERNS OF IMPACT ON
EDGAR'S WATER QUANITY AND QUALITY
Elwell St
BUREAU OF MINES-WETSTIEN-TRANSPONDER
SCHOOL WELL
MONTANA TECH MONITOR WELL
Windfarm312 stock well Gradwohl in 1947 fil
0.6 ACRES--WINDMILL312 2017 FILING 814,628 GAL/YEAR
EXHIBIT "E"
Edgar, MT 59026
Google Earth
© 2018 Google
N
1000 ft

There obviously is a great amount of groundwater available in the Madison and hydraulically connected formations in the vicinity of Bowler Flats, at reasonable drilling depths, and under strong artesian pressure. It is assumed that water-quality is adequate for irrigation, inasmuch as one nearby artesian well is presently utilized as a source of irrigation water. There is a risk in attempting to develop this source, due to the vagaries of limestone lithology. Fracturing associated with faulting apparently is very significant in the development of large-yield wells.

Shortages of municipal and rural water. Towns located along major drainages can find sufficient water in the alluvium, or can augment supplies with infiltration wells or galleries. Sometimes wells in bedrock aquifers are developed in preference to alluvial wells, because bedrock aquifers are much less susceptible to pollution and contamination. Farmsteads can obtain water through wells in the alluvium, in terrace gravels, and in shallow bedrock. In the Basin area, several Fort Union water wells may be required to provide adequate supplies for one farmstead. In fortuitous circumstances, abandoned mines filled with water may be found by the drill. In grazing areas, small storage facilities can be constructed to retain surface runoff, and wells can be drilled.

Three towns in the county—Belfry, Edgar, and Silesia—reportedly do not have central water systems. Belfry is on the Clarks Fork floodplain in Township 8 South, Range 22 East and most likely could utilize alluvial water. Wells drilled in nearby shallow bedrock would find small amounts of water in the Fort Union. To utilize bedrock aquifers with better hydrologic characteristics, wells would need be drilled 3,000 to 4,000 feet into the Eagle-Telegraph Creek interval. Shallower wells could be drilled on the flank of the Pryor uplift and water could be transported 10 or more miles to the valley, across the river and into town.

The town of Edgar, in Township 4 South, Range 23 East is on the Clarks Fork floodplain where the floodplain has the widest extent in the county. Shallow groundwater is available in the alluvium. Development in the Eagle-Telegraph Creek interval about five miles to the west might be preferred, and this would require a system to transport water to the townsite.

Silesia is on the floodplain 5 miles north of Edgar in Township 3 South, Range 23 East and has a hydrologic setting similar to Edgar. Silesia and Edgar might feasibly construct one system to supply both towns, particularly if a bedrock source were preferred.

High water tables. High-water tables many times are caused by irrigation. Water-management and engineering can help alleviate the problem. Once irrigation is established, a system of drains is required to transmit surplus water out of irrigated areas which have been developed on impervious or only slightly pervious soil.

Water-quality. Water-quality is attributed to the source of the groundwater, the rate of percolation, soluble minerals in the host material, and man's use of the land. Precipitation absorbs dust and gases in the atmosphere which are mostly filtered out of groundwater as it percolates downward; deterioration can be expected if the water moves slowly across or through shale, and if agricultural chemicals are leached from the soil by groundwater over a period of years.

The Clarks Fork River, where it flows across the flank of the Pryor uplift, has developed its alluvial floodplain over bedrock of the Colorado Group and the Montana Group. The bedrock underlying the thin alluvium is dark-colored shale and narrow outcrop bands of Judith River and Eagle sandstones. The great expanse of shale undoubtedly contributes minerals in solution to the water resources which cause a deterioration of water-quality.

Montaqua. The hot water well at Montaqua is not operating, reportedly due to the effects of the

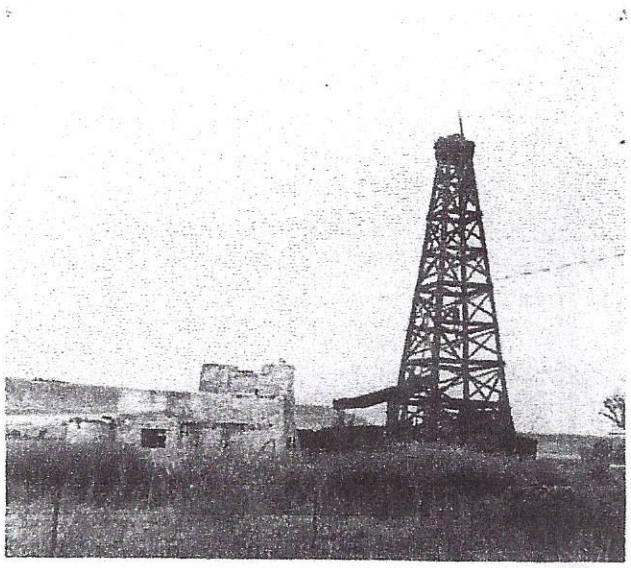


Figure 12.—Montaqua hot water well and recreation facilities. The well practically ceased flowing during the earthquake of 1959.

EXHIBIT "F"

NEW

PLEASE ATTACH THIS CORRECTION AND APOLOGY TO MY TEN PAGE SUBMISSION TO THE PLANNING BOARD ON 6/19/2018

NEVINS HARDING <nevinsharding@hotmail.com>

Thu 6/21/2018 8:52 AM

To:Forrest Mandeville <Forrest@forrestmandevilleconsulting.com>; craig@performance-ec.com <craig@performance-ec.com>;

Good morning Mr. Mandeville:
Please attach this email as a correction to the ten page document that I submitted to the Planning committee on Tuesday evening.
During the meeting on June 19, one of the board members(I do not know his name) pointed out that containment sewage tanks were no longer approved. I have since found, after talking with DEQ that he was, in fact, correct. Would you kindly extend to the board member and the board as a whole, my apologies for my incorrect statement and provide them this email.
Out of concern, I did check with the tribal organization that contracted for the tank installation to insure that I did not perform a violation. The installation was legal under DEQ exceptions for governments.

ALTERNATE PROPOSAL FOR SEWAGE FOR WINDMILL FARMS:

Because of the great concern for bacterial infiltration into the potable water source for the Edgar town site, as evidenced at the meeting, I contacted some of the people at both the DEQ and DNRC. This concern is both with the current proposed 13 tract plot and the contemplated expansion for future home sites as found in different proposals. The DNRC pointed to the availability of advanced systems for treatment at the home site, although they did not direct me to suppliers.
Attached is the body of the DNRC's response yesterday:

Hi again Nev,

I was just talking to a colleague at DEQ and asked about further review of the proposed subdivision. I was assured that the proposal will have to go through subdivision review at DEQ where the developer will be required to demonstrate water availability and water quality protection. I was told that septic holding tanks are only allowed under very specific and limited circumstances and that they would not be allowed for permanent residential use. There are a couple waste treatment options available besides drainfields that are very expensive and likely a showstopper if that is what would be required (if drainfields were disallowed due to nitrate issues). My colleague talked about a past proposal for some kind of RV park in Edgar that was tabled/kiboshed because of water availability issues and septic issues.

The DEQ did respond with sewage treatment alternatives including spray irrigation and investigating advanced treatment options and mounds.

I have attached the body of the response received yesterday from the DEQ:

Mr. Harding,

Are you referring to a holding tank to be pumped by a septic pumper and disposed of elsewhere- at an approved land application site or other septage disposal location? That is not an option at this site in any scenario I can think of. Given the difficulties with monitoring how often they are pumped out and the inconvenience for the landowner, they have not been an option in a new subdivision for some time. I did have a situation where there was an old plat approval and the parcels were used seasonally. Even in that case, your commissioners were reluctant to approve the variance that would be required.

The subdivision rules for individual sewage treatment systems are here:

http://deq.mt.gov/Portals/112/DEQAdmin/DIR/Documents/legal/Chapters/CH36-03.pdf

ENVIRONMENTAL QUALITY SUBDIVISIONS/ON-SITE SUBSURFACE ...

deq.mt.gov

ENVIRONMENTAL QUALITY . CHAPTER 36 . SUBDIVISIONS/ON-SITE SUBSURFACE WASTEWATER TREATMENT . Subchapter 3 . Subdivision Requirements . Rule 17.36.301 Lot Sizes (REPEALED)

page 11 talks about holding tanks.

As for suggested alternatives, there really aren't any on an individual system basis. There are advanced treatment options that can improve the quality of the effluent and elevated sand mounds for high groundwater situations. Those are still considered septic systems with a drainfield for final disposal.

If the developer were willing to consider public wastewater system options, "spray irrigation" has become popular and might address your concerns. The brief description of that process is that the effluent is sent to a lined lagoon which is connected to a center pivot that applies the effluent to non-food crops at a calculated rate during the appropriate time of year. Of course the lagoon mush hold the effluent during the winter months.

If you want to wade through it, those specifications are here:

http://deq.mt.gov/Portals/112/Water/WQInfo/Documents/Circulars/Circulars/DEQ2_Final_2016.pdf

DESIGN STANDARDS FOR PUBLIC SEWAGE SYSTEMS

deq.mt.gov

circular deq-2. design standards for. public sewage systems. final 2016

Look in Chapter 120.

Hope that helps,
End of DEQ response.

Thank you,
Nevins Harding

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (1/12/2012 10:29:21 AM)

Site Name: ELTON, RANDY AND DEBBIE
GWIC Id: 263997

Section 1: Well Owner(s)

1) ELTON, RANDY AND DEBBIE (MAIL)
202 ELWELL
EDGAR MT 59026 [09/07/2011]

Section 2: Location

Township	Range	Section	Quarter Sections
04S	23E	26	NW¼ NE¼ NW¼

County
CARBON

Geocode

Latitude	Longitude	Geomethod	Datum
45.46342803455	-108.856014682	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, September 07, 2011

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	20	8.75
20	35.5	7

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	35.5	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
35.5	35.5	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	0	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 35.5
Static Water Level: 18
Water Temperature:

Air Test *

60 gpm with drill stem set at 35 feet for 1 hours.
Time of recovery 0.08 hours.
Recovery water level 18 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log

Geologic Source
110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	2	TOPSOIL TAN SOFT
2	5	SANDY LOAM TAN SOFT
5	27	GRAVEL TAN MEDIUM
27	31	SAND TAN SOFT
31	32	CLAY TAN SOFT
32	35.5	GRAVEL TAN MEDIUM

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: PAUL STEINMETZ
Company: AAQUA DRILLING INC
License No: WWC-542
Date Completed: 9/7/2011

PROPOSAL ON THE WINDMILL SUBDIVISION

CARBON COUNTY COMMISSION

JULY12, 2018

We the residents of Edgar request that the County Commission hold any decision in abeyance, pending proof that Windmill312 will have irrigation water on the proposed sub division. The ditch water right is 1898 which is the first to be cut off, usually from June 15 until the middle of August.

The use of Cooney dam water is problematic because my sources in the Cooney Dam water world state that it is a pipedream that the subdivision will get any Cooney water. The subdivision proposal does not define the method of division of the Cooney water throughout the 67 acres. Cooney dam will not transfer less than 50 shares in a block. A water court needs to appoint a creek commissioner to distribute the water. It is only fair to the community to be assured that this work has been done and engraved in stone. It is important that the proposed subdivision is not a dust bowl. This is more important because it is unlikely that the subdivision will have access to ground water.

May we suggest to the commission that Windmill construct a surge pond to stockpile water when ditch water is available.

[illegible] Jamie Walters Michael Indelicato

Debbie Grewell

Randy Elton Marley Grewell

Dennis Herman Gerry Spitzer

Vertoria Rae Haney Deana Foos

Beverly Haggerty Randy Foos

Betty Joyce; Jane Pool

Denise G. Maas

[illegible] Harding

Debby Elton

DENISE MAAS

P.O. BOX 114

204 ELWELL STREET

EDGAR, MT 59026

RECEIVED
JUL 5 2018

July 1, 2018, 2018

RE: Windmill Farms Subdivision

Dear Carbon County Commissioners,

In early June, 2018 I learned of the preliminary plat application for the proposed Windmill Farms Subdivision, originally a 20-lot major subdivision located on the southeast corner of Highway 312 and East Pryor Road/Elwell Street near Edgar, MT in Carbon County and also an additional 20 one acre sites adjacent to the first in the second stage of development.

As a resident and property owner in Edgar, MT, I attended the Carbon County Planning meeting on June 9, 2018 to express my concern and opposition to the Subdivision. While attending the meeting, I learned that the proportions for the 20 acre sites were changed to somewhat fewer but larger than the original planned sites.

Much of my knowledge regarding the issues I am writing about come from my well informed neighbors; many are quite familiar with the history in Edgar and have resided here with their families many years, also, from other Edgar residents who have professional knowledge and or have served on local boards related to water and sewer maintenance. Their major concern and mine for the town of Edgar is to protect the limited water supply, our water supply comes into town from the southwest and would be intercepted by the proposed Subdivision. Some wells here get extremely low or dry at various times of the year. Tapping into this aquifer by the proposed Subdivision may have dire consequences, negatively impacting the water supply for the existing Edgar residents. The other huge concern is the contamination of Edgar's wells by

leach fields from septic tanks at the Subdivision sites and discharging into the subsurface aquifer that feeds Edgar's wells.

While considering this proposed Subdivision, I ask that you look carefully at all the possibilities and consequences regarding the environmental impact to this area, thank you for your attention to this matter.

Sincerely,

Denise Maas

Denise Maas