

## Idaho Water Engineering Expert Report



**Idaho Water Engineering**  
*Water Solutions*

In  
2918 N. El Rancho Place Office: (208) 378-1513  
Boise, Idaho 83704 Cell: (208) 870-0345  
[www.idahowaterengineering.com](http://www.idahowaterengineering.com) Fax: (888) 538-7703  
[info@idahowaterengineering.com](mailto:info@idahowaterengineering.com)

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### Background:

Idaho Water Engineering LLC (IWE) has been retained to provide expert technical support by Beranna Dairy LLC (Beranna), in regard to an Application for Transfer of Water Right filed by IMH Boise Cimarron (IMH) on December 20, 2021. Beranna has filed a Protest to the proposed Transfer for multiple reason including potential impact to Beranna water rights. The proposed Transfer is for an adjoining property immediately West and North of the Beranna properties. IWE has done a hydrogeologic evaluation of potential impact to Beranna water rights using available data and information. Given that hydrogeologic data and information included in the Transfer Application is limited, there are numerous questions which remain including those identified in this report. IWE has also evaluated the potential expansion of the authorized elements of the IMH Water Right. IWE reserves the right to modify, amend, update or revise our report as these questions are answered and/or additional information becomes available.

### Site Geology and Hydrogeology:

The geology in the vicinity of Beranna and the proposed development by IMH is characterized by over 600 feet of sediments consisting of gravel, sand and clay. The upper 275-300 feet is called the Snake River Group. The lower 300 plus feet is called the Idaho Group. The Snake River Group is characterized by sands and gravels and layers of clay. The Idaho Group is characterized by fine grained sands and thicker clay layers. The transition from the Snake River to the Idaho Group is typically when thick layers of blue clay are encountered. Previous studies by IDWR have shown that there are differences in water chemistry and water quality between the two groups.

Figure 1 shows the four wells that were reviewed for this report. Table 1 shows the attributes for those four wells. All four wells encountered both geological groups, and all four wells encountered blue clay with the depth range for the clay being 276-309 feet below the land surface.

There are aquifer zones in both the Snake River and Idaho Groups in this area. Wells 1 and 2 were exposed to both geological groups as indicated by the openings (perforations) listed on the well driller reports. Since both geological groups contain aquifers, this means that Wells 1 and 2 comingle waters from the two different groups. This method of completion was common in the past but is no longer allowed by IDWR for new wells because comingling can cause mixing of waters with different qualities and under different pressures. Wells that have comingled aquifers are also very

challenging with respect to analyzing ground water level trends. It is often difficult to determine which aquifer is causing the trend, or if both aquifers are causing the trend.

Wells 3 and 4 are completed solely in the deeper Idaho Group aquifers. Well 3 is completed in three zones, whereas Well 4 is only completed in one zone near the bottom of the well.

Beranna has additional wells to the east and southeast of their Dairy facility. These wells have similar or shallower depths to Wells 1-4. Western Farms has two irrigation wells about 0.5 miles to the northwest of Well 3. These wells are 358 feet and 420 feet deep. Both wells are completed in the Snake River and Idaho Group formations, making them similar to Wells 1 and 2.

The only static water level measurements available for the four wells examined for this study are from the well driller's reports. IDWR has a ground water level monitoring program that includes hundreds of wells. Unfortunately, there are no IDWR program wells in the vicinity of Beranna and IMH that are being monitored for ground water levels in the deeper Idaho Group aquifers.

**Table 1.** Well Attributes for Key Wells in the Beranna and IMH area.

| Map Number | Name on Well Report | Year Drilled | Well Depth (feet) | Depth of first blue clay | Openings                      | Static Water Level |
|------------|---------------------|--------------|-------------------|--------------------------|-------------------------------|--------------------|
| 1          | Rawlins             | 1962         | 490               | 276                      | 195-220<br>260-275<br>279-463 | 220                |
| 2          | Rawlins             | 1992         | 465               | 287                      | 240-270<br>320-380<br>490-410 | 230                |
| 3          | Beranna             | 2019         | 640               | 309                      | 302-362<br>428-448<br>489-509 | 309                |
| 4          | Beranna             | 1998         | 518               | 300                      | 503-518                       | 300                |

#### **Land Use Changes:**

The land use in the vicinity of the Beranna and IMH is primarily agricultural. There is some residential development a few miles to the east of Beranna that consists of individual homes generally on several acres. The owner of Beranna stated that some of this residential development has occurred in the last 10 years or so.

Changes in land use between 2000 and 2015 were analyzed. Figure 2 shows that there have been increases from non-irrigated lands to irrigated lands in the nearby fields to the north and west of Beranna, and to several fields at a greater distance to the east and southeast of Beranna. There is also a small piece of land to northwest of Beranna that changed from semi-irrigated to irrigated between 2000 and 2015. Currently, the land use coverage of 2015 is the most recent available from the Idaho Department of

## Water Resources.

Canyon County predicted the potential for residential developments in the area for the time period from 2011 to 2022 (Figure 3). This figure shows the proposed IMH development and other potential developments to the north and east. Figure 4 shows the actual residential development that has occurred in the area according to two categories (pre 2011 development and post 2011 development). Figure 4 also shows the plats of land that are currently being processed by the County for future developments. Figure 4 illustrates that development is occurring in the area and that these developments have occurred a couple miles to the east of Beranna.

## Water Supply Issues:

The Idaho Department of Water Resources (IDWR) has been concerned about declining ground water levels in the area south of Lake Lowell for a number of years. According to the Southwest Regional Manager Mr. Nick Miller there is not an official designation, such as "Ground Water Management" or Critical Ground Water Area" established for South of Lake Lowell, but they have been closely monitoring the available ground water data and Applications for new ground water Permits are on hold. According to Mr. Miller there does seem to be some stabilization of ground water elevations and actually some areas of improvement but more future data are needed to firmly establish the stabilization.

According to IDWR records and staff communication there are approximately 100 cfs of Supplemental ground water right Application on file with IDWR in the area South of Lake Lowell. These applications, by multiple entities, are very controversial and are currently slowly proceeding through the administrative process. It is certainly unclear at this time how many of the proposed applications will be approved, if any, but it could potentially impact the available ground water supply available to Beranna Dairy. When considering the sufficiency of supply question related to the IMF Application and future potential impacts of additional ground water use is a real concern.

In a report prepared for the Nampa Meridian Irrigation District in 2014,<sup>1</sup> estimated that 100 percent conversion from gravity to sprinkler irrigation in the Boise Basin would significantly reduce discharge for 4 major drains, Table 1.

**Table 2.** Current and Projected Drain Discharge

|                                   | Fifteen<br>Mile Creek | Indian<br>Creek | Mason<br>Creek | Sand Hollow<br>Creek |
|-----------------------------------|-----------------------|-----------------|----------------|----------------------|
| Current Surface Water (ac-ft)     | 27,128                | 46,770          | 35,500         | 54,959               |
| Current Ground Water (ac-ft)      | 34,360                | 55,427          | 43,134         | 45,132               |
| Current Total Discharge (ac-ft)   | 61,488                | 102,197         | 78,634         | 100,091              |
| Projected Drain Discharge (ac-ft) | 21,886                | 35,230          | 18,842         | 30,708               |
| Percent Reduction                 | 64%                   | 66%             | 76%            | 69%                  |

<sup>1</sup> *Estimates of Impacts on Lower Boise Valley Drain Discharge with Elimination of Gravity Irrigation*, ERO Resources Corporation, April 17, 2014.

As the Treasure Valley continues to grow more and more irrigated agriculture is converted to commercial or residential land use. Recent data collected on Boise River drains confirms that indeed return flows from drains is declining. Data and information presented by the Water District 63 Water Master, document that drain flows back to the Boise River has been declining. The Boise River drainage system was constructed to return excess irrigation water and shallow ground water back to the Boise River. Storm water runoff is also returned to the river via the drainage system. There are a number of reasons for the reduced drain discharge including; conversion of previously gravity irrigated lands to residential and commercial, irrigations delivery system efficiency improvements, conversion from gravity to sprinkler and drip irrigation. The impacts of these changes have two major impacts:

1. Reduced natural flow in the Boise River available to senior surface water users.
2. Declines in the shallow ground water elevations, which primarily effects self-supplied domestic water users' wells, and recharge to the deeper aquifers.

The shallow ground water system in the Treasure Valley is the primary recharge source for the deeper aquifers. There is significant concern related to the reduced drain flows and WD-63 and others are requesting funding to study the impacts and develop solutions to minimize the negative impacts.

The rapid land use changes in the Treasure Valley appear to be a major contributor to the reductions in drainage flows. A significant component of the drainage flows come from shallow ground water. This is a serious concern regarding the future sustainability of both the shallow and deeper aquifers in the Boise Basin.

The IMH Transfer Application proposes that Permit 63-34320 will be exercised to provide for an additional 50 acres of irrigation not included in the authorized Place of Use for Water Right 63-3298. Permit 63-34320 is junior to all 15 of the Beranna Dairy Water Rights. The proposed Transfer Water Right 63-3298 is junior to five of the 15 Beranna rights. IWE could not confirm if Permit 63-34320 including the proposed new wells have been constructed; however it appears that they have not been completed.

If these new wells are constructed and an additional 50 acres of irrigation developed, the potential for injury to the senior Beranna Water Rights is quite possible.

IDWR Administrators Memorandum, Transfers Policies and Procedures, dated December 21, 2009, states the following:

**5d. Enlargement of Use**

For any application for transfer, IDWR must determine whether the proposed change will enlarge the use of water under the water right(s). Enlargement will occur if the total diversion rate, annual diversion volume, or extent of beneficial use (except for non-consumptive water rights), exceeds the amounts or beneficial use authorized under the water right(s) prior to the proposed transfer.

Given that the proposed Transfer includes changing a portion of the irrigation beneficial use to year-round residential and additional 50 acres of irrigation with Permit 63-34320, it appears quite possible that IDWR would consider this an enlargement. However, there are many questions concerning the proposed development, proposed wells, the existing and proposed consumptive use which need answered before there can be a determination of enlargement or not. Some of these questions are outlined below.

### **Potential Impacts to Ground Water Levels Due to Changes in Pumping Schedules**

The addition of two new production wells in the area could impact the ground water levels in existing wells. For example, if the IMH's proposed wells are completed in a deep single zone of the Idaho Group, like Well 4, this may impact water levels in Well 4 and perhaps in Well 3. This is because at least one of the proposed new wells is to pump all of the time, as opposed to the current seasonal irrigation pumping of the existing wells. This pumping schedule change would lower the ground water level at the new wells through the formation of a new cone of depression. Because the well would always pump, the static water level near the well, and at some unknown distance from the well, would never return to its original elevation. This is different than the current pumping of the irrigation wells where there are significant drawdowns during the pumping season, but then complete (or nearly complete) recovery during the non-pumping season. If the cone of depression from the new pumping center extends laterally a large distance, then it could impact Well 4 and maybe even Well 3. To determine the impacts, the applicant would need to monitor water levels for a year or two before any change in pumping patterns, and then monitor water levels during a long term well pumping test of the new wells. Without said information, we cannot determine the potential impacts from the proposed wells on the wells in the vicinity, including those of Beranna and Western Farms. Some additional questions which need to be answered before IWR or IDWR can determine the potential impacts are outlined below.

### **Additional Information Needed and Questions:**

IWE has identified multiple data and information gaps that limit the confidence of the analysis and conclusions. The areas of major concerns are present and potential land use changes, present and future water supply issues and very limited ground water level and trend data. The following questions would provide additional needed elements for improving confidence in our findings:

1. What are the proposed well designs for the two new community supply wells, including total depth, screening, casing schedules, and all other construction plans including targeted aquifer zone(s)?
2. Is IMH going to be required by IDWR to construct a separate monitoring well?
3. IMH plan calls for two new 8-inch community supply wells. Will both wells be used for production or will one be used for production and the other for back-up?
4. What was the source of the information used to determine the annual domestic use need, described in "Transfer Part 1A.3."?

5. What measurements including production and water levels have been done on any existing IMH wells. If none, can IMH supply power records for the last several years and provide annual withdrawal information? This is critical to determine if an enlargement could occur with IMH's proposed change-of-use plans. For example, if IMH has not been using their full amount under their water right, but does use the full amount under their proposed development plans, there could be enlargement and injury.
6. What is being proposed for future ground water level and production monitoring for all of IMH's irrigation and community wells? What is IDWR likely to require for monitoring?
7. What volume and pumping rates will be required to satisfy the community supply needs by month?
8. What information can be provided to document that conversion from irrigated agriculture to residential lawns and gardens are similar in consumptive use?
9. The Transfer Application includes a Preliminary Plat map that shows streets and lots on the south side of the property that was historically non-irrigated. Are these homes and lands to be serviced using the IMH Water Right 63-3298 or Permit 63-34320? If so, what is the calculated irrigated acreage and consumptive use?

#### **Conclusions:**

The proposed development would be the first large-scale residential development in the area. The impacts to the aquifers in this are unknown and unpredictable because of the current limitation of data. There are a lot of wells in the Beranna and IMH area, but there are very limited ground water level data for these wells. Thus, it is not possible to determine if ground water trends have occurred in the past or occurring currently. Going forward, ground water level data need to be collected at multiple existing wells, and at all new wells.

Because the proposed IMH Transfer is in an area that has historically been of concern due to declining ground water levels, the rapidly changing land uses in the Treasure Valley, a number pending supplemental ground water applications and documented declines in shallow ground water and drain return flows, there is a reasonable possibility that approving the IMH Transfer could negatively impact the Beranna Dairy wells (and Western Farms' Supplemental Well?).

Due to the rapidly changing land use, declining drain flows, outstanding Water Right Applications and lack of sufficient hydrogeologic data, IWE concludes that the proposed Transfer requires heightened scrutiny in order to ensure that the proposed IMH transfer and development does not cause injury to Beranna or Western Farms.

Relative to the questions concerning potential enlargement of the existing IMH Water Right, IWE could not adequately analyze the potential because the information presented in the Application is insufficient. However, based upon the information available and/or provided with the Application it does appear that given the IDWR Transfer Administrators Memorandum, the IMH Transfer could result in enlargement.

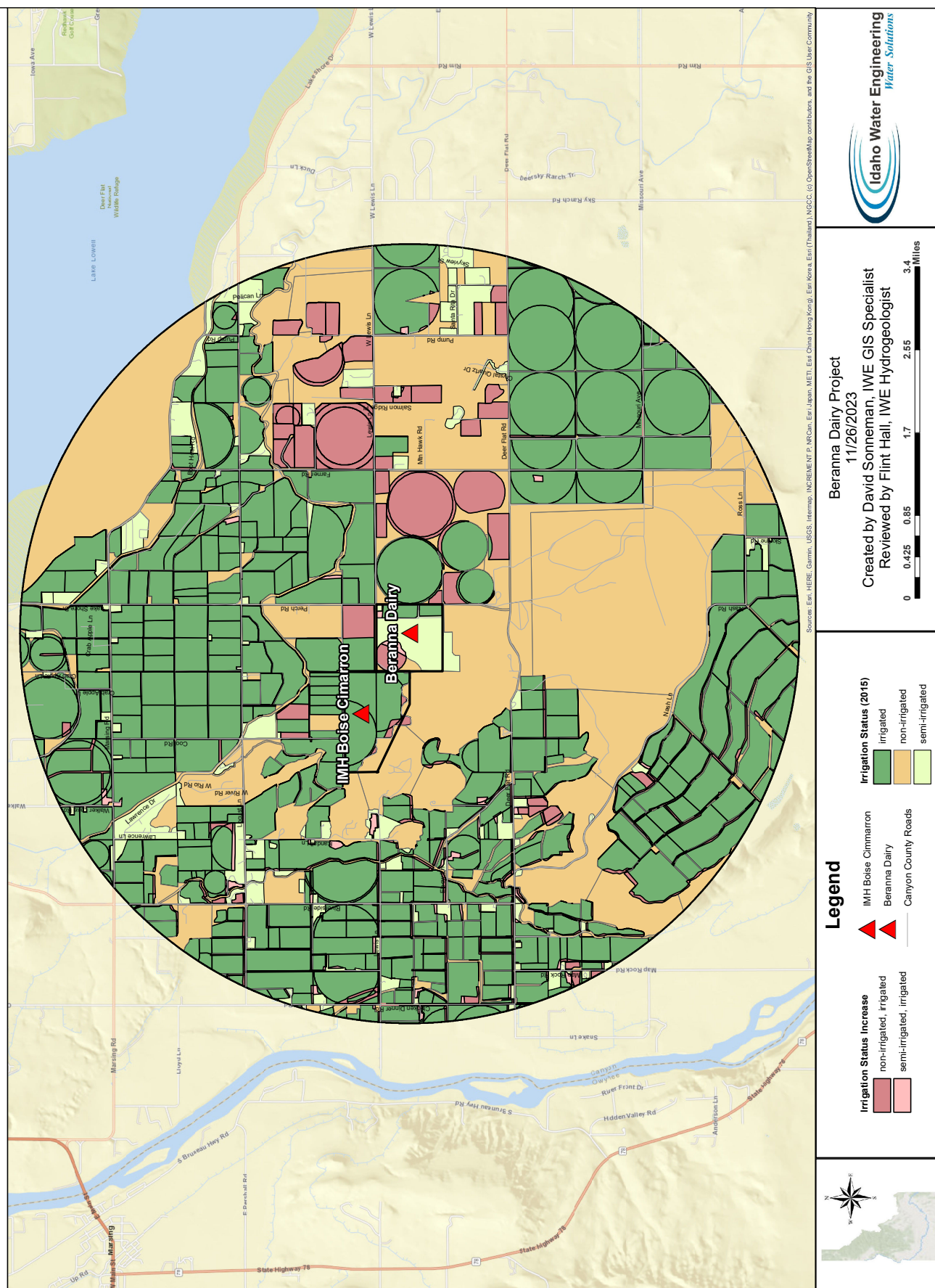
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- Figure 2. Map showing the changes from non-irrigated and semi-irrigated lands to irrigated lands in the area.
- Figure 3. Canyon County's prediction of potential residential developments in the area, 2011-2022.
- Figure 4. Canyon County's record of residential developments in the area (pre-2011, post 2011, and current plats for development).

Figure 1: Key Wells in the Beranna Dairy Area



Figure 2: Land Use Changes by Irrigation Status



### Figure 3: Land Use and Potential Residential Zone Codes

### Figure 4: Land Use and Residential Development