

SITE-SPECIFIC INVESTIGATION REPORT
EAST GRAND AVENUE PROPERTY
LARAMIE, WYOMING

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Project #: 415-022-001

SUBMITTED BY: Trihydro Corporation

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1.0 INTRODUCTION

The City of Laramie (City) owns the property located east of the intersection of South Boulder Drive and East Grand Avenue in Laramie, Wyoming, in the northeastern corner of the northwest quarter of the northeast quarter of Section 2, Township 15 North, Range 73 West. The property lies within the boundaries of the Casper Aquifer Protection Overlay Zone (APO Zone) described in the *Casper Aquifer Protection Plan (CAPP)*, which was approved by the City of Laramie on June 3, 2008. This site-specific investigation (SSI) report addresses the planned development in accordance with the requirements of Section 15.08.040.A of the Laramie Unified Development Code (UDC).

The City has no current plans to develop the property though the possibility for future development exists. Future development of the property may include landscaping and beautification work.

This investigation report was prepared by a professional geologist (required by Section 15.08.040.A.8.a) on behalf of the City. The report identifies potential groundwater impacts from the proposed development (required by Section 15.08.040.A.8.b) and describes existing conditions, proposed activities, and applicable stormwater management techniques (required by Section 15.08.040.A.8.c).

2.0 SITE-SPECIFIC INVESTIGATION DATA

Information required in the site-specific investigation is presented in the Laramie UDC, Section 15.08.040.A. The results from the site-specific investigation are presented below by the code citation, followed by the applicable investigation data or response.

1. A literature search to determine the presence of mapped faults, folds, fractures, and other evidence of conduit flow on the subject property: In conducting the literature search for this site-specific investigation, references reviewed/consulted include the following:

- Geologic maps of the area (Ver Ploeg 2009)
- City of Laramie GIS maps

During the literature search a fault, an anticline, and one ephemeral drainage were identified to be in the vicinity of the property. The Quarry fault is an east-west trending normal fault, with the southern side being the downthrown side of the fault. The location of the fault, as mapped by Ver Ploeg (2009) in relation to the subject property, is shown on Figure 1. According to Ver Ploeg the Quarry Fault bisects the property.

The Quarry Anticline lies more than 400 feet from the site. Evidence of the anticline can be observed in the outcrop of the Casper Formation approximately 1,000 feet north of the subject property. Further investigation of the Quarry Anticline was performed by Weston Engineering (Weston) for the Wyoming State Bank SSI submitted March 2012. Weston concluded from its investigation that the location of the anticline was approximately 200 feet north of the location mapped by Ver Ploeg (2009), with the revised location shown on Figure 1.

The unnamed drainage travels through the length of the property from east to west. The drainage represents a location for increased infiltration/recharge to the Casper aquifer. The drainage is concrete-lined in the western portion of the site, as seen in the photographs in Appendix A.

2. A Site narrative that includes historical information on previous land use, contaminant releases, abandoned wells, underground storage tanks, and septic systems as well as any other information relevant to the site: The subject property is currently owned by the City. The property is currently undeveloped, except for a City-owned pumphouse. The pumphouse is used to convey water to the eastern portion of the municipal water system, which is up-gradient of the well fields. The pumphouse houses a backup generator to maintain power to the system in the event of a power outage. Photographs of the subject property are presented in Appendix A.

Based on a review of the Wyoming Department of Environmental Quality, Solid and Hazardous Waste online database, a record of previous contaminant releases at the subject property was not identified.

3. A site plan showing the proposed use and zoning of the property including existing and proposed ground contours accurate to a two-foot interval as referenced to the USGS contour map for the area or other specified elevation standard as required by the City, and for a distance of at least five hundred feet beyond any proposed development activity, existing and proposed structures, parking areas, driveways, landscaping areas, setbacks, surface and subsurface drainage facilities, potential contaminant storage locations and methods of storage, above ground storage tanks, best management practices, utilities, roads, storm water management, and a vicinity map. Where necessary, specific construction details shall be provided to assure adequacy to accept design standards: A site plan for development is not presented as the City has no plans to develop this property at this time.
4. Identification of potential contaminants and amounts stored, generated, or handled on the subject property: Future development of the site is not expected to involve more than landscaping and beautification work. Landscaping of the area may introduce contaminants in the form of fuel (diesel and gasoline), antifreeze, fertilizers, herbicides, and pesticides. Per Section 15.08.040.A.6 (Prohibited Activities) of the Laramie UDC, developments requiring the application of certain types and quantities of pesticides, herbicides, and fertilizers are prohibited activities in the APO Zone. Herbicides and pesticides applied to park landscaping must become non-hazardous within 48 hours of application. Additionally, fertilizer must be applied in quantities less than or equal to the agronomic uptake rate of the vegetation fertilized.

The pumphouse located near the southern boundary of the property houses a backup generator. This generator requires fuel to operate in the event of a power outage. Therefore, gasoline is stored on-site in the pumphouse. The gasoline is stored polyethylene fuel containers.

5. A field inspection shall be conducted to verify the presence or absence of vulnerable features as defined in Section 15.08.040.A. A summary of the field inspection shall include a written report, maps identifying vulnerable features, and the distance and direction of the nearest well and vulnerable feature. Where subsurface wastewater disposal is proposed, the investigator shall conduct deep pit soil analysis to a depth at least five feet below the proposed bottom of the leaching system to establish that there are no obstructions such as bedrock, water table or other forms of refusal that could interfere with the proper functioning of the wastewater disposal system: A field inspection of the subject property was conducted on April 29, 2015, for the purpose of identifying site features, identifying current land use, and gathering information to be included in this site-specific investigation report. Photographs of the site are presented in Appendix A. As reported above, an ephemeral drainage traverses the length of the property. Water is conveyed through the drainage to the west into a stormwater control channel and culvert westerly toward Spring Creek.

Evidence of the presence of the Quarry Fault was not observed on the property during the site inspection due to Quaternary cover present over much of the property. The location of the fault is evident east of the property based

on topography, stratigraphy, and formation dip. The Satanka Shale has been eroded off of the Casper Formation on the north side of the fault, indicating that the south side is the down-thrown side of the fault.

The nearest well to the subject property is the 41T2 monitoring well (Wyoming State Engineer's Office (WSEO) Permit Number U.W. P157C). This well is located on the property in the northwest quarter of the northeast quarter of Section 2, Township 15 North, Range 73 West, as shown on Figure 1. The monitoring well was drilled in 1941 as a municipal water supply well (Turner #2), but was never used as a water supply well. The current Turner #2 well is located approximately a quarter mile west of this location.

There is no subsurface wastewater disposal proposed on the property. Therefore, deep pit soil analysis was not conducted for this site-specific investigation.

6. A map showing the area and types of exposed bedrock, marshes, perennial drainages, intermittent drainages, ephemeral drainages, creeks, and other bodies of water on the subject property: Figure 1 shows the location of exposed bedrock surrounding the property. The western portion of the property is covered by Quaternary alluvium and colluvium deposits. The eastern portion of the property is comprised of Permian and Pennsylvanian Casper formation to the north and Permian Satanka Shale to south. The unnamed drainage flowing through the property flows directly over the Casper Formation. The Quarry Fault divides the Casper Formation and Satanka Shale in the area.
7. Where the 100-year flood plain mapping is unavailable, the professional geologist and/or engineer will calculate the 100-year floodplain for the drainage. The flood plain mapping will be provided on a site map with a scale not to exceed 1 inch equals 200 feet: Based on data from the Federal Emergency Management Agency (FEMA) Flood Plain mapping, effective October 16, 1996, the subject property is located outside of the 100-year flood plain. The FEMA mapping also indicates that the property is located outside the 500-year flood plain as well. The portion of the 1996 flood plain map showing the property is included as Appendix B.
8. An evaluation of the water supply and sewage system that includes the potential effects or risks of the system to the Casper Aquifer and its recharge area and the adequacy and safety of the systems. Items such as floor drains and plumbing schematics and the locations of potential contaminants, waste storage, and liquid transfer area locations shall be provided: Development to the this property is likely limited to landscaping and beautification work along with operating/maintaining the pumphouse, as such the water supply for irrigation will be served by the City municipal system. A sewage system is not needed for this type of development.
9. A map(s) depicting the potentiometric surface of the Casper Aquifer at the subject property using data from historical water level measurements and published potentiometric surface maps. No new wells shall be drilled for the purpose of determining the potentiometric surface: The potentiometric surface map of the Casper Aquifer is



shown on Figure 1. The potentiometric surface was generated based upon the water-level data gathered from the Laramie Water Management Study, Level II (Toboga 2006). The potentiometric surface indicates that groundwater at the project site flows generally from east to west. Based on the potentiometric surface data and the elevation of the property (7,315 feet above mean sea level), groundwater in a well would rise to within approximately 40 feet of ground surface at the subject property.

10. A surface water risk assessment and mitigation plan for any impacts caused by storm water runoff, retention and/or detention basins on the City water supply and the Casper Aquifer: Based on the presence of the Casper Formation outcrop, vulnerable features and the intermittent drainage flowing over the Casper Formation on the property, it is recommended that the property remain undeveloped. Stormwater generated on the property will be conveyed to the drainage channel traversing the property and conveyed westerly to Spring Creek.
11. A maintenance plan and agreement for any retention and/or detention basins and associated improvements will be required. Such plan and agreements shall be recorded in the Albany County Clerk's Office: A stormwater discharge channel currently exists on the property. However, retention, detention or other new stormwater management facilities are not proposed to be constructed on this property.
12. A groundwater risk assessment and mitigation plan to respond to any evidence of contamination or vulnerability which is the result of the development. Such plan shall not limit the liability of any person for impacts to the Casper Aquifer: The most likely proposed development at the subject property is landscaping and beautification work will likely use City municipal water facilities. Groundwater risks from these facilities are therefore low based on the information presented above, and a mitigation plan is not proposed for the subject property.
13. Demonstration of compliance with all applicable City Standards: If modifications to the existing pumphouse are needed or new landscaping is planned, professional design services will be provided by architects and engineers registered in Wyoming. The design and construction plans will follow City of Laramie standard details. Plans and designs are subject to the City review process prior to approval.

3.0 SITE-SPECIFIC INVESTIGATION CONCLUSIONS

Development of the property located east of the intersection of South Boulder Drive and East Grand Avenue is not expected to occur at this time. A City-owned pumphouse is located on the property near the southern property boundary. The pumphouse houses an emergency backup generator and fuel (gasoline) for its operation. Possible future development of the property including landscaping and beautification may have prohibited uses as provided in Section 15.08.040.A.6 (Prohibited Activities) of the Laramie UDC. Landscaping should be maintained under the requirements of the UDC. The Quarry Fault located in the southeastern portion of the site, the exposure of the Casper Formation on the eastern portion of the site, and the ephemeral drainage that transects the property represent vulnerable features for infiltration of contamination to the Casper Aquifer. As such, development of this property beyond the aforementioned landscaping and pumphouse maintenance should not be undertaken at this property.

4.0 REFERENCES

CAPP. 2008. Casper Aquifer Protection Plan. City of Laramie, Wyoming.

City of Laramie/Albany County. Environmental Advisory Committee. 2006. Laramie Regional Drinking Water Protection Plan. An Aquifer Protection Plan for the City of Laramie, WY.

Federal Emergency Management Agency. 1996. Flood Insurance Rate Map – City of Laramie, Wyoming. Wyoming: Community Panel Number 560002 0005 D.

Toboga, Karl G. 2006. Laramie Water Management Study, Level II. Wyoming: Wyoming Water Development Commission Report.

Ver Ploeg, Alan J. 2009a. Geologic map of the Laramie quadrangle, Albany County, Wyoming: Wyoming State Geological Survey Map Series 50 (MS-50). Map scale 1:24,000. 1 sheet.

Weston Engineering. 2012. Wyoming State Bank addition site specific geologic and hydrogeologic investigation report: Laramie, WY.

FIGURE



APPENDIX A

FIELD INSPECTION PHOTOGRAPHS

APPENDIX B

LARAMIE FLOOD MAP