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September 16, 2015

City of Laramie  
City Manager's Office  
P.O. Box C  
Laramie, Wyoming 82073

Attn.: Mr. Darren Parkin  
Water Resources Manager

Re: Site Specific Investigation  
Upland Heights Block 2 Lot 1  
Technical Review

Dear Mr. Parkin:

This letter serves to present the findings of our technical review of the site specific investigation prepared by Trihydro Corporation (Trihydro) for the City of Laramie for the City owned Upland Heights Block 2 Lot 1 parcel of land located within the Casper Aquifer Protection Area. Our review comments will be presented to address the adequacy of this site specific investigation in fulfilling the requirements of the City of Laramie's Unified Development Code, subsection 15.08.040.A.8.

***15.08.040.A.8(d)(i) A literature search to determine the presence of mapped faults, folds, fractures, and other evidence of conduit flow on the subject property.***

Trihydro's literature search to address the presence of mapped faults, folds, fractures, and other evidence of conduit flow on the site of the proposed subdivision is adequate although somewhat limited. Trihydro identified two mapped vulnerable features; the Quarry anticline and an unnamed intermittent drainage which transects much of the acreage in a north-south direction. Only the unnamed drainage is within the required vulnerable feature setback distance of 100 feet (City of Laramie Unified Development Code, subsection 15.08.040.A.7(b)). The mapped fold axis of the Quarry anticline is located over 100 feet south of the southern lot boundary of Upland Heights Block 2 Lot 1.

As mentioned, the literature search performed by Trihydro appears to be adequate to identify the mapped features in the project location, however, it is recommended that previous SSI reports in the study area be reviewed both for thoroughness and consistency. A review of previous SSI reports will benefit the City of Laramie in developing their overall understanding of the hydrogeologic conditions within the Casper Aquifer Protection Overlay Zone. If inconsistencies are found with other data reported in previous SSI reports, these inconsistencies should be identified with a justification for the discrepancy. Previous SSI reports that have been submitted to the City of Laramie that are within the general area of this SSI report include the following:

- Final Site-Specific Investigation Report, Laramie Ford Expansion, Revision No. 3, Prepared by Trihydro Corporation for Grothouse Construction, November 12, 2012.
- Technical Review of: SSI Report Laramie Ford Expansion, Grothouse Construction, Laramie, Wyoming. Revised June 7, 2011 by Trihydro Corporation. Technical review

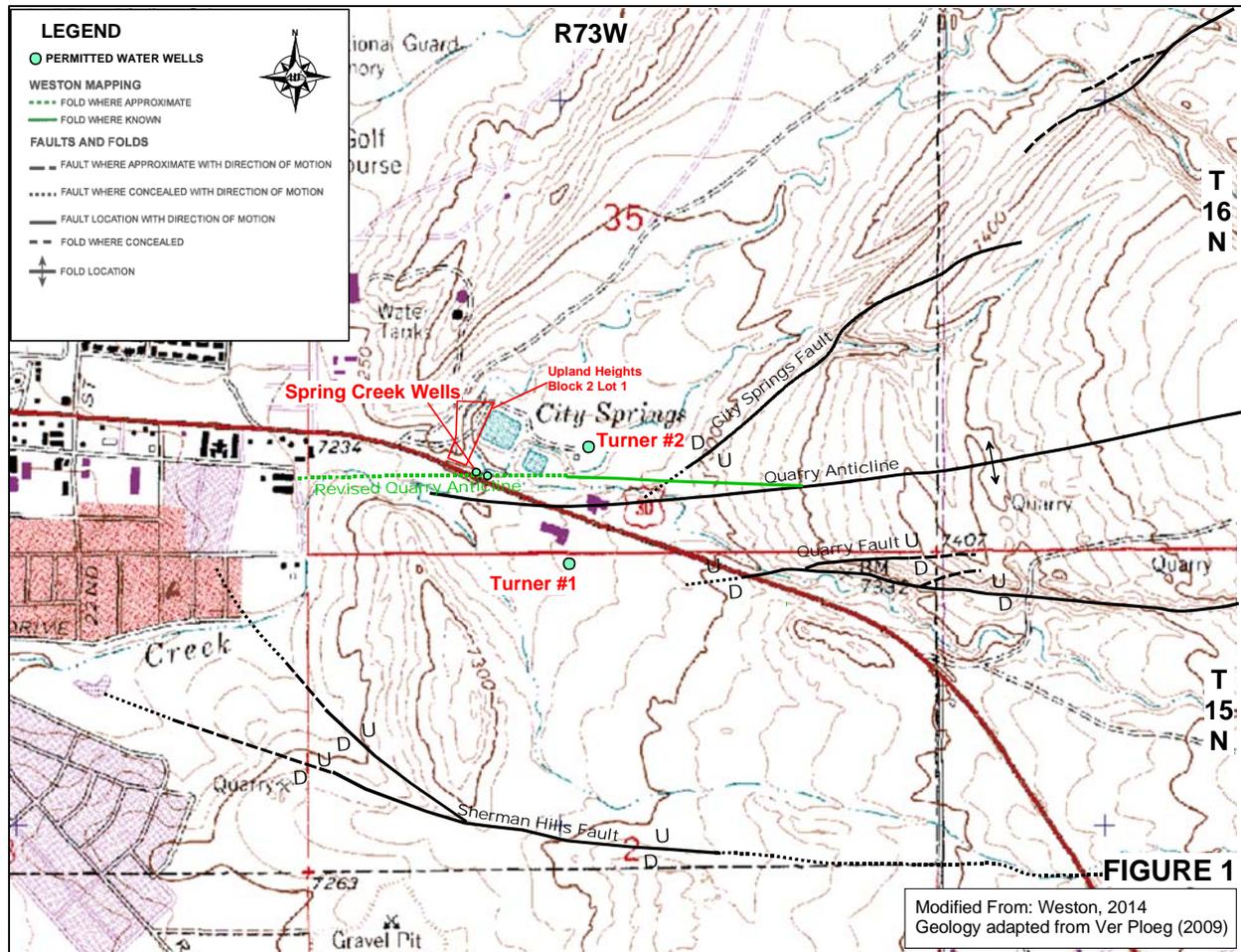
prepared and submitted by Wyoming Groundwater, LLC, June 10, 2011.

- Technical Review of: SSI Report Laramie Ford Expansion, Groathouse Construction, Laramie, Wyoming. Revised June 7, 2011 by Trihydro Corporation. Technical review prepared and submitted by Wyoming Groundwater, LLC, November 23, 2012.
- Addendum to Site-Specific Investigation for White's University Motors for Commercial Building Services Inc. Prepared by Trihydro Corporation, May 2, 2014.
- Technical Review of: Addendum to Site-Specific Investigation for White's University Motors for Commercial Building Services Inc. May 2, 2014, by Trihydro Corporation. Technical review prepared and submitted by Wyoming Groundwater, LLC, June 10, 2014.
- Site-Specific Geologic and Hydrogeologic Investigation Report Wyoming State Bank Addition. Prepared by Weston Engineering for Snowy Range Investments, LLC, March 2012.
- Technical Review of the Site-Specific Geologic and Hydrogeologic Investigation Report Wyoming State Bank Building Addition Provided by Weston Engineering to the City of Laramie. Technical review prepared and submitted by InterTech Environmental & Engineering, LLC, March 22, 2012.
- Site-Specific Investigation Report for City of Laramie, City Springs Chlorination Application Site Improvements. Prepared by WWC Engineering for the City of Laramie, June 10, 2010.
- Technical Review of: SSI Report for City Springs Chlorination Application Site Improvements. June 10, 2010, by WWC Engineering. Technical review prepared and submitted by Wyoming Groundwater, LLC, July 1, 2010.
- Site-Specific Geologic and Hydrogeologic Investigation Report, American National Bank Exterior Improvements Project. Prepared by Weston Engineering for Realty Management Group, September 15, 2014.

Some, or all of these documents may have been reviewed by Trihydro as part of their efforts in preparing the SSI report (several of these documents were generated by Trihydro), but it is unknown if they were reviewed since they were not listed in this section of the SSI report or in the reference section. If other documents were reviewed, they should be noted as such so that the City of Laramie and the SSI technical reviewer can judge the full depth of review that has taken place in the preparation of the SSI document.

One item that was researched and discussed in later sections of Trihydro's SSI, but not listed in this section of their report, were the State Engineer's Office completion records for the wells in the subject property area. A review of the statement of completion records for the two Wyoming State Highway Department wells (Spring Creek Well Nos. 1 and 2) located immediately to the south of the study site reveals that "fractured zones" were encountered at depths below approximately 20 feet. The reference to fracture zones in the nearby wells is evidence that

conduit flow could be present in the area of the Upland Heights Block 2 Lot 1 parcel. The locations of the Spring Creek wells are shown in the figure below.



**15.08.040.A.8(d)(ii) 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.**

As described in Trihydro's SSI report, development on the property consists of the Wister Drive Pump Station. Additionally, development on Lot 1 includes the abandoned Hi/Lo Pump Station (replaced by the Wister Drive Pump Station), numerous water lines associated with the Wister Drive Pump Station, a sewer service line and buried power lines associated with the electrical service to Wister Drive Pump Station. Wister Drive Pump Station has a diesel generator for a backup power supply. The Hi/Lo Pump Station did not have an alternative power supply source. Almost all of the development features are located west of the Casper Aquifer Protection Overlay Zone boundary.

A review of the WDEQ Solid and Hazardous Waste Division's website and EPA's Enviromapper databases shows that there have been no recorded contaminant releases and we concur that there is no evidence of any contaminant releases on the project site.

Our review of the Wyoming State Engineer's Office (SEO) E-Permit website indicates that there have been no wells permitted with the SEO in Sections 35 of Township 16 North, Range 73 West and Section 2 of Township 15 North, Range 73 West since Trihydro prepared the SSI. Therefore, based on the data presented in the SSI report and as discussed in the site investigation narrative, Trihydro has confirmed that there are no wells on the project site.

With the data presented, and from their narrative with respect to their contaminant release and well research, Trihydro has met the requirements of this section.

***15.08.040.A.8(d)(iii) 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, stormwater management, and a vicinity map. Where necessary, specific construction details shall be provided to assure adequacy to accepted design standards.***

The SSI prepared by Trihydro does not address this section. A preliminary site plan was not presented by Trihydro as they state "A preliminary site plan for development is not presented as there are no plans to develop this property any further at this time." The SSI report did present a surface geology map that has the Laramie USGS 7.5 Minute topographic map as a background (Figure 1). However, the scale of this map did not accurately reflect the topography (scale of map was too large to show adequate number of contours and the contour labeling). The SSI report also incorporates an aerial photograph as a background (Figure 2) which shows the existing land use in the area.

In general we agree with the concept presented in the SSI report that this section cannot be fully addressed at this time due to the status of the development plans for this parcel of land. However, we feel it would be beneficial to the City to include some of the requested information such as a topographic map, a discussion of the existing land use practices in the area and some general discussion with respect to development constraints or issues associated with this parcel of land due to its proximity to the vulnerable features identified in paragraph 15.08.040.A.8(d)(i).

***15.08.040.A.8(d)(iv) Identification of potential contaminants and amounts stored, generated or handled on the subject property.***

As identified in the SSI, the City of Laramie presently has no plans to develop the property with the possible exception of additional landscaping and beautification efforts. As such, the future landscaping/beautification work may include the following prohibited activities as listed by Table 15.08.040.A – Prohibited Activities:

1. Application of pesticides and herbicides which do not become non-hazardous within 48 hours of application or which are not applied according to the manufacturer's instructions.
2. Application of fertilizer at greater than the agronomic uptake rate of the vegetation fertilized.

All of these prohibited activities were addressed in the Trihydro SSI. Additionally, the SSI report identified the potential use of gasoline and/or diesel on the acreage, but qualified this by stating that these fuels would not be stored on site.

If the Wister Drive Pump Station were located within the Casper Aquifer Protection Overlay Zone, the backup power supply generator for the Wister Drive Pump Station would be a prohibited activity as defined by Table 15.08.040.A – Prohibited Activities (*Commercial and home occupation generation of electrical power by means of fossil fuels except generation by means of natural gas or propane.*) It should be noted, just for clarification, that the backup generator in the Wister Drive Pump Station is a diesel fueled 600 kW generator with a double wall, welded steel fuel storage tank with a usable capacity of 685 gallons, not a gasoline fueled system with a polyethylene storage tank as stated in the SSI report.

***15.08.040.A.8(d)(v) A field inspection shall be conducted to verify the presence or absence of vulnerable features as defined in subsection 15.08.040.A.7.a A summary of the field inspection shall include a written report, maps identifying the 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.***

As discussed under the 15.08.040.A.8(d)(i) section, two vulnerable features, Quarry anticline and an unnamed ephemeral drainage, were identified in the Upland Heights Block 2 Lot 1 area. However, only the unnamed drainage is located within the 100 foot setback distance. The SSI prepared by Trihydro presents a map (Figure 1) which identifies the location of only the Quarry anticline. The location of the other vulnerable feature, unnamed drainage, is discussed in the text of the SSI report but is not called out in this figure. The drainage is shown more clearly in Figure 2 of the SSI report, but is again not labeled. No evidence of fracturing was noted in the unnamed drainage and no spring flow is present. During the design and construction of the Wister Drive Pump Station, groundwater at the pump station site was encountered at a depth of 13 feet below ground level (approximate elevation of 7,242 feet).

The Trihydro SSI report accurately identifies the nearby wells as: 1) the City of Laramie Turner #2 well (U.W. 55508); 2) WYDOT's Spring Creek #1 well (U.W. 69160); and 3) WYDOT's Spring Creek #2 well (U.W. 69161). Only the location of the Turner #2 well is shown on Figure 1 even though the SSI report text indicates that all three of these wells have been shown on this figure. The Spring Creek wells are located just to the east of the Upland Heights Block 2 Lot 1 parcel on the east and west side of the Grand Avenue bridge that crosses Spring Creek (northeast and northwest abutments). The locations of these nearby wells have been shown in the figure on page 3 of this letter report.

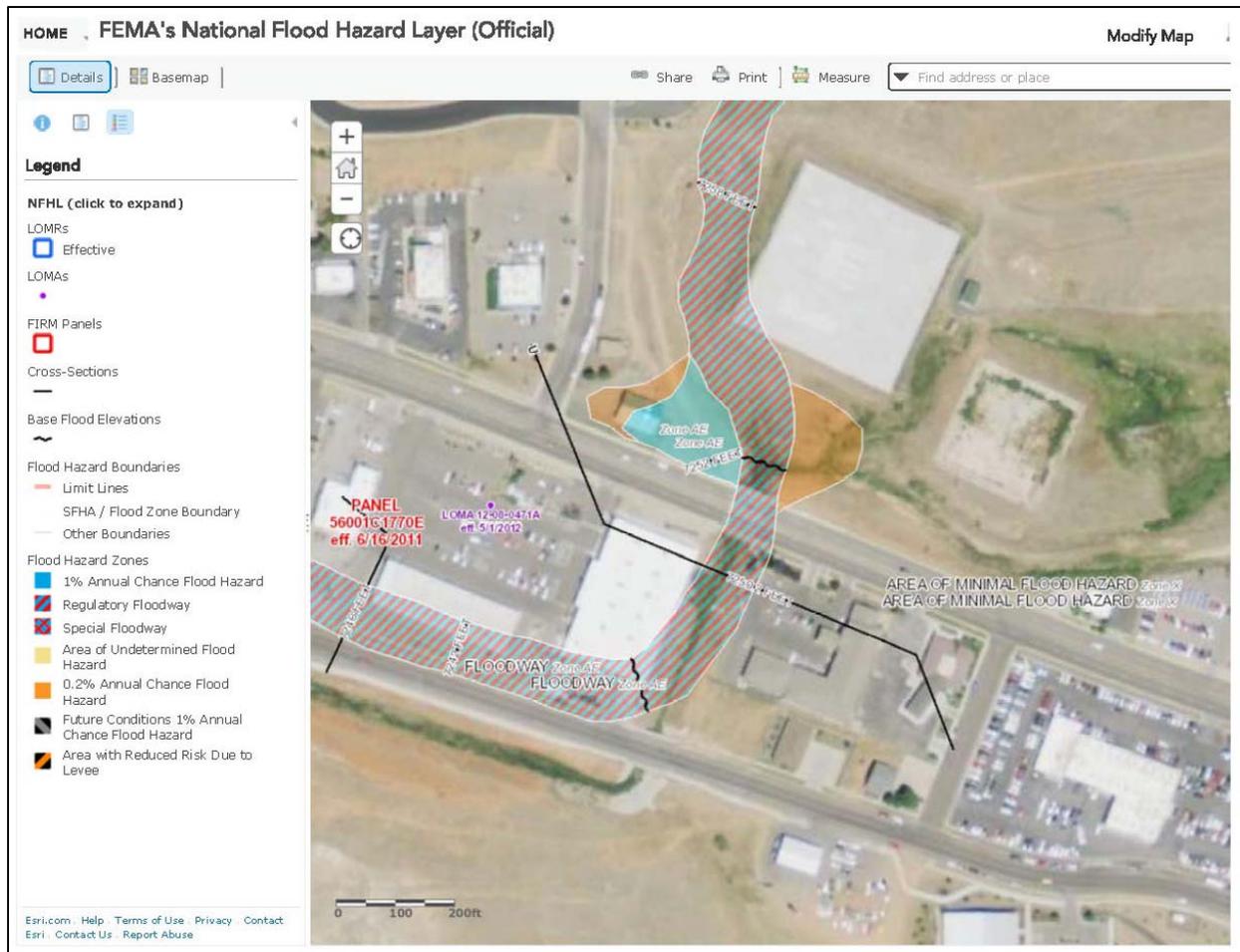
Onsite wastewater systems are not proposed for future development of the property. Therefore, a deep pit soil analysis for this SSI was not required and was not conducted.

**15.08.040.A.8(d)(vi) 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.**

The report maps and report narrative meet the requirements of this section. Labeling of the drainage on the figures is recommended.

**15.08.040.A.8(d)(vii) Where the 100-year flood plain mapping is unavailable, the professional geologist and/or engineer will calculate the 100-year flood plain 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.**

Wester-Wetstein reviewed Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM) Panel NO 56001C1770E for Albany County, Wyoming with an effective date of June 16, 2011 available online at the FEMA Map Service Center website. A review of this map confirms the findings of Trihydro's SSI. It should be noted that the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map as quoted in the SSI has been updated. The effective date of Panel NO 56001C1770E is June 16, 2011 and not October 16, 1996. The update of this panel, however, does not impact the findings in Trihydro's SSI report. For clarification to the map presented by Trihydro in Appendix B, it is recommended that a more detailed legend be provided. Below is a captured print from the FEMA website of the area shown by Trihydro in their Appendix B figure. The addition of the legend item "1% Annual Chance Flood Hazard" shown by the solid blue area would have made this figure a little less confusing to the reviewer.



**15.08.040.A.8(d)(viii) An evaluation of the water supply and sewage system that includes the potential effects or risks of the systems 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.**

The SSI prepared by Trihydro does not address this section as they state: “Future development at the property is unlikely to require a water supply or sewage system. Therefore, an evaluation of potential risks associated with these facilities is not needed.” If future development were to occur on this parcel that included water and wastewater services, they would be required to meet WDEQ standards and all other applicable building codes and therefore would pose a minimal risk to the Casper Aquifer.

**15.08.040.A.8(d)(ix) 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.**

Trihydro’s SSI satisfied this requirement. The potentiometric contours for the Casper Aquifer were superimposed upon the surface geologic map and were based upon data from the Laramie Water Management Study, Level II. The potentiometric contours indicate that groundwater in the Casper Aquifer beneath the Tract A property is moving in a westerly direction under a gradient of approximately 2 feet per 800 feet. The potentiometric data presented by Trihydro does not extend through the Lot 1 area. The potentiometric surface elevation of the Casper Aquifer on the very eastern edge of LaPrele Park is approximately 7,263 feet which correlates well with the potentiometric data presented by Trihydro in their SSI report. The potentiometric surface elevation of the Casper Aquifer through the Lot 1 area would be approximately 7,265 feet.

**15.08.040.A.8(d)(x) 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.**

Wester-Wetstein agrees with Trihydro’s evaluation that the risk of impacts to the Casper Aquifer from storm water runoff is, in all likelihood, minimal based on the anticipated lack of storm water runoff due to the perceived minimal exposure of man-made impermeable surfaces because of the limited development area available. The SSI and the technical review performed for the City Springs Chlorination Application Site concluded that discharge into Spring Creek (which is the receiving body of the unnamed drainage through Upland Heights Block 2 Lot 1) would not recharge into the Casper Aquifer, but would instead flow down Spring Creek and into the Laramie River.

**15.08.040.A.8(d)(xi) 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.**

As stated by Trihydro, a maintenance plan and agreement will probably not be needed since it is not anticipated that retention, detention or other stormwater management facilities will be constructed on this site. If, however, such systems are proposed for this acreage, the impact to the Casper Aquifer would be minimal because of the thickness of Satanka Shale over the

aquifer and the capability of Spring Creek in conveying the water away from the aquifer overlay zone and into the Laramie River.

**15.08.040.A.8(d)(xii) 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.**

Wester-Wetstein agrees with the conclusion provided by Trihydro that the risk of contamination to the Casper Aquifer from this present use of the Upland Heights Block 2 Lot 1 parcel is low. In addition, the potential risk to the aquifer from development of this acreage is also low. This concurrence was based upon the following:

1. Presently the current use of the lot (Wister Drive Pump Station) poses a minimal threat to the aquifer. The pump station is located outside of the Aquifer Protection Overlay Zone and the one activity that could present a slight risk to the aquifer is the refueling of the backup generator at the Wister Drive Pump Station. Again, because of the location of the pump station (down-gradient from Aquifer Protection Overlay Zone), the thickness of the Satanka cover over the aquifer (greater than 100 feet) and the controlled nature of the refueling activity, refueling of the generator poses a very minimal risk to the aquifer. The remainder of the lot is undeveloped and therefore none of the prohibited activities as identified in the City of Laramie's Unified Development Code, subsection 15.08.040.A. in Table 15.08.040.A Prohibited Activities are being conducted and the exposure to human activity is essentially non-existent.
2. The location of the FEMA designated flood hazard zones effectively limits the development of the eastern half of the lot. This reduces the potential acreage for development down to approximately 1¼ acres. Most of this acreage is located to the west of the Casper Aquifer Protection Overlay Zone boundary.
3. The development limitations stated in item 2 above, effectively limits the potential development of this acreage that is located within the Casper Aquifer Protection Overlay Zone to that identified in the SSI by Trihydro to landscaping and/or other beautification efforts. The risk to the Casper Aquifer will remain low as long as the necessary precautions are taken during the construction of any of these improvements and the proper type and application of fertilizer, herbicides and insecticides are adhered to.

**15.08.040.A.8(d)(xiii) Demonstration of compliance with all applicable city standards.**

The SSI has adequately addressed and identified the requirements as mandated by this section of the City of Laramie's Unified Development Code.

If you have any questions, please do not hesitate to call.

Respectfully submitted,  
**Wester-Wetstein & Associates, Inc.**



John Wetstein

