

## **INTRODUCTION**

Purpose: To challenge some of the statements EID made during its presentation to the Utah State Engineer on December 19th, 2018, to outline potential detrimental effects of commercial wells due to groundwater mining, to summarize important points that were made in opposition to EID's permanent change applications, to inform neighbors and guide decisions on future water policy and water management in Emigration Canyon.

## **LACK OF INFORMATION FROM EID**

During the hearing, EID incorrectly stated that information on hydrologic studies and groundwater monitoring wells are available on their website. In fact, their website has been scrubbed clean of all pertinent information since Mark Tracy filed a lawsuit against them in 2015. One of EID's board members and EID's manager were asked weeks before the hearing to provide access to information on hydrology and geology of the canyon, but neither followed through.

*EID does not want their actions to be scrutinized or challenged and likes to keep Emigration Canyon residents in the dark.*

## **INFLUENCE OF COMMERCIAL WELLS ON WATER RESOURCES**

During the hearing, EID claimed their wells have no influence on private wells and groundwater levels in Emigration Canyon. They base their assertion on a 2000 geology and hydrology study - finally released by EID after the hearing - by Adolph Yonkee and EID hydrologist Don Barnett. However, this study does not provide any scientific evidence for their claim. To the contrary, this study confirms that all catalogued surface and groundwater aquifers are part of an integrated hydrologic system. All present and future water diversions, including commercial wells operated by EID, impact the canyon's water resources.

During their presentation, EID showed a slide comparing the depth of their wells with those of private wells along the creek, suggesting commercial wells pull water from aquifers much deeper than those along the creek. However, water withdrawal starts at the top of the perforated area within the well - called the cone of depression - which occurs in the upper part of the well and influences groundwater flow. According to the 2000 Yonkee and Barnett study, groundwater flow patterns are likely complex and detailed hydrologic data are not available.

*Without actual data on groundwater flow patterns, EID cannot claim knowledge about the effects of their wells on private wells in the canyon. The Utah State Engineer should insist EID provide accurate statements for the record and prevent EID from professing baseless claims as facts.*

## **OVER-PUMPING, GROUNDWATER MINING AND DAMAGE TO AQUIFERS**

The 2000 Yonkee and Barnett study provides insight into several potential detrimental effects of commercial wells in Emigration Canyon. The three wells currently operated by

EID draw water from aquifers located in areas of fractured bedrock or fractured limestone in the Twin Creek Limestone formation. Because of the soil structure and geology in the canyon, these aquifers have limited storage capacity.

Due to limited aerial extent and less permeable boundaries of aquifers in the Twin Creek Limestone formation, increased drawdown of water in the well is likely when wells are pumped at a high rate or for prolonged periods of time. When pumping exceeds the amount of water the well can produce, the cone of depression expands, resulting in groundwater mining.

Repeated, excessive drawdown of the well, in turn, may damage the aquifers. Fractures in the bedrock that transmit water to the well may close down during over-pumping and may not completely reopen once water level in the well regains its normal level. Over time, over-pumping can permanently decrease productivity and efficiency of the well. Periods of drought can put an additional strain on the system and can significantly decrease the ability of commercial wells to provide adequate yields of water.

*Over-pumping of commercial wells leads to excessive drawdown in the well, resulting in groundwater mining and may permanently damage the aquifers the wells draw water from.*

#### **OVER-PUMPING OF EID'S UPPER FREEZE CREEK WELL**

During the hearing, EID stated 88% of their water since 2015 has been produced by their Upper Freeze Creek Well. Would that not result in excessive drawdown of water in the well, groundwater mining and potential damage to the aquifer? Why not use all three available wells equally, especially during a period of drought like the summer of 2018? Did the other two wells already lose productivity and efficiency as a result of over-pumping? Is the reason one of EID's four wells is no longer in use related to damage to the aquifer? Is decreased productivity of wells the reason why EID, during a board meeting in the fall of 2018, announced possible water rationing in case of another dry summer next year? Is that also why EID - without any discussion in their public meetings - added 5 additional well sites to their permanent change application?

*The Utah State Engineer should require monitoring of water drawdown levels in EID's wells to determine the extent of groundwater mining and potential impact on private wells during times of drought.*

#### **WATER LEAK IN EMIGRATION OAKS STORAGE TANK**

During the hearing, EID stated average water use per water connection is 22,000 gallons per month during the summer months. That number presumably reflects water data from individual water meters. But what about water loss associated with a leak in the large 1,000,000 gallon tank? Three years ago EID reported a loss of 1000 gallons per day due to this leak. According to Mark Tracy, the leak was only partially repaired.

*The Utah State Engineer should require EID to provide data on water pumped from their*

*wells in addition to data from individual water meters to reflect actual water withdrawal from aquifers, and determine potential water loss within their system.*

## **LONG-TERM VIABILITY OF EID'S WATER SYSTEM**

According to the 2000 study by Yonkee and Burnett safe, long-term yield of aquifers commercial wells rely on cannot be determined and is a major concern. If science cannot help predict long term viability of EID's water system, what knowledge can we gain from 30 years of operational experience?

EID has spent over \$14,000,000 on a water system serving only 286 connections. One of EID's two tanks appears to be leaking and there are reports of wells failing to meet Utah Health Department water quality standards. Of the four commercial wells built, one is already out of commission, two appear to be producing low yields of water and only the Upper Freeze Creek well seems viable and is used to meet 88% of water demand. How long is that well going to produce adequate yields of water? Building new wells every few year to keep the system operational is not a long-term sustainable or financially feasible solution.

*An independent study assessing the sustainability and financial viability of EID's water system is needed to see if it is a realistic long-term solution for providing water in Emigration Canyon before pouring any more money into it.*

## **PROBLEMS ASSOCIATED WITH GROUNDWATER MINING**

There are three problems associated with groundwater mining due to operation of commercial wells in Emigration Canyon:

1. Increased risk of wildfires
2. Loss of stream flow
3. Drinking water contamination

### **1. INCREASED RISK OF WILDFIRES**

Groundwater mining related to operation of commercial wells by EID in the Emigration Oaks subdivision may decrease the water table to the point where roots have limited to no access to water, resulting in dry, easily ignitable vegetation, increasing risk of wildfires. Fire risk increases during the summer months, especially during drought conditions. As mentioned during the hearing on December 19th, groundwater mining has played a significant role in the devastating Paradise fire in California.

What makes things worse in Emigration Canyon is the existence of a petroleum line running along the west side of the creek in the main canyon. Part of this line is actually above ground. It is not hard to imagine what will happen if a wildfire reaches this pipe. When taking the additional factor of canyon winds into consideration (going up-canyon in the morning and down-canyon in the evening), it is easy to see how fires may threaten not only Emigration Canyon but Salt Lake City as well.

*Groundwater mining results in dry, easily ignitable vegetation which increases risk of wildfires. According to the fire marshall of Emigration Canyon, fire hydrants installed by EID are of little to no use when fighting wildfires.*

## **2. LOSS OF STREAMFLOW**

Excessive pumping by commercial wells results in groundwater mining which, in addition to changing weather patterns related to climate change, lowers the water table below Emigration Creek. Resulting loss of streamflow affects wildlife, flora and fauna and those with surface water rights at the mouth of Emigration Canyon. Loss of streamflow also leads to loss of artesian pressure, which is essential for the proper functioning of private wells along the creek.

The aquifers private wells in Emigration Canyon rely on are quite fragile, do not yield water easily, and generally have low capacity (less than 50% compared to those in other areas). They are dependent on artesian pressure to maintain adequate water levels for pumping. Without streamflow there is no artesian pressure, water levels in the wells drop, the pumps starts to draw water from the bottom of the wells, affecting water quality and quantity, until eventually the wells run dry.

*To determine impairment of water rights of private well owners, the Utah State Engineer should not only rely on data reflecting groundwater levels, but also consider loss of streamflow and related artesian pressure.*

## **3. DRINKING WATER CONTAMINATION**

Increased risk of drinking water contamination is another problem associated with operation of commercial wells, especially in steep parts of the canyon. Groundwater mining by commercial wells lowers the water table below the stream, resulting in leakage of surface water into the ground. If surface stream and shallow groundwater are contaminated with E. coli bacteria, attributed to improperly constructed or leaking septic tanks, the chance of contamination of water in private wells increases. Water molecules in fractured steeply dipping bedrock tend to travel more quickly with less time for filtration down to deeper ground levels where they can infiltrate wells and threaten the health of well owners.

*Groundwater mining increases the chance of E. coli contamination of private wells and threatens the health of well owners.*

## **WATER QUALITY IMPROVEMENT PLAN**

During the hearing, EID stated they are working on a plan to address water quality issues in Emigration Canyon. That does not appear to be an accurate statement. Three years ago the Department of Drinking Water proposed a management plan to address water quality issues related to leaking or improperly constructed septic tanks in Emigration Canyon. In a nutshell, the plan calls for money from a block grant - which needs approval by the Water Quality Board - to help fund replacing, flushing or repairing

failing septic systems. Owners would sign up to participate on a voluntary basis. In return, they would agree to have their system pumped every 5 years and provide access for inspections. The Department of Water Quality approached the president of EID three years ago to be the grantee-on-contract, required to set the plan in motion. They have not heard back since, and the plan is about to be shelved due to inaction on the part of EID.

*EID has shown no interest in being involved in a water quality improvement plan that could have a significant effect on the health of private well owners along Emigration Creek.*

### **PROPOSED COMMERCIAL WELLS IN THE BURR FORK DRAINAGE**

EID proposes to build 5 new wells in the upper part of the Burr Fork drainage. This is a region of high elevation (>8000 ft) with high precipitation levels, and is considered particularly important for recharge of aquifers and runoff to streams. The 2000 study by Yonkee and Barnett warns pumping by commercial wells in the Burr Fork drainage could lead to groundwater mining and significantly lower the water table below stream level. Resulting loss of streamflow and related artesian pressure leads to potential decrease in quality and quantity of water produced by private wells. Proximity of proposed commercial wells to the creek and other private wells owners further increases the chance of impairment of private wells, especially during times of drought.

*Considering potential impact on water resources and interference with surface and ground water rights, the 5 additional well sites in permanent change application a44045 should be denied.*

### **EID WATER CONNECTIONS: A RACKET**

During the hearing, EID assured residents they would monitor groundwater levels in the Burr Fork drainage area to prevent impairment due to proposed commercial wells. However, since groundwater levels alone may not predict impairment, that is pretty much an empty promise. It is the close interaction between groundwater, streamflow and related artesian pressure that appears to be most important factor for proper functioning of private wells.

During the hearing, EID denied demonstrated impairment of over 40 private wells in the main canyon and denied their water system has anything to do with loss of streamflow in the creek. If EID's water system has no influence on streamflow, why did EID adopt a minimum streamflow goal in their Water Management Plans of 1996 and 2002?

Considering EID's response to impairment of private wells in the main canyon, there is no reason to expect anything different when private wells in the Burr Fork drainage area start to go dry or show signs of water quality or quantity impairments. Private well owners will be forced to consider improving their wells or hooking up to a system that appears to be financially unsustainable and detrimental to the eco-system of the canyon.

*When private wells run dry, owners face the choice between either improving productivity of their well or connecting to EID's water system - at considerable cost. If groundwater mining and resulting loss of streamflow by EID's commercial wells is responsible for impairment of private wells, EID essentially creates its own demand for water connections.*

### **SENIOR WATER RIGHTS OF EID**

During the hearing, EID pointed out they own the most senior water right in the canyon (priority of 1872), and claim to have first right to water in Emigration Canyon. When taking a closer look at their water right, however, that statement does not appear to be exactly true. EID's water right was originally deeded at the mouth of the canyon and later moved upstream. When a water right is moved, there is potential interference with previously established and approved water rights.

*If the Utah State Engineer finds previously established and approved water rights of private well owners have been impaired by EID's water system, their water rights have priority over EID.*

*If, on the other hand, the Utah State Engineer finds there is insufficient water in the canyon, EID's underlying priority date becomes important and EID will have first right to water in the canyon.*

### **EFFECTS OF CLIMATE CHANGE ON WATER RESOURCES**

While groundwater mining likely contributes to impairment of private wells, there is no question that changes in weather patterns related to climate change put a strain on water resources as well. While overall precipitation has increased over the last 100 years, precipitation in the form of snow has decreased by 30%. Snow increases recharge of groundwater and aquifers, while rain increases runoff. Excessive runoff in the spring may decrease natural recharge of aquifers and decrease water availability during the summer months even in relatively good water years.

*Studies are needed to look at ways to counteract effects of climate change on water resources. One option may be to capture increased runoff at higher elevations and moderate release. Another option is to promote roof designs that capture runoff. Even simply collecting water from rain spouts to be used for irrigation later can make a difference.*

### **RECHARGE OF PRIVATE WELLS VERSUS COMMERCIAL WELLS**

The advantage private wells have over commercial wells operated by EID is that private wells are sustainable and have been successfully used in Emigration Canyon for many years. Because of their low rate of production (gallons of water per minute), they do not significantly impact groundwater levels and do not affect other wells nearby.

Hydrologists estimate 50% of water pumped from these wells is returned to the hydrologic system in the canyon which helps recharge groundwater and streamflow in

the creek.

In contrast, EID's commercial wells are characterized by high rate of production with prolonged periods of pumping resulting in groundwater mining, especially in times of drought, which damages aquifers and, over time, leads to decreased yield. During the hearing, EID stated 48% of water pumped by their wells is returned to the canyon's hydrologic system and helps recharge of streamflow in the creek. However, that water will be used first to saturate desiccated soil and root systems affected by groundwater mining. Considering the distance to the creek, hydrologists estimate recharge to the level of the creek may be delayed for decades and has likely little to no effect on streamflow.

## **CONCLUSION**

The watershed in Emigration Canyon is clearly under stress. There is a limit to the amount of water available for domestic use, irrigation, wildlife, flora, and fauna. Climate change will further strain the fragile ecosystem and available water resources. Under these changing conditions, it is imperative that water management decisions are based on accurate scientific data.

In EID's 1996 and 2002 Water Management and Conservation Plan, EID determined the canyon's hydrology could not support more than 700 homes - connected to either EID or private wells - without affecting streamflow, which was supported by scientific data. Their subsequent decision to abandon the 700 build-out limit and expand their system to 500 total water connections, promoting further development in the canyon, appears to be guided by self-interest and a desire to meet their bottom line. If Emigration Creek is struggling to maintain adequate streamflow at the current housing density, a moratorium on further development needs to be implemented to protect further depletion of water resources.

EID's management decisions are characterized by a lack of transparency and limited oversight by the Utah State Engineer. The 2000 study by Yonkee and Barnett provides clear evidence EID's proposal for additional wells in the Burr Fork drainage area will likely affect natural recharge of aquifers and runoff to streams. Furthermore, the study indicates a high likelihood of interference with surface water rights and water rights of private well owners living along the creek, especially during times of drought. This study should have been used by EID to shelve expansion plans into this sensitive area.

Studies warn safe, long-term yield of aquifers commercial wells in Emigration Canyon rely on cannot be determined, which is a major concern and puts long-term viability of the system into question. The current condition of EID's wells does not instill any confidence in EID's ability to meet long-term demands for water to canyon residents. Their commercial wells are associated with groundwater mining and do not appear to be compatible with documented geologic and hydrologic constraints in Emigration Canyon.

Considering increased risk of wildfires, associated with groundwater mining by EID's water system, Emigration Oak residents are literally sitting on a time-bomb. Plans for

building a wedding venue and fire range at the top of Pinecrest Canyon exacerbates their plight. Their needs would be better served by asking the Salt Lake City Department of Public Utilities to connect them to their water system. Pumping water uphill would be expensive, but putting more money into a system with questionable long-term viability, a system that effectively harms the environment - the reason residents moved here to begin with - would not be a prudent decision.

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**We urge the Utah State Engineer to use his authority to DENY PERMANENT CHANGE APPLICATION a44045 in its current form on the following grounds:**

**1. IMPAIRMENT:** Surface water rights and water rights of owners of over 40 private wells along the stream already show signs of impairment. The 2000 study by Yankee and Barnett warns of potential interference in the Burr Fork drainage area as a result of proposed commercial wells by EID.

**2. ECONOMIC STRAIN:** Construction of new wells affecting the Burr Fork drainage may result in a self-perpetuating demand for new EID connections. New EID wells impair private wells through groundwater mining, loss of stream flow and related loss of artesian pressure. Affected well owners see no other option then connect to EID at a cost of around \$16,000/connection, posing an economic strain on residents.

**3. HEALTH THREAT:** Potential E. coli contamination of private wells due to ground water mining poses a serious threat to safe drinking water and the health of private well owners along Emigration Creek.

**4. FINANCIAL CONCERNS:** EID's water system appears to be financially unsustainable and is characterized by wells that are either failing or are unable to sustain adequate yield. Only one of their wells is still viable and meets 88% of water demand. Considering questionable long-term ability to meet water needs of canyon residents, over \$14,000,000 spent on existing wells and related infrastructure for 286 connections, taxation of Emigration Canyon property owners - connected or not - to the maximum extent possible, and implementation of monthly fire hydrant fees, imposed to finance their latest \$2,000,000 well, further expansion of EID's costly water system is not a good investment.

**5. LAND SPECULATION:** Private land speculators have made a lot of money due to increased value of properties bought and sold after EID was able to provide water to lots in Emigration Oaks. Additional EID wells - sustainable or not - will result in additional development and land speculation.

**6. GROUNDWATER MANAGEMENT PLAN:** EID's Water Management and Conservation Plans of 1996 and 2002 recognized limits to the canyon's hydrology and set goals for minimum streamflow of 1.6 cfs (not met in 10 of the last 17 years), and a 700 home build-out limit (objective abandoned). Since EID failed to meet their own water management goals in the past, they cannot be trusted to protect the watershed and manage groundwater levels in the future.